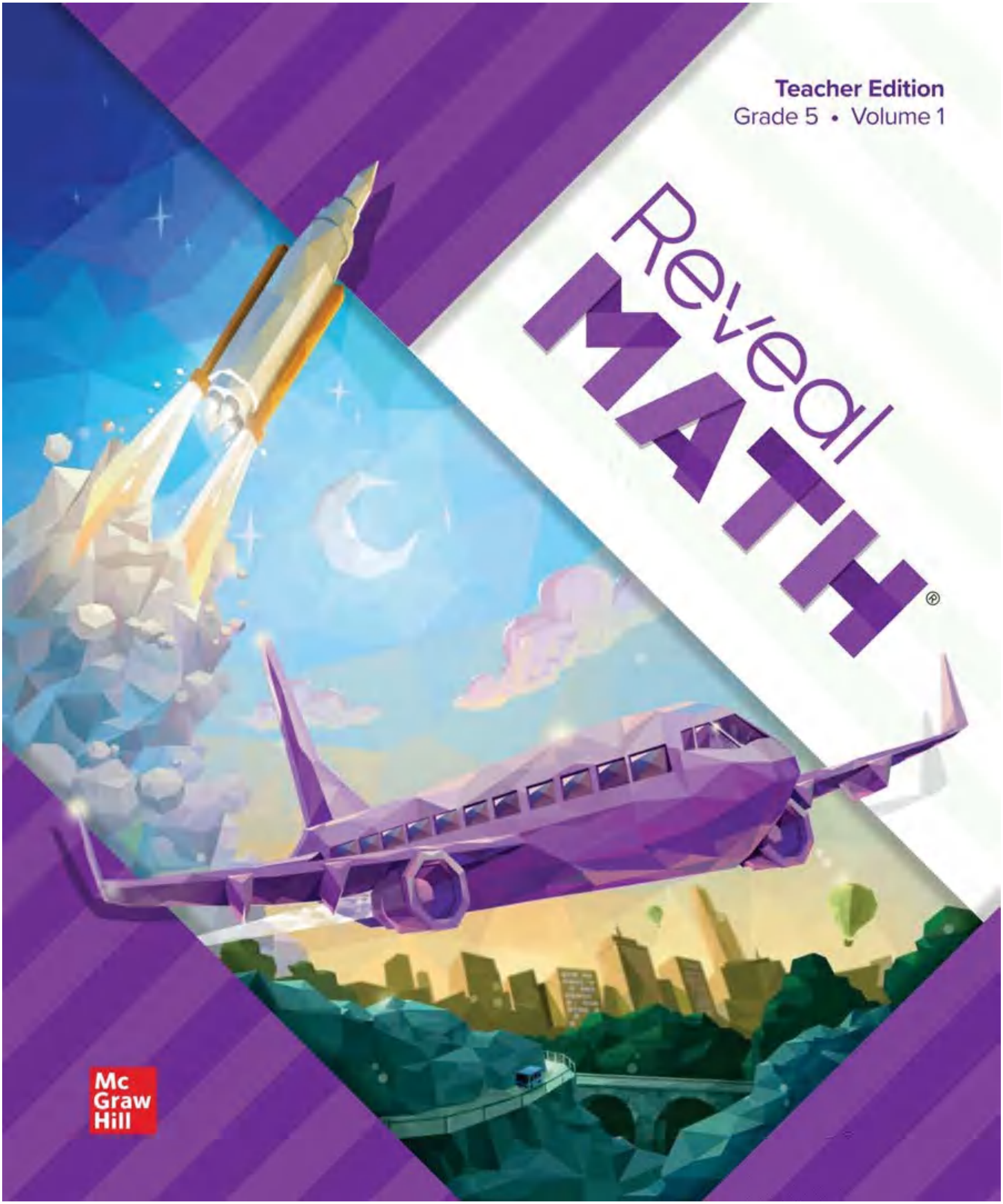
Teacher Edition

Grade 5 • Volume 1

Reveal MATH®



McGraw Hill

Teacher
Edition

Reveal MATH®

Grade 5 • Volume 1

Mc
Graw
Hill

Use the image on the back cover to spark student curiosity about slope. Here are some questions to help guide the conversation as students describe what they notice and wonder about this takeoff.

- What story could you tell about this image?
- What could you use to find out the angle of the plane's take-off?

Back cover: guvendemir/E+/Getty Images

mheducation.com/prek-12

Send all inquiries to:
McGraw Hill
8787 Orion Place
Columbus, OH 43240

ISBN: 978-0-07-683919-3
MHID: 0-07-683919-2

Printed in the United States of America.

2 3 4 5 6 7 8 9 LMN 24 23 22 21 20

Contents in Brief

VOLUME 1

VOLUME 2

Welcome to *Reveal Math*

We are excited to share with you the *Reveal Math* program.

In developing *Reveal Math,* we had a clear vision for elementary math instruction. It was important that the program we developed incorporated key findings from recent research on best practices in math instruction. It was also important that the program reflect an emphasis on building students' social and emotional competencies as well ensuring their academic growth.

We also thought extensively about your needs teaching math and your expectations for a high-quality math curriculum. It was important to us that the program provide flexibility in instructional and implementation options to meet the range of instructional settings and the range of learners.

We were purposeful about the organization of concepts and the scope and sequence to make sure students build deep conceptual understanding and develop proficiency with essential concepts and skills.

We are confident that *Reveal Math* incorporates all these goals.

- The lesson model offers two instructional options for each lesson: a guided exploration that is teacher-guided and an activity-based exploration that has students exploring concepts through small group activities and drawing generalizations and understanding from the activities.
- The lesson model incorporates an initial sense-making activity that builds students' proficiency with problem solving. By focusing systematically on sense-making, students develop and refine not just their observation and questioning skills, but the foundation for mathematical modeling.
- Both instructional options focus on fostering mathematical language and rich mathematical discourse by including probing questions and prompts.
- The Math is... unit builds student agency for mathematics. Students consider their strengths in mathematics, the thinking habits of proficient "doers of mathematics," and the classroom norms that are important to a productive learning environment.
- The scope and sequence reflects the learning progressions recommended by leading mathematicians and mathematics educators. It emphasizes developing deep understanding of the grade-level concepts and fluency with skills, while also providing rich opportunities to apply concepts to solve problems.

Thank you for using *Reveal Math*.
The *Reveal Math* author team

The *Reveal Math* Authorship

McGraw Hill's Learning Scientists teamed up with expert authors to create a program guided by validated academic research and classroom best practices.

Ralph Connelly, Ph.D.
Authority on the development of early mathematical understanding.

Annie Fetter
Advocate for student ideas and student thinking that foster strong problem solvers.

Linda Gojak, M.Ed.
Expert in both theory and practice of strong mathematics instruction.

Sharon Griffin, Ph.D.
Champion for number sense and the achievement of all students.

Susie Katt, M.Ed.
Advocate for the unique needs of our youngest mathematicians.

Ruth Harbin Miles, Ed.S.
Leader in developing teachers' math content and strategy knowledge.

Nicki Newton, Ed.D.
Expert in bringing student-focused strategies and workshops into the classroom.

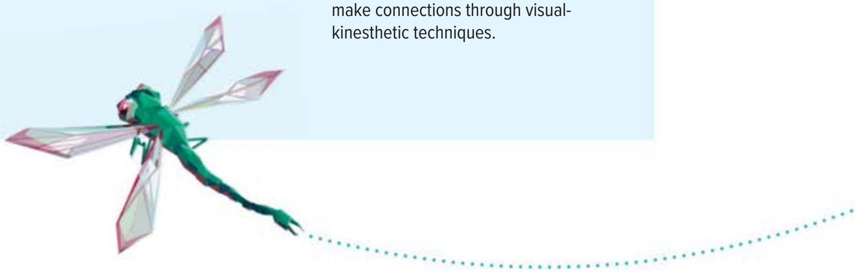
John SanGiovanni, M.Ed.
Leader in understanding the mathematics needs of students and teachers.

Raj Shah, Ph.D.
Champion of perseverant problem-solvers and student curiosity in mathematics.

Jeff Shih, Ph.D.
Advocate for the importance of student knowledge.

Cheryl Tobey, M.Ed.
Facilitator of strategies that drive informed instructional decisions.

Dinah Zike, M.Ed.
Creator of learning tools that make connections through visual-kinesthetic techniques.



Unit
1

Math Is...

Unit
2

Volume

Unit
3

Place Value and Number Relationships

Unit
4

Add and Subtract Decimals

Unit
5

Multiply Multi-Digit Whole Numbers

Unit
6

Multiply Decimals

Unit
7

Divide Whole Numbers

Unit
8

Divide Decimals

Unit
9

Add and Subtract Fractions

Unit
10

Multiply Fractions

Unit
11

Divide Fractions

Unit
12

Measurement and Data

Unit
13

Geometry

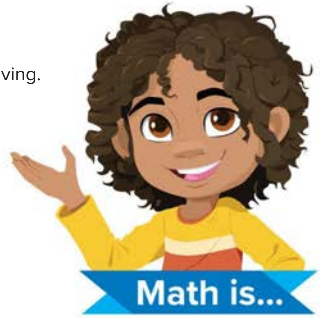
Unit
14

Algebraic Thinking

Math Is...Unit: Establish Classroom Norms for the Year

The first unit in every grade, the Math Is...Unit, aims to help students and teachers see math as problem solving strategies rather than just computation. Students define a productive and positive classroom environment where all students can:

- Share ideas and collaborate freely.
- Find success in math and become doers of mathematics.
- Apply the mathematical thinking and practices to problem solving.
- Take ownership of their personal learning journey.
- Become the creative problem solvers of tomorrow.



Lesson 1
Math Is... Mine

The first lesson aims to help all students see themselves as doers of mathematics, develop a growth mindset, and take ownership of their learning within the math classroom.

Students:

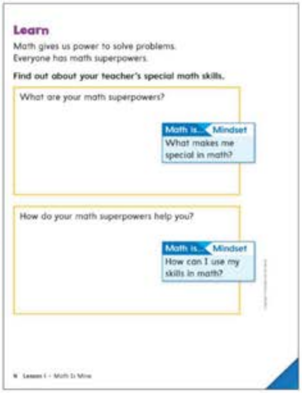
- Learn about the teacher's personal math story.
- Describe their math superpowers.
- Craft their personal math story.

Lesson 1-1

Math Is Mine

Be Curious

What do you notice?
What do you wonder?



Learn

Math gives us power to solve problems.
Everyone has math superpowers.

Find out about your teacher's special math skills.

What are your math superpowers?

Math is... Mindset
What makes me special in math?

How do your math superpowers help you?

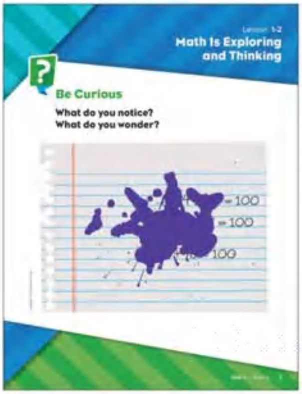
Math is... Mindset
How can I use my skills in math?

Lessons 2–5
Math Is... A Way of Thinking

The second through fifth lessons focus on thinking habits within the classroom. Each lesson seeks to unpack the thinking habits that are integral to problem solving.

Students:

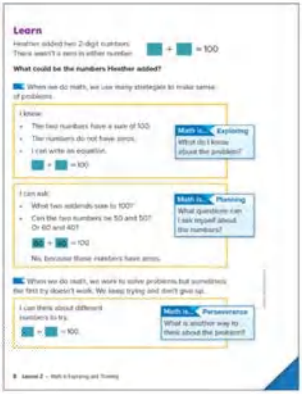
- Become mathematical thinkers.
- Apply the habits of mind of problems solving.
- Communicate effectively about math.



Math Is Exploring and Thinking

Be Curious

What do you notice?
What do you wonder?



Learn

Heather added two 2-digit numbers. There wasn't a zero in either number.

▢ + ▢ = 100

What could be the numbers Heather added?

When we do math, we use many strategies to make sense of problems.

I know:

- The two numbers have a sum of 100.
- The numbers do not have zeros.
- I can write an equation.

▢ + ▢ = 100

Math Is... Exploring
What do I know about the problem?

I can ask:

- What two addends sum to 100?
- Can the two numbers be 50 and 50? Or 60 and 40?

60 + 40 = 100

No, because those numbers have zeros.

Math Is... Planning
What questions can I ask myself about the numbers?

When we do math, we work to solve problems but sometimes the first try doesn't work. We keep trying and don't give up.

I can think about different numbers to try.

▢ + ▢ = 100

Math Is... Perseverance
What is another way to think about the problem?

Lesson 6
Math Is... Ours

The sixth lesson recalls the objective of the previous lessons as students learn what a positive and productive classroom environment looks like. Together, the class defines the classroom norms and expectations for the year.

Students:

- Demonstrate a voice and choice in their classroom environment.
- Understand the behaviors and mindsets of the math classroom.

Math Is Ours

Be Curious

What do you notice?
What do you wonder?

Learn

How do we do math?

When we do math, we work together.

We listen to our friends and teachers.

We think about others' ideas.

Math is... Mindset
What can I do to be a good listener?

When we do math, sometimes we work on our own.

We focus on our work.

We look for help when we feel stuck.

Math is... Mindset
What can I do to stay focused on my work?

Math is... Mindset

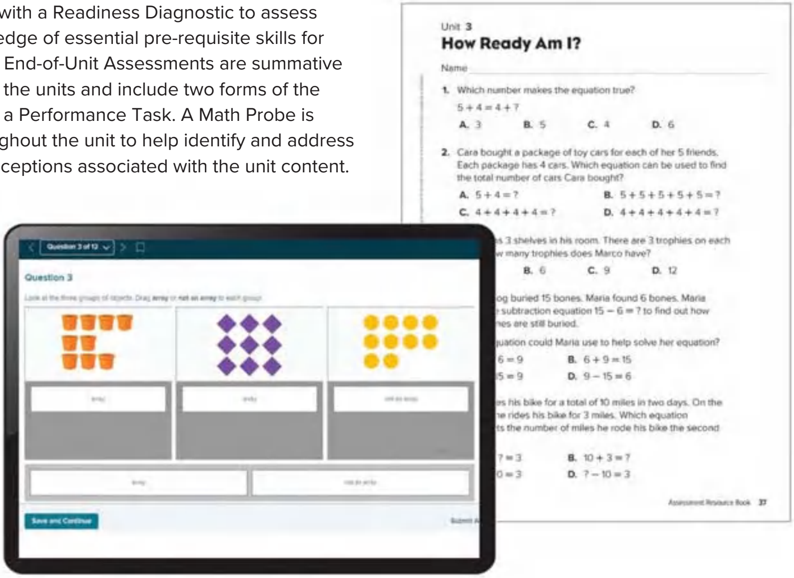
What can you do to work together with your classmates?

Math Is...Prompts

Math Is...prompts are embedded throughout the Student Edition to help students build proficiency with the thinking habits and classroom norms. These prompts help students to truly own their learning journey throughout the year.

Assessment

The unit begins with a Readiness Diagnostic to assess student's knowledge of essential pre-requisite skills for the unit content. End-of-Unit Assessments are summative assessments for the units and include two forms of the assessment and a Performance Task. A Math Probe is integrated throughout the unit to help identify and address common misconceptions associated with the unit content.



Unit 3

How Ready Am I?

Name

1. Which number makes the equation true?

$5 + 4 = 4 + ?$

A. 3 **B.** 5 **C.** 4 **D.** 6

2. Cara bought a package of toy cars for each of her 5 friends. Each package has 4 cars. Which equation can be used to find the total number of cars Cara bought?

A. $5 + 4 = ?$ **B.** $5 + 5 + 5 + 5 + 5 = ?$

C. $4 + 4 + 4 + 4 + 4 = ?$ **D.** $4 + 4 + 4 + 4 + 4 + 4 = ?$

s 3 shelves in his room. There are 3 trophies on each
w many trophies does Marco have?

B. 6 **C.** 9 **D.** 12

og buried 15 bones. Maria found 6 bones. Maria
subtraction equation $15 - 6 = ?$ to find out how
nes are still buried.

uation could Maria use to help solve her equation?

$6 = 9$ **B.** $6 + 9 = 15$

$5 = 9$ **D.** $9 - 15 = 6$

es his bike for a total of 10 miles in two days. On the
e rides his bike for 3 miles. Which equation
ts the number of miles he rode his bike the second

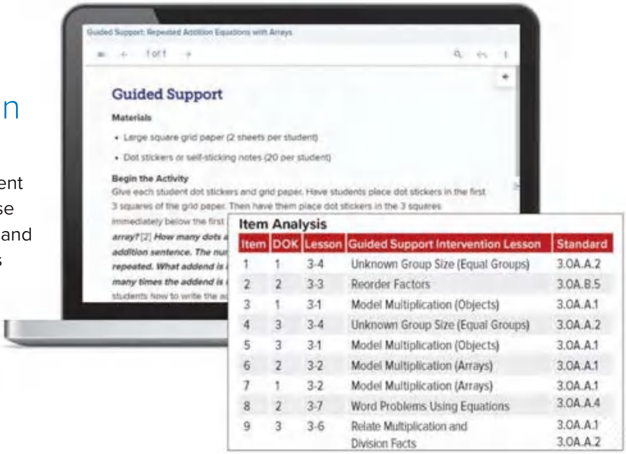
$? = 3$ **B.** $10 + 3 = ?$

$0 = 3$ **D.** $? - 10 = 3$

Assessment Resource Book 37

Targeted Intervention

Intervention resources align to the beginning- and end-of-unit assessment items and are available at point of use to quickly correct misunderstanding and target gaps with small group lessons and practice sheets.



Guided Support: Repeated Addition Equations with Arrays

Guided Support

Materials

- Large square grid paper (2 sheets per student)
- Dot stickers or self-sticking notes (20 per student)

Begin the Activity

Give each student dot stickers and grid paper. Have students place dot stickers in the first 3 squares of the grid paper. Then have them place dot stickers in the 3 squares immediately below the first

array? [2] ***How many dots a***
addition sentence. The nu
repeated. What addend is
many times the addend is
students how to write the ad

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	1	3-4	Unknown Group Size (Equal Groups)	3.OA.A.2
2	2	3-3	Reorder Factors	3.OA.B.5
3	1	3-1	Model Multiplication (Objects)	3.OA.A.1
4	3	3-4	Unknown Group Size (Equal Groups)	3.OA.A.2
5	3	3-1	Model Multiplication (Objects)	3.OA.A.1
6	2	3-2	Model Multiplication (Arrays)	3.OA.A.1
7	1	3-2	Model Multiplication (Arrays)	3.OA.A.1
8	2	3-7	Word Problems Using Equations	3.OA.A.4
9	3	3-6	Relate Multiplication and Division Facts	3.OA.A.1 3.OA.A.2

STEM-Focused Learning

Each unit highlights a STEM career and shows real-world applications of math to help students see math as a tool to explore the world around them.

Unit 3

Multiplication and Division

Focus Question

What does it mean to multiply and divide?

Hi, I'm Finn.

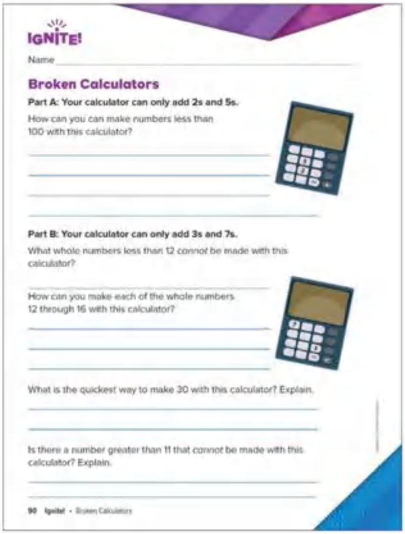
I want to be a construction manager. Let's say I run 3 different construction sites. I have 12 workers. It is important that I have an equal number of workers at each construction site. To help me do my job, I need to know how to multiply and divide.

The **STEM Career Kid video** introduces a STEM career and provides an overview of the job responsibilities.

The **Math in Action videos** apply the unit math content with the STEM career focus to bring the content into the real world.

Ignite!

Each unit opens with an Ignite! activity, an interesting problem or puzzle that sparks students' interest and curiosity. With a focus on the problem-solving journey, the activity provides only enough information to open up students' thinking and motivate them to persevere through challenges or setbacks along the problem-solving journey.



IGNITE!

Name ____________________

Broken Calculators

Part A: Your calculator can only add 2s and 5s.

How can you can make numbers less than 100 with this calculator?

Part B: Your calculator can only add 3s and 7s.

What whole numbers less than 12 cannot be made with this calculator?

How can you make each of the whole numbers 12 through 16 with this calculator?

What is the quickest way to make 30 with this calculator? Explain.

Is there a number greater than 11 that cannot be made with this calculator? Explain.

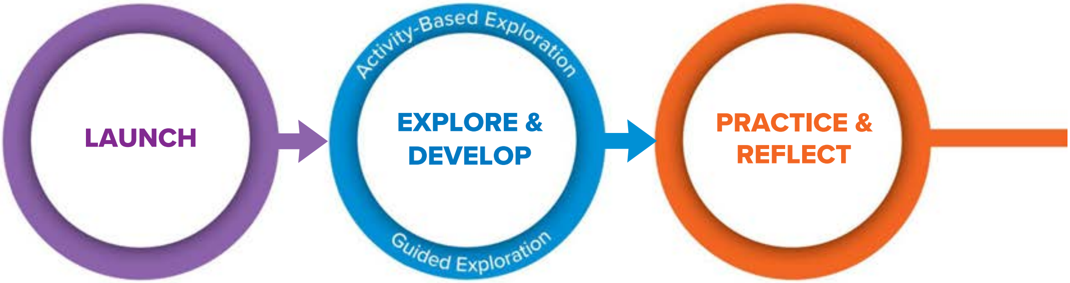
90 Ignite! • Broken Calculators

Andrejs Zemdega/Vetta/Getty Images

Explore Through a Flexible Lesson Design

The Lesson Model

Reveal Math's lesson model keeps sense-making and exploration at the heart of learning. Every lesson provides two instructional strategies to develop the math content and tailor the lesson to the needs and structure of the classroom.



Launch

Be Curious starts every lesson with the opportunity to be curious about math.

- Students focus on exploration and sense-making.
- Teachers foster students' thinking through meaningful discussion.

Explore & Develop

Explore and Develop unpacks the lesson content through either an activity-based or guided exploration.

- Students explore the lesson concepts and engage in meaningful discourse.
- Teachers implement effective teaching practices to make meaningful connections.

Practice and Reflect

On My Own offers opportunities for students to engage with the math and reflect on their learning.

- Students practice lesson concepts, completing the On My Own exercises.
- Teachers monitor progress and have students reflect on the lesson's learning targets.

Routines

Reveal Math integrates routines within each lesson to help students develop proficiency.

Build Fluency

Number Routines

Support the development of flexibility with numbers and fluency with operations at the start of every lesson.

MLR

Math Language Routines

Promote mathematical language use and development as part of math instruction.

Sense-Making Routines

Build sense-making as a foundation for problem solving and mathematical modeling.

Assess

The **Exit Ticket** includes a daily formative assessment to check for understanding.

- Students complete a short exit ticket and reflect on their learning.
- Teachers use data to inform their daily differentiation.

Differentiate

Daily **Differentiation** helps support every student in their path to understanding.

- Students work on differentiated tasks to reinforce their understanding, build their proficiency, and/or extend their thinking.
- Teachers pull small groups together as needed.

Lesson Model: Launch

Clear and Comprehensive Objectives

Learning Targets

Every lesson has two learning targets: one based on a skill and one on metacognition.

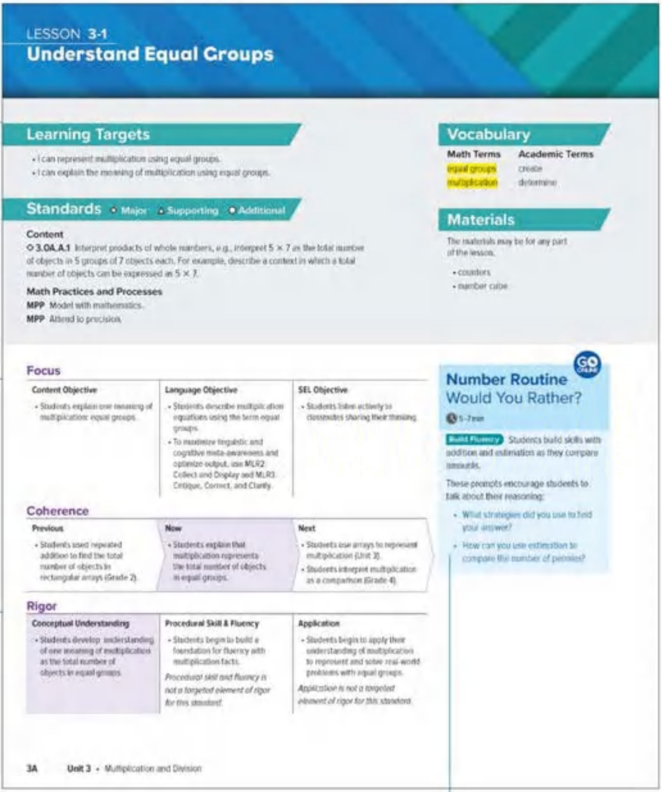
Objectives

Lessons have three objectives to support the whole child, including:

- Content objective
- Language objective
- Social and emotional learning objective

Rigor

Every lesson identifies the targeted element of rigor.



LESSON 3-1

Understand Equal Groups

Learning Targets

- I can represent multiplication using equal groups.
- I can explain the meaning of multiplication using equal groups.

Standards ○ Major △ Supporting ● Additional

Content

○ **3.OA.A.1** Interpret products of whole numbers, e.g., interpret 5 × 7 as the total number of objects in 5 groups of 7 objects each. For example, describe a context in which a total number of objects can be expressed as 5 × 7.

Math Practices and Processes

MPP Model with mathematics.

MPP Attend to precision.

Vocabulary

Math Terms	Academic Terms
equal groups	create
multiplication	determine

Materials

The materials may be for any part of the lesson.

- counters
- number cube

Focus

Content Objective	Language Objective	SEL Objective
• Students explain one meaning of multiplication: equal groups.	• Students describe multiplication equations using the term equal groups. • To maximize linguistic and cognitive meta-awareness and optimize output, use MLR2 Collect and Display and MLR3 Critique, Correct, and Clarify.	• Students listen actively to classmates sharing their thinking.

Coherence

Previous	Now	Next
• Students used repeated addition to find the total number of objects in rectangular arrays (Grade 2).	• Students explain that multiplication represents the total number of objects in equal groups.	• Students use arrays to represent multiplication (Unit 3). • Students interpret multiplication as a comparison (Grade 4).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students develop understanding of one meaning of multiplication as the total number of objects in equal groups.	• Students begin to build a foundation for fluency with multiplication facts. *Procedural skill and fluency is not a targeted element of rigor for this standard.*	• Students begin to apply their understanding of multiplication to represent and solve real-world problems with equal groups. *Application is not a targeted element of rigor for this standard.*

Number Routine
Would You Rather?

5–7 min

Build Fluency Students build skills with addition and estimation as they compare amounts.

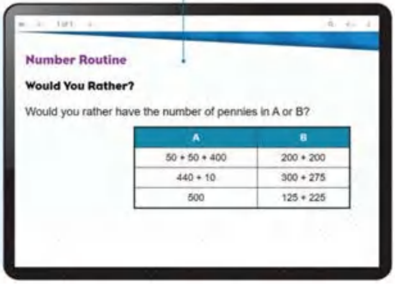
These prompts encourage students to talk about their reasoning:

- What strategies did you use to find your answer?
- How can you use estimation to compare the number of pennies?

3A Unit 3 • Multiplication and Division

Daily Focus on Number Sense and Fluency

The Number Routine provides a daily focus on developing fluency and efficiency of strategy. The Number Routine can be completed at any point in the day to build number sense.



Number Routine

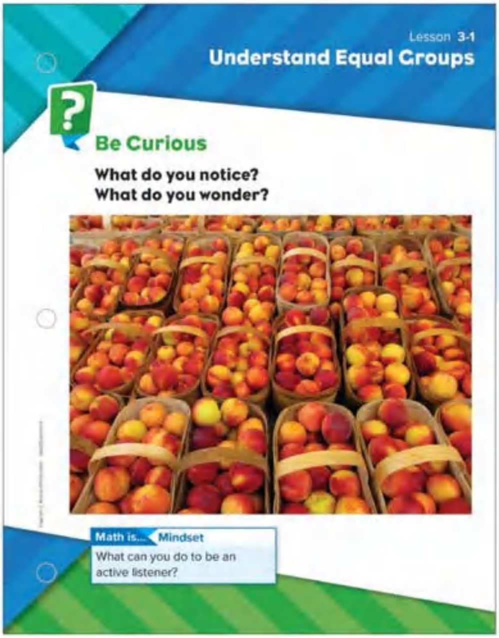
Would You Rather?

Would you rather have the number of pennies in A or B?

A	B
50 + 50 + 400	200 + 200
440 + 10	300 + 275
500	125 + 225

Derive Understanding by Sparking Curiosity

Sense-making routines launch every lesson, creating an equitable classroom culture where all ideas are welcome and respected. Student curiosity and ideas shared in *Be Curious* become the base for the day's lesson.



Lesson 3-1

Understand Equal Groups

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

What can you do to be an active listener?

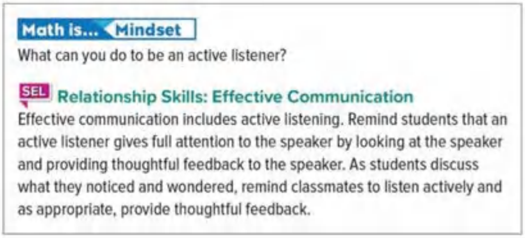
> *"All students have ideas about math that are valid and worth talking about."*
>
> **Annie Fetter**
> **Contributing Author**

Be Curious offers a high-ceiling/low-floor that allows every student to explore and discuss their ideas with multiple entry points and approaches to problem-solving.

Support the Whole Child With Social and Emotional Learning Integration

Every lesson integrates a social and emotional learning objective. These objectives are based on the CASEL Social and Emotional Learning competencies.

Math is... Mindset prompts with teacher supports keep social and emotional learning at the top of students' minds as they interact with classmates at key points during the lesson.



Math is... Mindset

What can you do to be an active listener?

SEL **Relationship Skills: Effective Communication**

Effective communication includes active listening. Remind students that an active listener gives full attention to the speaker by looking at the speaker and providing thoughtful feedback to the speaker. As students discuss what they noticed and wondered, remind classmates to listen actively and as appropriate, provide thoughtful feedback.

Two Approaches to Develop Understanding

For the lesson's main instruction, the teacher can choose between two instructional options: Guided Exploration or Activity-Based Exploration. Both options provide the same level of access to rigorous content. Integrated **Effective Teaching Practices** guide instruction and discourse, keeping the student at the center of the learning.

Comprehensive Supports for the Language of Math

EL

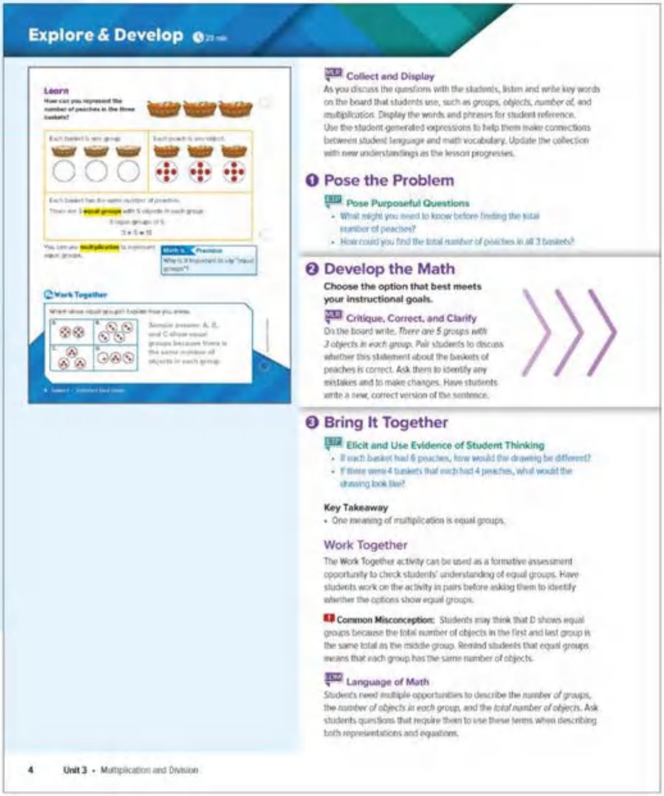
Built-in scaffolds for English Learners to interact with math language through speaking, listening, reading, and writing.

LOM

Language of Math supports how to talk about and think about math in context of the lesson content.

MLR

Math Language Routine promotes mathematical language use and development as part of math instruction.



Explore & Develop

Collect and Display

As you discuss the questions with the students, listen and write key words on the board that students use, such as groups, objects, *number of*, and multiplication. Display the words and phrases for student reference. Use the student-generated expressions to help them make connections between student language and math vocabulary. Update the collection with new understandings as the lesson progresses.

① Pose the Problem

Pose Purposeful Questions

- What might you need to know before finding the total number of peaches?
- How could you find the total number of peaches in all 3 baskets?

② Develop the Math

Choose the option that best meets your instructional goals.

Critique, Correct, and Clarify

On the board write, *There are 5 groups with 3 objects in each group.* Pair students to discuss whether this statement about the baskets of peaches is correct. Ask them to identify any mistakes and to make changes. Have students write a new, correct version of the sentence.

③ Bring It Together

Elicit and Use Evidence of Student Thinking

- If each basket had 6 peaches, how would the drawing be different?
- If there were 4 baskets that each had 4 peaches, what would the drawing look like?

Key Takeaway

- One meaning of multiplication is equal groups.

Work Together

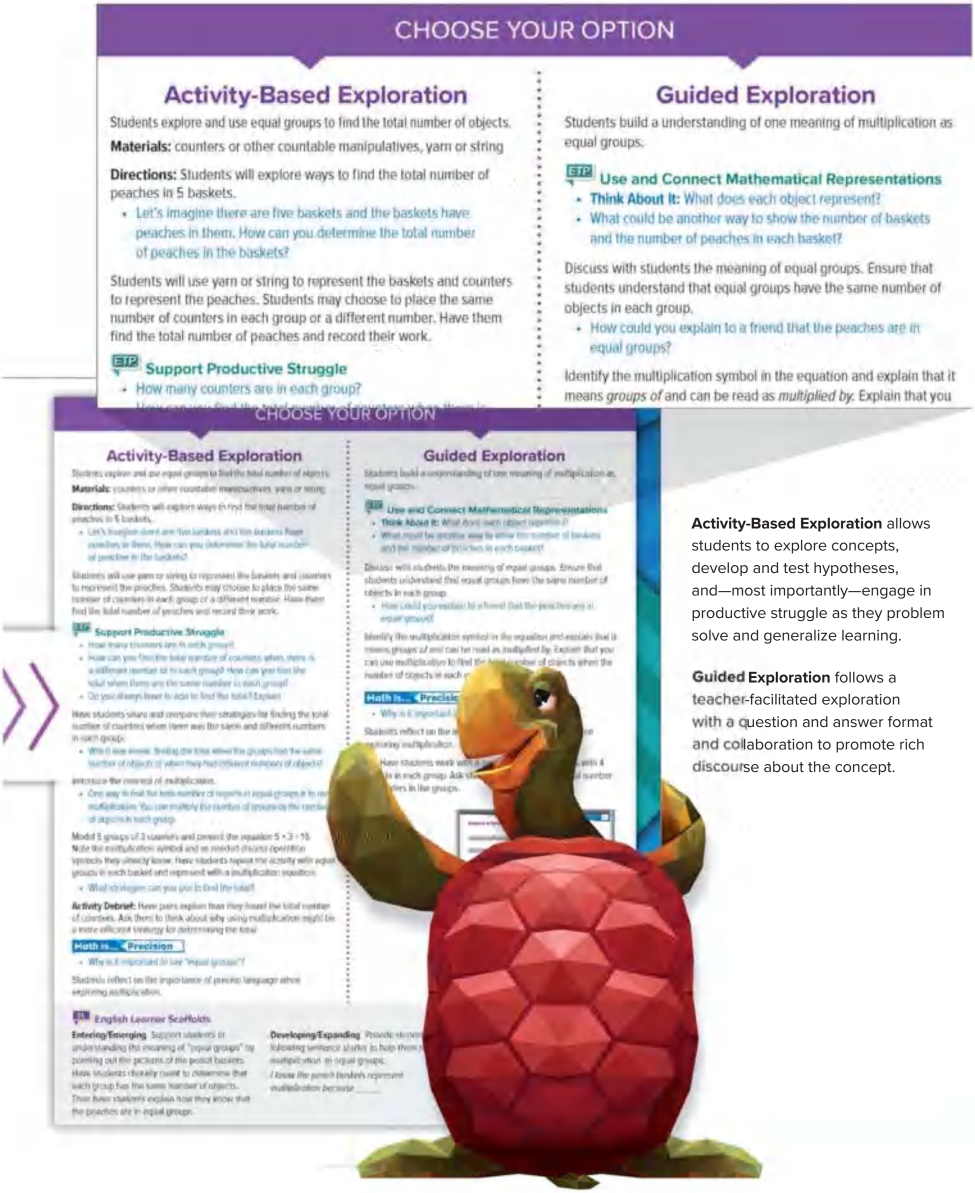
The Work Together activity can be used as a formative assessment opportunity to check students' understanding of equal groups. Have students work on the activity in pairs before asking them to identify whether the options show equal groups.

Common Misconception: Students may think that D shows equal groups because the total number of objects in the first and last group is the same total as the middle group. Remind students that equal groups means that each group has the same number of objects.

Language of Math

Students need multiple opportunities to describe the *number of groups*, the *number of objects in each group*, and the *total number of objects*. Ask students questions that require them to use these terms when describing both representations and equations.

4 Unit 3 • Multiplication and Division



CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore and use equal groups to find the total number of objects.

Materials: counters or other countable manipulatives, yarn or string

Directions: Students will explore ways to find the total number of peaches in 5 baskets.

- Let's imagine there are five baskets and the baskets have peaches in them. How can you determine the total number of peaches in the baskets?

Students will use yarn or string to represent the baskets and counters to represent the peaches. Students may choose to place the same number of counters in each group or a different number. Have them find the total number of peaches and record their work.

ETP Support Productive Struggle

- How many counters are in each group?

Guided Exploration

Students build a understanding of one meaning of multiplication as equal groups.

ETP Use and Connect Mathematical Representations

- **Think About It:** What does each object represent?
- What could be another way to show the number of baskets and the number of peaches in each basket?

Discuss with students the meaning of equal groups. Ensure that students understand that equal groups have the same number of objects in each group.

- How could you explain to a friend that the peaches are in equal groups?

Identify the multiplication symbol in the equation and explain that it means *groups of* and can be read as *multiplied by*. Explain that you

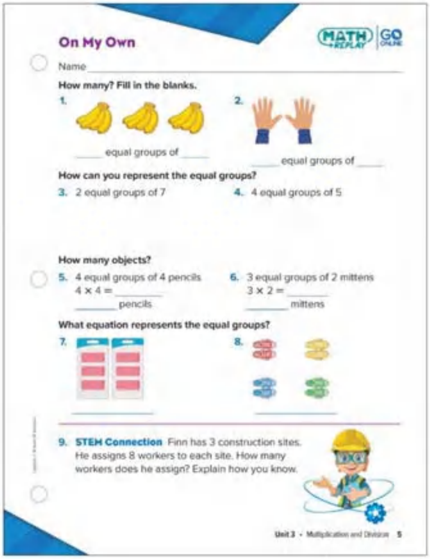
Activity-Based Exploration allows students to explore concepts, develop and test hypotheses, and—most importantly—engage in productive struggle as they problem solve and generalize learning.

Guided Exploration follows a teacher-facilitated exploration with a question and answer format and collaboration to promote rich discourse about the concept.

Engage in Concepts Independently and Further Understanding

Practice and Reflect provides students with practice with exercises that address all elements of rigor.

Math Replay videos contain a one- to two-minute explanation of the lesson concepts.



On My Own

MATH REPLAY | GO ONLINE

Name ____________________

How many? Fill in the blanks.

1. ____ equal groups of ____

2. ____ equal groups of ____

How can you represent the equal groups?

3. 2 equal groups of 7

4. 4 equal groups of 5

How many objects?

5. 4 equal groups of 4 pencils
4 × 4 = ________
________ pencils

6. 3 equal groups of 2 mittens
3 × 2 = ________
________ mittens

What equation represents the equal groups?

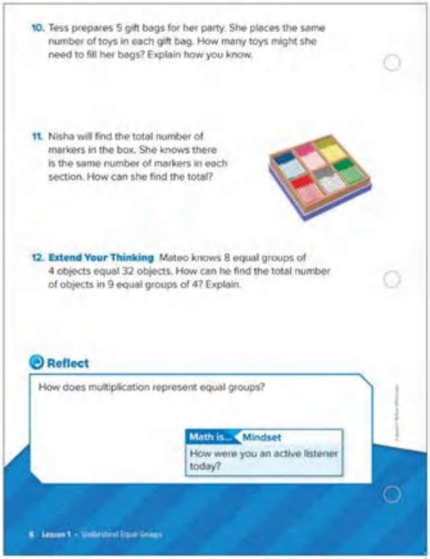
7. ________

8. ________

9. **STEM Connection** Finn has 3 construction sites. He assigns 8 workers to each site. How many workers does he assign? Explain how you know.

Unit 3 • Multiplication and Division 5

On My Own can be completed in the print or Interactive Student Edition. It is also available in Spanish print and downloadable PDF.



10. Tess prepares 5 gift bags for her party. She places the same number of toys in each gift bag. How many toys might she need to fill her bags? Explain how you know.

11. Nisha will find the total number of markers in the box. She knows there is the same number of markers in each section. How can she find the total?

12. **Extend Your Thinking** Mateo knows 8 equal groups of 4 objects equal 32 objects. How can he find the total number of objects in 9 equal groups of 4? Explain.

Reflect

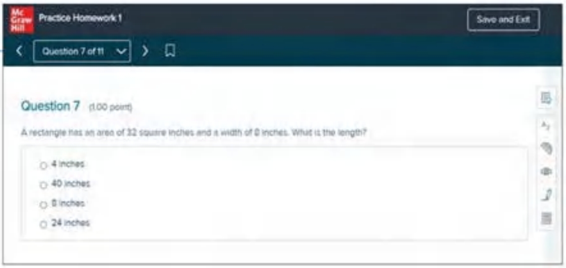
How does multiplication represent equal groups?

Math is... Mindset
How were you an active listener today?

6 Lesson 1 • Understand Equal Groups

Additional Practice

Additional practice exercises are available for every lesson. The exercises can be completed either in print or in the Digital Student Center.



Question 7 (1.00 point)

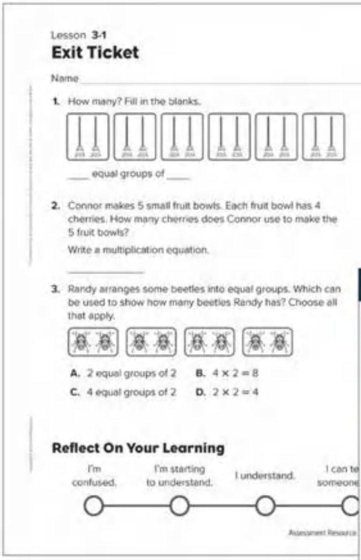
A rectangle has an area of 32 square inches and a width of 8 inches. What is the length?

○ 4 inches
○ 40 inches
○ 8 inches
○ 24 inches

Exit Ticket: Use Data to Inform Differentiation

Every lesson closes with an Exit Ticket. Differentiation recommendations reside in the Teacher Edition to make the Exit Ticket data actionable.

Exit Tickets can be completed in print or in the Digital Student Center.



Lesson 3-1

Exit Ticket

Name ____

1. How many? Fill in the blanks.

____ equal groups of ____

2. Connor makes 5 small fruit bowls. Each fruit bowl has 4 cherries. How many cherries does Connor use to make the 5 fruit bowls?

Write a multiplication equation.

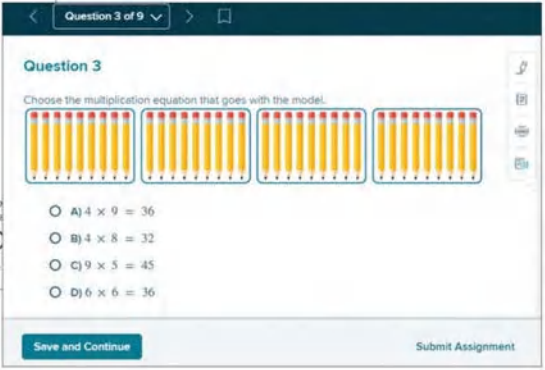
____

3. Randy arranges some beetles into equal groups. Which can be used to show how many beetles Randy has? Choose all that apply.

A. 2 equal groups of 2
B. 4 × 2 = 8
C. 4 equal groups of 2
D. 2 × 2 = 4

Reflect On Your Learning

I'm confused. — I'm starting to understand. — I understand. — I can te someone



Question 3

Choose the multiplication equation that goes with the model.

○ A) 4 × 9 = 36
○ B) 4 × 8 = 32
○ C) 9 × 5 = 45
○ D) 6 × 6 = 36

Reflect On Your Learning allows students to reflect on their learning daily and communicate their confidence level with the teacher.

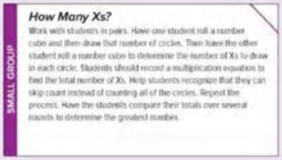
Create Purposeful Learning Moments Driven by Data

Differentiation within *Reveal Math* provides a variety of engaging, multi-modal activities in different delivery options that any student can access based on the area they need to focus on most for each lesson.

Workstations

Online Activities

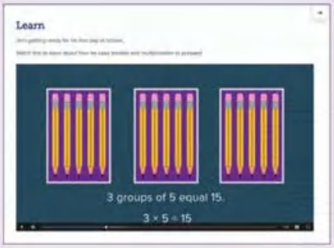
Reinforce Understanding


SMALL GROUP

How Many Xs?

Work with students in pairs. Have one student roll a number cube and then draw that number of circles. Then have the other student roll a number cube to determine the number of Xs to draw in each circle. Students should record a multiplication equation to find the total number of Xs. Help students recognize that they can skip count instead of counting all of the circles. Repeat the process. Have the students compare their totals over several rounds to determine the greatest number.

Small Group Instruction
Teacher-facilitated small group mini-lesson that uses concrete modeling and discussion to reteach and build conceptual understanding.


Learn

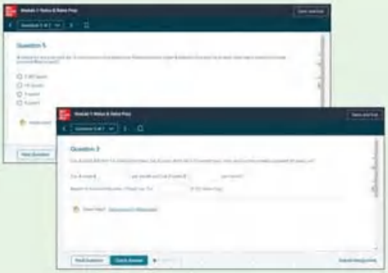
3 groups of 5 equal 15.

3 × 5 = 15

Build Proficiency

Digital Station
Digital Games encourage proficiency through a fun and engaging practice environment.

Game Station
A hands-on way to engage with the lesson content and collaborate with classmates.



Extend Thinking

Application Station
Opportunity to apply unit content to real-world problems and projects through one of three categories of application cards: STEM Projects, Cross-Curricular Connections, or Real World Problem-Solving Cards.


The tool provided has a box for holding cheese. There are blocks of cheese next to the box. Each block is made up of 1, 2, or 5 cubes of cheese.

Move blocks of cheese into the box to fill it. The blocks should not overlap.

Ok, so these seeds need dirt, sunlight, and water to grow. But how much?

Take Another Look
Assignable mini-lessons that provide actionable data to help inform instruction while supporting each student with a three-part, gradual-release activity, including:

- Model of the Concept
- Interactive Practice
- Quick Check

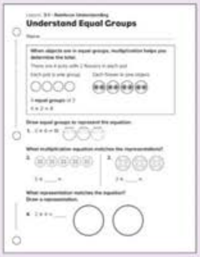
Spiral Review
Digital practice with mixed standards coverage for major clusters within each grade level to prepare students for end-of-year testing.

Interactive Additional Practice
Digital practice, complete with learning aids integrated into problems at point-of-use.

WebSketch Exploration
Highly visual and engaging interactive digital activities where students explore with a concept through an open-ended environment.

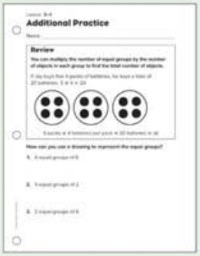
STEM Adventure
STEM Adventures are rich digital simulations that allow students to apply skills and concepts to solve real-world problems. Simulations deliver multiple outcomes as a result of the student's choices throughout the experience.

Independent Practice



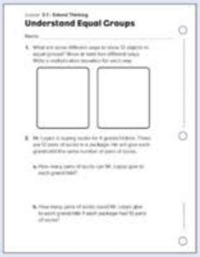
Understand Equal Groups

Reinforce Understanding Practice Sheet
Practice sheet focused on practicing and understanding the concepts within the lesson.



Additional Practice

Student Practice Book
Two additional practice pages for practice and/or homework.



Understand Equal Groups

Extend Thinking Practice Sheet
Practice sheet focused on application.

Student Resources

Print Resources

Digital Center

Two-Volume Student Edition
Available in print and interactive formats, the Student Editions are consumable and perforated for ease of use. Helpful Math Is...prompts remind students of how to actively apply the mathematical practices.

- Interactive Student Edition
- Math Replay Videos
- eToolkit
- eGlossary
- STEM Career Kid Video Library
- Math In Action Video Library

Student Practice Book
The Student Practice Book provides two pages of additional practice for each lesson.

- Interactive Digital Practice
- Interactive Spiral Review
- Digital Games Library

On My Own

Complete exercises 1 through 9.

1. Fill in the blanks.

How many?

3 equal groups of 4

Student Spanish Materials

Student Edition

Student Practice Book

- Student eBook
- Math Replay Videos
- eGlossary
- Family Letter

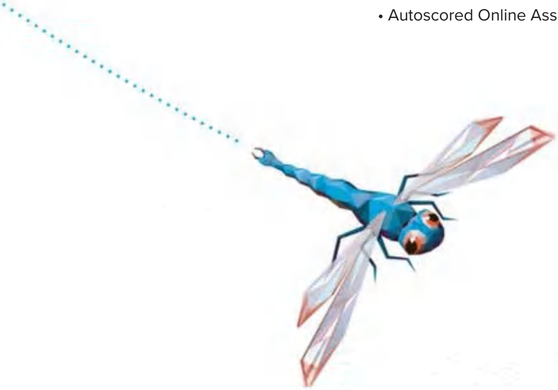
Teacher Spanish Materials

Assessment Resource Book

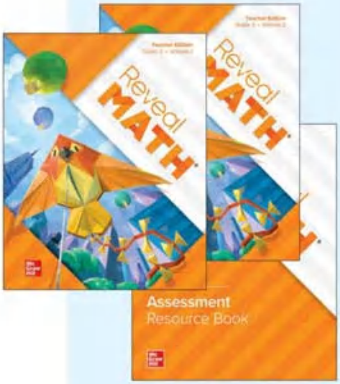
Application Station Cards

Game Station Resource Book

- Differentiation Resource Book
- Assessment Resource Book
- Application Station Card
- Game Station Resource Book
- Autoscored Online Assessments



Print Resources	Digital Center
Implementation Guide The Implementation Guide supports implementation with a user guide, professional development resources, and overarching program information, such as lesson components, correlations, and more.	• Expert Insight Videos • Program Quick Start • Classroom Videos • Workshop Modules • Point of Use Videos
Two-Volume Teacher Edition Available in print and ebook formats, the Teacher Editions provide comprehensive supports, such as Effective Teaching Practices, embedded within the instruction.	• Teacher Edition eBook • Lesson Presentations • Planning and Classroom Management Tools • Unit and Lesson Downloadable Files
Assessment Resource Book The Assessment Resource Book contains the masters for the following assessments: • Course Diagnostic • Unit Readiness Diagnostics • Exit Tickets • Unit Assessments • Benchmark Assessments • Math Probes • Performance Tasks • Summative Assessment	• Assessment PDFs • Autoscored Online Assessments – Course Diagnostic – Unit Readiness Diagnostics – Exit Tickets – Unit Assessments – Performance Tasks – Benchmark Assessments – Summative Assessment • Targeted Intervention – Guided Support – Skills Support Sheets
Differentiation Resource Book The Differentiation Resource Book provides access to the Reinforce Understanding and Extend Thinking worksheets. **Workstation Kit** The Workstation Kit supports daily differentiation and includes: • Game Station Resource Book • Workstation Teacher Guide • Application Station Cards • Manipulatives	• Digital Games • STEM Adventures • WebSketch Explorations • Take Another Look Lessons • Interactive Digital Practice • Interactive Spiral Review • Student Practice Book PDFs • Spiral Review PDFs • Reteach and Extend PDFs • Application Station Card PDFs • Games Station PDFs
Manipulative Kits Manipulative Kits are available and contain the manipulatives used within the lessons.	eToolkit to include: Counters; Base-Ten Blocks; Array Builder; Fraction Model; Bucket Balance; Geometry Sketch; Money; Fact Triangles; Number Line; and more!



Getting Started Support: Program Resources

Review the Implementation Guide

The Implementation Guide provides a wide range of information to help familiarize teachers with *Reveal Math*, including:

Program Design

- Product Structure and Components
- Standards
- Focus, Coherence, and Rigor
- Mathematical Practices and Processes

Major Themes

- Fluency
- Practice
- Social and Emotional Learning
- Student Agency
- Language Supports
- Routines

Implementation Support

- Unit and Lesson Walkthrough
- Digital Implementation Support

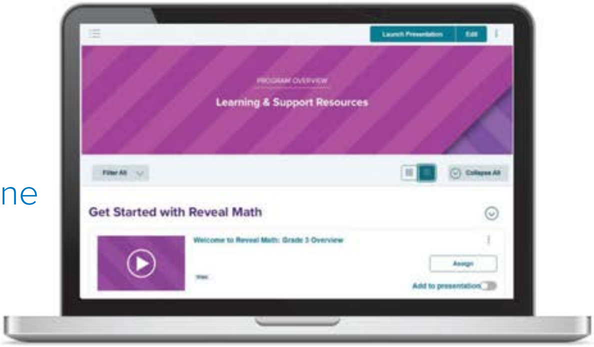
Content Overview

- Key Objectives
- Standards Correlations
- Scope and Sequence
- Social and Emotional Learning Correlations
- STEM Careers Overview

Find Professional Learning Resources Online

Professional Learning resources are provided for the teacher to reference 24/7. Resources include:

- Workshop modules to unpack key instructional moments in the classroom.
- Classroom videos that demonstrate a productive and positive classroom environment.
- Expert videos that support effective teaching practices and the content within each unit.



PROGRAM OVERVIEW

Learning & Support Resources

Get Started with Reveal Math

Welcome to Reveal Math: Grade 3 Overview

Prepare for a Unit

Every unit provides relevant and efficient information to help inform effective unit instruction and content. Within the Teacher Edition, the Unit Overview includes the following overview support for the unit:

- Focus, Coherence, and Rigor
- Routines
- Effective Teaching Practices
- Math Practice and Process
- Social and Emotional Learning
- Language Support

Unit Overview

Focus

Multiplication and Division

Coherence

What Students Have Learned

What Students Are Learning

What Students Will Learn

Rigor

Conceptual Understanding

Procedural Skill and Fluency

Application

Effective Teaching Practices

Implement Tasks That Promote Problem Solving and Reasoning

Math Practices and Processes

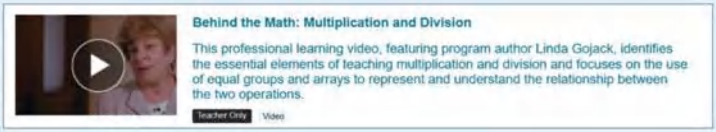
Look For and Make Use of Structure

Social and Emotional Learning

What Skills Will We Develop?

Embedded Expert Insight Videos

Experts provide practical information about the math within each unit, tips of effecting teaching, and what to look and listen for during instruction.



Behind the Math: Multiplication and Division

This professional learning video, featuring program author Linda Gojack, identifies the essential elements of teaching multiplication and division and focuses on the use of equal groups and arrays to represent and understand the relationship between the two operations.

Teacher Only Video

Course Diagnostic

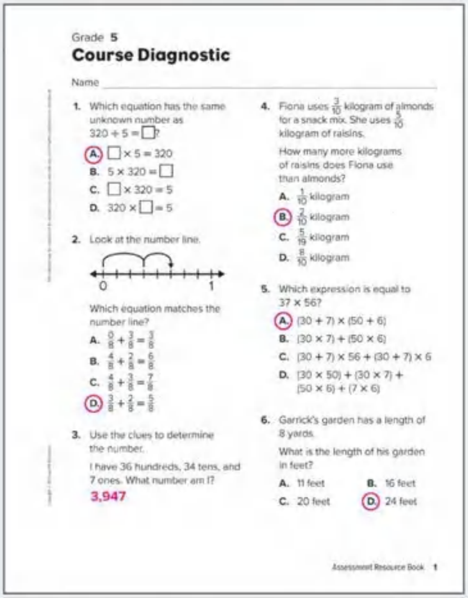
The Course Diagnostic is available in both print and digital.

Data When students complete the Course Diagnostic in the Digital Student Center, their responses are auto-scored.

If students need support based on the Course Diagnostic, use the Unit Level Readiness Diagnostic Intervention Lessons.

Item Analysis

Item	DOK	Skill	Unit	Standard
1	1	Relate multiplication and division	7	4.NBT.B.6
2	2	Add fractions with like denominators	9	4.NF.B.3
3	2	Write whole numbers in standard form	3	4.NBT.A.2
4	2	Subtract fractions to solve word problems	9	4.NF.B.3.d
5	2	Use place value and properties of operations to multiply multi-digit numbers	5	4.NBT.B.5
6	2	Convert standard units of length	12	4.MD.A.1
7	2	Use division to solve multi-step word problems	7	4.OA.A.3
8	2	Add fractions with like denominators	9	4.NF.B.3
9	2	Solve area word problems	2	4.MD.A.3
10	2	Estimate quotients	7	4.NBT.B.6
11	1	Multiply a unit fraction by a whole number	10	4.NF.B.4
12	2	Compare fractions	9	4.NF.A.2
13	2	Round numbers	3	4.NBT.A.3
14	2	Compare decimals	3	4.NF.C.7
15	2	Identify shapes by attributes	13	4.G.A.2
16	2	Convert units of time	12	4.MD.A.2
17	1	Add mixed numbers	9	4.NF.B.3.c
18	2	Multiply by fractions to solve word problems	10	4.NF.B.4.c
19	2	Compare decimals	3	4.NF.C.7
20	2	Calculate area	2	4.MD.A.3
21	2	Multiply by fractions to solve word problems	10	4.NF.B.4.c
22	2	Add mixed numbers	9	4.NF.B.3.c
23	3	Use data on a line plot to solve word problems	12	4.MD.B.4, 4.NF.B.3.c
24	2	Multiply 2-digit numbers to solve word problems	5	4.NBT.B.5
25	2	Subtract fractions	9	4.NF.B.3.a
26	2	Represent comparison word problems with multiplication equations	5	4.OA.A.2
27	2	Interpret the remainder in division word problems	7	4.OA.A.3
28	1	Write a fraction as a decimal	3	4.NF.C.6
29	3	Use data on a line plot to solve word problems	12	4.MD.B.4, 4.NF.B.4
30	2	Identify equivalent fractions	9	4.NF.A.1
31	1	Understand multiplication as scaling	10	4.NBT.A.1
32	2	Use division to solve word problems	7	4.NBT.B.6
33	2	Multiply 2-digit numbers	5	4.NBT.B.5
34	1	Add tenths and hundredths	4	4.NF.C.5
35	3	Use models to write division expressions	7	4.NBT.B.6



Grade 5

Course Diagnostic

Name ____________________

1. Which equation has the same unknown number as $320 \div 5 = \square$?

[✓ A.] $\square \times 5 = 320$
B. $5 \times 320 = \square$
C. $\square \times 320 = 5$
D. $320 \times \square = 5$

2. Look at the number line.

Which equation matches the number line?

A. $\frac{0}{8} + \frac{3}{8} = \frac{3}{8}$
B. $\frac{4}{8} + \frac{2}{8} = \frac{6}{8}$
C. $\frac{4}{8} + \frac{3}{8} = \frac{7}{8}$
[✓ D.] $\frac{3}{8} + \frac{2}{8} = \frac{5}{8}$

3. Use the clues to determine the number.

I have 36 hundreds, 34 tens, and 7 ones. What number am I?

3,947

4. Fiona uses $\frac{3}{10}$ kilogram of almonds for a snack mix. She uses $\frac{5}{10}$ kilogram of raisins.

How many more kilograms of raisins does Fiona use than almonds?

A. $\frac{1}{10}$ kilogram
[✓ B.] $\frac{2}{10}$ kilogram
C. $\frac{5}{19}$ kilogram
D. $\frac{8}{10}$ kilogram

5. Which expression is equal to 37×56?

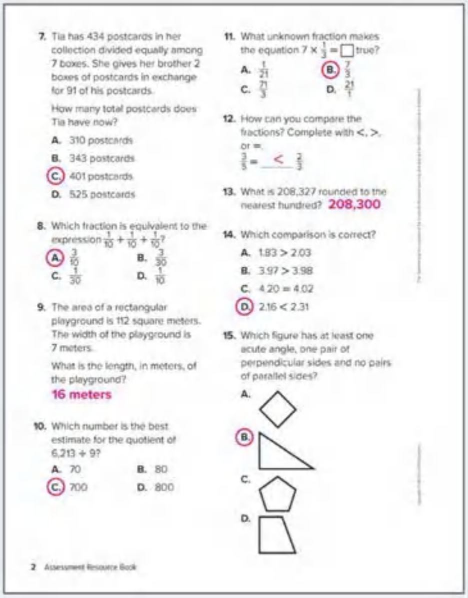
[✓ A.] $(30 + 7) \times (50 + 6)$
B. $(30 \times 7) + (50 \times 6)$
C. $(30 + 7) \times 56 + (30 + 7) \times 6$
D. $(30 \times 50) + (30 \times 7) + (50 \times 6) + (7 \times 6)$

6. Garrick's garden has a length of 8 yards.

What is the length of his garden in feet?

A. 11 feet
B. 16 feet
C. 20 feet
[✓ D.] 24 feet

Assessment Resource Book 1



7. Tia has 434 postcards in her collection divided equally among 7 boxes. She gives her brother 2 boxes of postcards in exchange for 91 of his postcards.

How many total postcards does Tia have now?

A. 310 postcards
B. 343 postcards
[✓ C.] 401 postcards
D. 525 postcards

8. Which fraction is equivalent to the expression $\frac{1}{10} + \frac{1}{10} + \frac{1}{10}$?

[✓ A.] $\frac{3}{10}$
B. $\frac{3}{30}$
C. $\frac{1}{30}$
D. $\frac{1}{10}$

9. The area of a rectangular playground is 112 square meters. The width of the playground is 7 meters.

What is the length, in meters, of the playground?

16 meters

10. Which number is the best estimate for the quotient of $6{,}213 \div 9$?

A. 70
B. 80
[✓ C.] 700
D. 800

11. What unknown fraction makes the equation $7 \times \frac{1}{3} = \square$ true?

A. $\frac{1}{21}$
[✓ B.] $\frac{7}{3}$
C. $\frac{71}{3}$
D. $\frac{21}{1}$

12. How can you compare the fractions? Complete with <, >, or =.

$\frac{3}{5}$ = <u> < </u> $\frac{2}{3}$

13. What is 208,327 rounded to the nearest hundred? 208,300

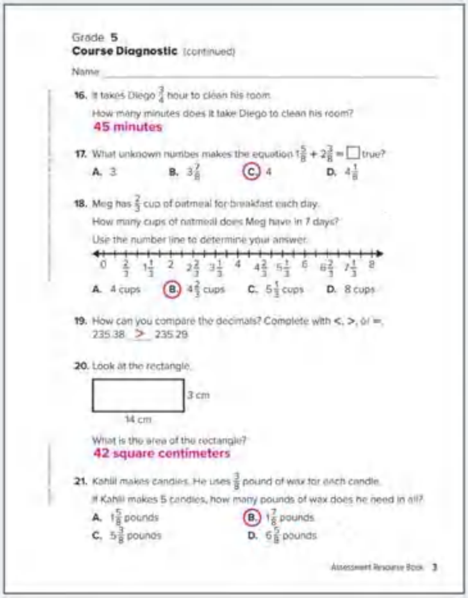
14. Which comparison is correct?

A. $1.83 > 2.03$
B. $3.97 > 3.98$
C. $4.20 = 4.02$
[✓ D.] $2.16 < 2.31$

15. Which figure has at least one acute angle, one pair of perpendicular sides and no pairs of parallel sides?

A.
[✓ B.]
C.
D.

2 Assessment Resource Book



Grade 5

Course Diagnostic (continued)

Name ______________________

16. It takes Diego $\frac{3}{4}$ hour to clean his room.

How many minutes does it take Diego to clean his room?

45 minutes

17. What unknown number makes the equation $1\frac{5}{8} + 2\frac{3}{8} = \square$ true?

A. 3 B. $3\frac{7}{8}$ [✓ C. 4] D. $4\frac{1}{8}$

18. Meg has $\frac{2}{3}$ cup of oatmeal for breakfast each day.

How many cups of oatmeal does Meg have in 7 days?

Use the number line to determine your answer.

A. 4 cups [✓ B. $4\frac{2}{3}$ cups] C. $5\frac{1}{3}$ cups D. 8 cups

19. How can you compare the decimals? Complete with <, >, or =.

235.38 __>__ 235.29

20. Look at the rectangle.

What is the area of the rectangle?

42 square centimeters

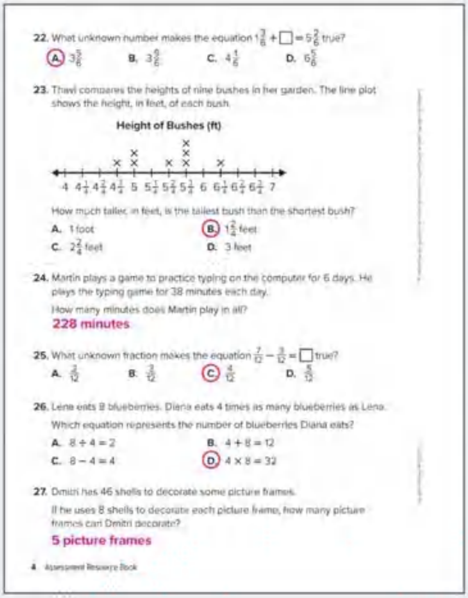
21. Kahlil makes candles. He uses $\frac{3}{8}$ pound of wax for each candle.

If Kahlil makes 5 candles, how many pounds of wax does he need in all?

A. $1\frac{5}{8}$ pounds [✓ B. $1\frac{7}{8}$ pounds]

C. $5\frac{3}{8}$ pounds D. $6\frac{5}{8}$ pounds

Assessment Resource Book 3



22. What unknown number makes the equation $1\frac{3}{6} + \square = 5\frac{2}{6}$ true?

[✓ A. $3\frac{5}{6}$] B. $3\frac{6}{6}$ C. $4\frac{1}{6}$ D. $6\frac{5}{6}$

23. Thavi compares the heights of nine bushes in her garden. The line plot shows the height, in feet, of each bush.

Height of Bushes (ft)

How much taller, in feet, is the tallest bush than the shortest bush?

A. 1 foot [✓ B. $1\frac{2}{4}$ feet]

C. $2\frac{2}{4}$ feet D. 3 feet

24. Martin plays a game to practice typing on the computer for 6 days. He plays the typing game for 38 minutes each day.

How many minutes does Martin play in all?

228 minutes

25. What unknown fraction makes the equation $\frac{7}{12} - \frac{3}{12} = \square$ true?

A. $\frac{2}{12}$ B. $\frac{3}{12}$ [✓ C. $\frac{4}{12}$] D. $\frac{5}{12}$

26. Lena eats 8 blueberries. Diana eats 4 times as many blueberries as Lena.

Which equation represents the number of blueberries Diana eats?

A. $8 \div 4 = 2$ B. $4 + 8 = 12$

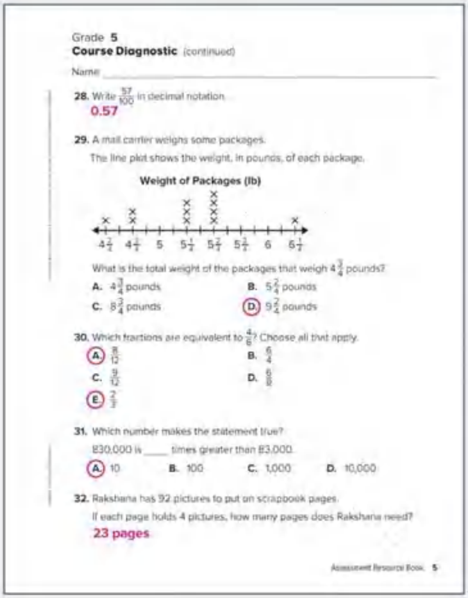
C. $8 - 4 = 4$ [✓ D. $4 \times 8 = 32$]

27. Dmitri has 46 shells to decorate some picture frames.

If he uses 8 shells to decorate each picture frame, how many picture frames can Dmitri decorate?

5 picture frames

4 Assessment Resource Book



Grade 5

Course Diagnostic (continued)

Name ______________________

28. Write $\frac{57}{100}$ in decimal notation.

0.57

29. A mail carrier weighs some packages.

The line plot shows the weight, in pounds, of each package.

Weight of Packages (lb)

What is the total weight of the packages that weigh $4\frac{3}{4}$ pounds?

A. $4\frac{3}{4}$ pounds B. $5\frac{2}{4}$ pounds

C. $8\frac{3}{4}$ pounds [✓ D. $9\frac{2}{4}$ pounds]

30. Which fractions are equivalent to $\frac{4}{6}$? Choose all that apply.

[✓ A. $\frac{8}{12}$] B. $\frac{6}{4}$

C. $\frac{9}{12}$ D. $\frac{6}{8}$

[✓ E. $\frac{2}{3}$]

31. Which number makes the statement true?

830,000 is ____ times greater than 83,000.

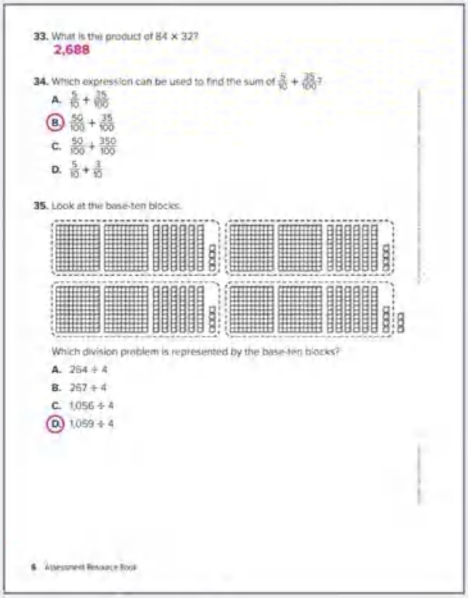
[✓ A. 10] B. 100 C. 1,000 D. 10,000

32. Rakshana has 92 pictures to put on scrapbook pages.

If each page holds 4 pictures, how many pages does Rakshana need?

23 pages

Assessment Resource Book 5



33. What is the product of 84×32?

2,688

34. Which expression can be used to find the sum of $\frac{5}{10} + \frac{35}{100}$?

A. $\frac{5}{10} + \frac{35}{100}$

[✓ B. $\frac{50}{100} + \frac{35}{100}$]

C. $\frac{50}{100} + \frac{350}{100}$

D. $\frac{5}{10} + \frac{3}{10}$

35. Look at the base-ten blocks.

Which division problem is represented by the base-ten blocks?

A. $264 \div 4$

B. $267 \div 4$

C. $1{,}056 \div 4$

[✓ D. $1{,}059 \div 4$]

6 Assessment Resource Book

UNIT 1 PLANNER
Math Is...

PACING: 8 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! Map It Explore how many different colors are needed to color a region so that no adjacent spaces are the same color.			
1-1 Math Is Mine	Students discuss the role of math in their and other people's lives.	Students talk about how to use math while answering *Wh-* questions.	Students describe their feelings and attitudes toward mathematics.
1-2 Math Is Exploring and Thinking	Students discuss approaches for making sense of a problem and determining strategies for solving it. Students look for connections among quantities.	Students talk about making sense of a problem and represent it in different ways while answering *Wh-* questions and using *another way*.	Students recognize when they feel frustration during math class.
1-3 Math Is in My World	Students consider different ways to use mathematics to represent a real-world situation.	Students explain and show real-world phenomena with mathematical models while answering *Wh-* questions and using *visualize* and *represent* as needed.	Students show appreciation for the different perspectives of their classmates.
1-4 Math Is Explaining and Sharing	Students refine their skills in constructing arguments to support their thinking. Students respond to the ideas and arguments of others.	Students discuss arguments to support their thinking while answering *Wh-* questions and using *carefully* as needed and able.	Students practice showing respect for classmates as they share ideas and thinking.
1-5 Math Is Finding Patterns	Students consider strategies for uncovering patterns and for using patterns to solve problems. Students consider efficient strategies derived from repeated reasoning.	Students talk about strategies for uncovering patterns and for using patterns to solve problems while answering *Wh-* and Yes/No questions and using the verb *can* as needed.	Students practice self-control as they learn to take turns when sharing ideas with a partner or in a group.
1-6 Math Is Ours	Students discuss classroom norms of interaction for a productive learning environment.	Students talk about the behaviors and mindsets that contribute to a productive learning environment while answering *Wh-* and Yes/No questions and using the verb *disagree* and the adverb *respectfully* as needed.	Students make decisions about classroom norms for working productively with classmates.
Unit Review			
Fluency Practice			

FOCUS QUESTION:
What does it mean to do math?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	Academic Terms			
1-1	hobby	interview	• bowl • letter-size paper cut into quarters	Conceptual Understanding	4.OA.C.5
1-2	strategy	analyze	• coins: nickels, dimes, and quarters	Conceptual Understanding	4.NF.B.4 4.NF.B.4.c
1-3	grid model	visualize	• none	Conceptual Understanding	4.NF.B.3.d
1-4	fractional	critique justify defend	• none	Conceptual Understanding	4.NF.A.2
1-5		efficient generalizations	• none	Conceptual Understanding	4.OA.C.5
1-6		norms responsibility	• geoboards or *Dot Paper* Teaching Resource • pattern blocks or *Pattern Blocks 2* Teaching Resource	Conceptual Understanding	4.NF.B.3.d

Unit Overview

Focus

Understanding What Math Is

The focus of this unit is threefold:

- to build students' agency as doers of mathematics. It is important that students understand that math is not just something done in school. Math is part of our daily lives and shows up in almost every activity. It is also important that students see themselves as skilled doers of math, so helping them understand that doing math is not carrying out operations or calculations. Rather, doing math is more accurately making sense of and solving problems and finding patterns and relationships among quantities and numbers. Lesson 1-1 helps students see themselves as doers of math as they examine their attitudes towards math and their images of themselves as doers of math.
- to build students' proficiency with the habits of mind that are integral to doing mathematics. These include the thinking that makes up the problem-solving process and that is involved in finding patterns and relationships among quantities and values. Lessons 1-2 through 1-5 focus on helping students build proficiency with these habits of mind.
- to build understanding of the norms of interaction that allow for a productive math learning environment where students candevelop, refine, and enhance the habits of mind that are integral to doing math. Lesson 1-6 offers the opportunity for students to develop together the classroom norms for math for the school year.

Coherence

What Students Have Learned

- Students refined their problem-solving skills as they analyzed givens and developed solution strategies.
- Students modeled real-world situations with a range of representations.
- Students responded appropriately to their classmates' reasoning.
- Students used clear and precise language in their explanations and arguments.
- Students made generalizations after noticing patterns in operations.

What Students Are Learning

- Students build on their problem-solving skills as they consider alternative strategies for solving the problem presented.
- Students model real-world situations with a range of representations.
- Students construct arguments to critique the reasoning of classmates.
- Students use appropriate units in their calculations.
- Students make generalizations after noticing repeated calculations with operations.

What Students Will Learn

- Students extend their problem-solving skills as they consider reasonableness of their solutions.
- Students model real-world situations with equations.
- Students construct arguments to defend their thinking.
- Students use appropriate units in their calculations.
- Students develop efficient approaches for solving equations based on repeated calculations.

Rigor

Conceptual Understanding

Students refine their understanding of

- the habits of mind that are part of the problem-solving process;
- classroom norms that are integral to a productive math learning environment;
- themselves as doers of math.

Procedural Skill and Fluency

Student build proficiency with

- the habits of mind that are part of the problem-solving process;
- constructing arguments to support their mathematical thinking;
- using precise language when constructing arguments.

Application

Students apply their knowledge of

- the habits of mind that are part of the problem-solving process as they solve problems;
- themselves as doers of math to solve problems efficiently;
- the language of mathematics when engaging in mathematical discourse.

Effective Teaching Practices

Ambitious Teaching

In 2014, the National Council for Teachers of Mathematics released *Principles to Actions: Ensuring Mathematical Success for All*, a publication designed to support teachers in implementing "ambitious teaching," an approach to teaching that views students as able to engage productively in the problem-solving process, and encourages and values students' thinking and ideas. To implement "ambitious teaching," the authors of *Principles to Actions* offer eight teaching practices. These research-based practices are grounded in the goals of helping students develop sense-making, thinking, and reasoning skills.

Each unit will highlight one of the eight teaching practices, providing an overview of what the practice means and how it helps to contribute to students' success in learning mathematics.

The eight practices are:

- Establish mathematics goals to focus learning.
- Implement tasks that promote reasoning and problem solving.
- Use and connect mathematical representations.
- Facilitate meaningful mathematical discourse.
- Pose purposeful questions.
- Build procedural fluency from conceptual understanding.
- Support productive struggle in learning mathematics.
- Elicit and use evidence of student thinking.

Math Practices and Processes

Promoting students' sense-making, thinking, and reasoning.

- In this unit, Lessons 1-2 through 1-5 focus students' learning on the mathematical habits of mind that are integral to proficiency in mathematics. Each lesson focuses on two specific habits of mind:
- Lesson 1-2 – *Math Is Exploring and Thinking:* Students are presented with the thinking habits that can help them make sense of a problem posed, analyze givens and unknowns, think through a solution strategy, and consider approaches to persevering when they run into road blocks in the problem-solving process. Students also consider the meaning of quantities and the relationship among the quantities and values in a problem.
- Lesson 1-3 – *Math Is In My World:* Students explore real-world phenomena and look to model these phenomena using the mathematics they know. Students consider the different tools they know that they can use to model the mathematics and make decisions around the appropriate tool for the problem.
- Lesson 1-4 – *Math Is Explaining and Sharing:* Students focus on strengthening their mathematical discourse and argumentation as they explain their reasoning about a strategy or solution. They also build discourse by responding to the reasoning of their classmates. They not only seek clarification around classmates' reasoning, but also challenge the reasoning with their own explanations and thinking.
- Lesson 1-5 – *Math is Finding Patterns:* Students notice patterns and repeated reasoning with numbers and operations. They analyze the patterns they notice to come up with generalizations and strategies to make computation more efficient.

Social and Emotional Learning

Build Student Agency

This unit introduces students to the Math is... Mindset feature of the program. This feature is designed to build student agency by focusing on students' social and emotional learning, specifically the five competencies that make up the framework established by the Collaborative for Academic, Social, and Emotional Learning (CASEL). The five competencies are:

Self-awareness: Students learn to recognize their emotions and understand their influence on their behaviors.

Self-management: Students learn to regulate their emotions, and behaviors effectively in different situations.

Social awareness: Students develop understanding of and empathy for others from different backgrounds and cultures.

Relationship skills: Students learn to establish and maintain healthy relationships with students from different backgrounds and cultures.

Responsible decision-making: Students learn to make constructive choices about their behavior and their interactions with others.

Lesson 1 focuses on self-awareness, self-management, and responsible decision-making as students think about their attitudes toward and strengths in mathematics. As part of the lesson, students write their math biography.

Lesson 6 focuses on social awareness, relationship skills, and responsible decision-making as students discuss classroom norms for a productive learning environment. They generate a list of classroom norms and expectations for math class.

Starting in Unit 2, students will see Math Is... Mindset questions at the beginning and end of each lesson. These questions will help students build proficiency with the five competencies.

Language of Math

Vocabulary

There are some math and academic terms that students should be familiar with but may warrant revisiting.

- **Critique** (Lessons 1-4): Make sure students understand that the focus of the critique is students' reasoning, not the students themselves.
- **Efficient** (Lesson 1-5): Students have seen this term in previous grades, but it is an important term for them to understand. An efficient strategy is one that can be done the same way quickly.
- **Fractional** (Lesson 1-2): Some students may not make the connection between "fraction" and "fractional." Help them see that the two terms are related.
- **Hobby** (Lesson 1-1): This may be a new term for some students. Explain that a hobby is an activity that one does in their free time.
- **Grid** (Lesson 1-3): This may be a new term for some students although they will be introduced to the coordinate plane and coordinate grids later in the school year.

Math Language Development

A Focus on Speaking and Listening

A main emphasis of this unit is helping students become proficient doers of mathematics and that requires that students become proficient at communicating clearly and precisely. Communicating clearly and precisely involves not just strong speaking skills, but strong listening skills as well.

When students engage in active listening, they attend fully to the speaker. They concentrate on what the speaker is saying, processing the ideas being shared. Active listeners can re-state with understanding what the speaker has shared and can then respond clearly to the ideas shared.

When students engage in active speaking, they attend fully to their audience. They concentrate on what they are saying and use the reactions from the audience to determine how well the audience is understanding the ideas that speakers are sharing.

As students go through these lessons, have some students read aloud the Math Is... questions and others actively listen to the questions being asked. Have student listeners re-state the questions read and explain what the question means for them.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to what math is to them. Because many of the words (positive, stuck, argument), phrases (don't give up, keep trying, carry out, work together/on your own), and structures (If…, [then]…) used in this section are likely unfamiliar or unknown to ELs, students are supported in understanding and using these words so that the instruction is more accessible to them.

Lesson 1-1 – *positive*
Lesson 1-2 – *stuck, don't give up, keep trying*
Lesson 1-3 – *carry out*
Lesson 1-4 – *argument*
Lesson 1-5 – *If, …. (then)….*
Lesson 1-6 – *work together, on your own*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense. They also help students develop the thinking habits of mind that are important for proficient doers of math.

Math Pictures

Purpose: Build estimating and visual discrimination skills.

Overview: Students examine an interesting photograph and answer a question about it.

Lesson 1-1: Students are presented with an image of people riding in gondolas. They respond to the prompt, "What numbers can describe the picture?"

Lesson 1-2: Students are shown some plastic ducks, most of which are yellow and one is purple and respond to the prompt, "What fractions can you use to describe the picture?"

Lesson 1-3: Students see an assortment of dominos and respond to the prompt, "About how many dots are on all the dominos?"

Lesson 1-4: The image shows two pea pods, one open to show the peas inside and the second closed. Students respond to the prompt, "About how many seeds are in 125 pods?"

Lesson 1-5: The image shows a stack of rolls of pennies. Students to the prompt, "If there are 50 pennies in a roll, are there more or fewer than 400 pennies in the picture?"

Lesson 1-6: The image shows decorated spheres hanging on a board. Students respond to the prompt, "About what fraction of decorations is missing?"

Sense-Making Routines

Notice & Wonder (Lessons 1-1, 1-2, 1-3, 1-5, 1-6)
In Lesson 1-1, students notice and wonder about a student pensively reflecting. For Lesson 1-2, students notice and wonder about two stacks of coins (one of quarters and one of dimes), each about the same height. Students may wonder which stack has the greater value. In Lesson 1-3, students notice the number of squares of each color in two 4 × 4 grids. They may wonder about the part of the whole that each color represents. The prompt for Lesson 1-5 shows a sunflower. Students may notice the pattern and wonder whether there is a rule that can define the pattern. In Lesson 1-6, students wonder what students are working on and how they work together.

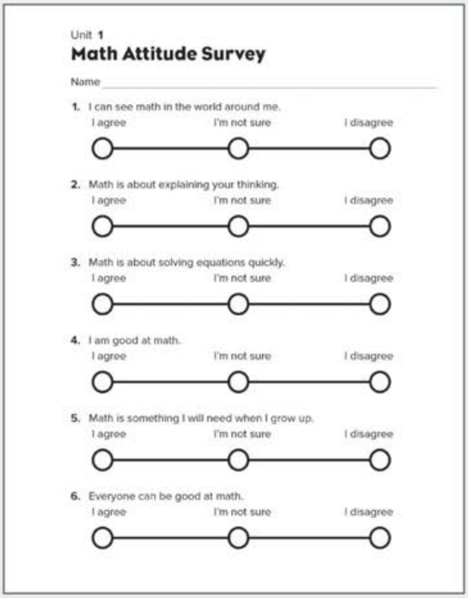
Which Doesn't Belong? (Lesson 1-4)
Students analyze four wholes partitioned into different-sized equal parts with different numbers of sections colored. They may notice while some have two parts colored, the fraction of the whole that is colored differs.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. These routines can also be used as formative assessment opportunities as students develop proficiency in English and mathematical language. They can be used in ways that support real-time-, peer-, and self-assessment. For more information on the Math Language Routines, see the Appendix.

- Lesson 1-1 – In order to cultivate conversation, students participate in MLR8: Discussion Supports.
- Lesson 1-2 – In order to optimize output, students participate in MLR7: Compare and Connect.
- Lesson 1-3 – In order to optimize output, students participate in MLR4: Info Gap.
- Lesson 1-4 – In order to optimize output, students participate in MLR1: Stronger and Clearer Each Time.
- Lesson 1-5 – In order to support sense-making, students participate in MLR2: Collect and Display.
- Lesson 1-6 – In order to maximize linguistic and cognitive meta-awareness, students participate in MLR5: Co-Craft Questions and Problems.

Math Attitude Survey



Unit 1

Math Attitude Survey

Name ______________________

1. I can see math in the world around me.

   I agree ○ —— I'm not sure ○ —— I disagree ○

2. Math is about explaining your thinking.

   I agree ○ —— I'm not sure ○ —— I disagree ○

3. Math is about solving equations quickly.

   I agree ○ —— I'm not sure ○ —— I disagree ○

4. I am good at math.

   I agree ○ —— I'm not sure ○ —— I disagree ○

5. Math is something I will need when I grow up.

   I agree ○ —— I'm not sure ○ —— I disagree ○

6. Everyone can be good at math.

   I agree ○ —— I'm not sure ○ —— I disagree ○

7. For me, someone who is good at math is...

8. When I get the wrong answer to a problem, I feel...

9. When I don't know what to do to solve a problem, I...

10. For me, math is...

You may want to have your students complete the Math Attitude Survey to get a sense of their attitudes toward math and their self-perceptions of their math strengths and weaknesses.

Consider having them review their responses periodically throughout the school year to track any changes in their attitudes or self-perceptions.

Download and print the Math Attitude Survey from the Digital Teacher Center.

Unit Opener

Focus Question

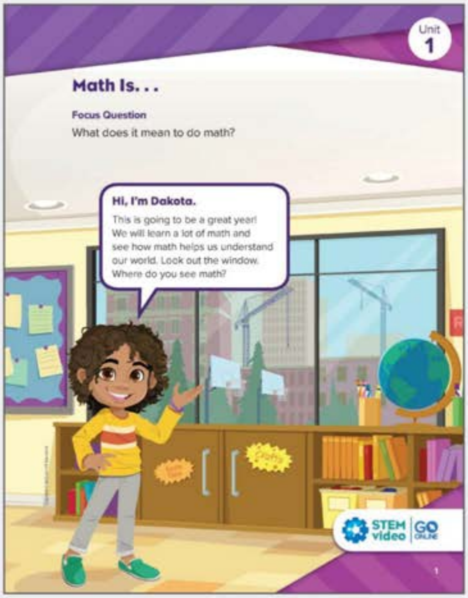
Introduce the Focus Question: *What does it mean to do math?* Ask students to think about what they know about doing math.

- What do you notice about Dakota’s classroom?
- What math do you see in the classroom?
- What math do you see outside the window?

Remind students that at the end of the unit, they will reflect on what they learned.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.



Unit 1

Math Is. . .

Focus Question

What does it mean to do math?

Hi, I’m Dakota.

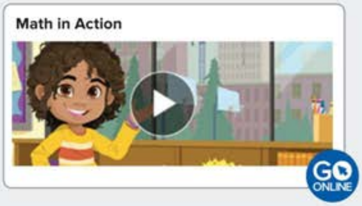
This is going to be a great year! We will learn a lot of math and see how math helps us understand our world. Look out the window. Where do you see math?

STEM video | GO ONLINE

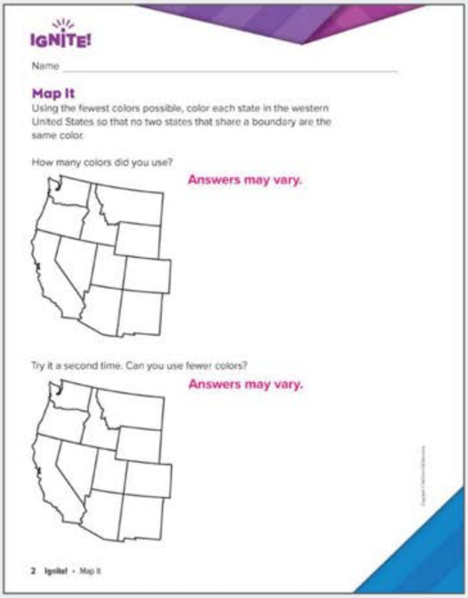
1

Math in Action Video

Students can watch the Math in Action video.
Grade 5: Meet Dakota



Math in Action



IGNITE!

Name

Map It

Using the fewest colors possible, color each state in the western United States so that no two states that share a boundary are the same color.

How many colors did you use?

Answers may vary.

Try it a second time. Can you use fewer colors?

Answers may vary.

2 Ignite! • Map It

Ignite!

Map It

Students explore map coloring and the four color theorem, which states that no more than four colors are needed to color areas of a map so that no two adjacent areas have the same color.

1. Explain the task to student: They will color each state in the map provided using the fewest number of colors. No two adjacent states can be the same color.
   - How did you think about the problem?
   - What strategy did you use?
   - How did you determine the number of colors needed?
2. Have students try the second task using a different strategy.
   - How did the second strategy compare to the first?

Get Ready for Ignite!

Ignite! Activities, written by Dr. Raj Shah, launch every unit in *Reveal Math K–5*.

These activities are designed to

Cultivate Curiosity Mathematics is as much about asking questions as it is about finding solutions. Get your students to start wondering!

Accept the Challenge Attitude is everything. Encourage your students to take on new challenges and see how far they can go.

Trial and Error Students cannot learn by watching. To make sense of math, they have to try things… and keep trying.

Embrace "Failure" Learning new things is hard. Mistakes will happen. Allow your students the freedom to make mistakes and learn from them.

Work Together There is power in a community of learners working together to discover new things. Math should not be done alone.

Just Play Students can explore, discover, conjecture. Solving problems is fun!

Dr Raj Shah

Dr. Raj Shah has always had an affinity for math. Powered by his love of math, he earned a Ph.D. in Physics in 1999, which led to a career in R&D at Intel. In 2008, he left his job and founded Math Plus Academy, an after-school STEM enrichment program for students ages 5–14. His mission is to introduce students and adults to the wonders of mathematics. Dr. Shah also contributes his time to Math Teacher Circles, the Julia Robinson Math Festival, and is a founding member of The Global Math Project. He believes that everyone can enjoy math, develop strong number sense, and become a perseverant problem solver.

LESSON **1-1**

Math Is Mine

Learning Targets

- I can tell my math biography.
- I can recognize the ways in which we are all doers of math.

Vocabulary

Math Terms	**Academic Terms**
hobby	interview

Standards ◇ Major △ Supporting ○ Additional

Content

○ **4.OA.C.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Construct viable arguments and critique the reasoning of others.

Materials

The materials may be for any part of the lesson.

- bowl
- letter-size paper cut into quarters

Focus

Content Objective	Language Objective	SEL Objective
• Students discuss the role of math in their and other people's lives.	• Students talk about how to use math while answering *Wh-* questions. • To support cultivating language, ELs participate in MLR8: Discussion Supports.	• Students describe their feelings and attitudes toward mathematics.

Coherence

Previous	Now	Next
• Students identified their superpowers and those of others.	• Students think about their own and others' math biographies. They reflect on the mindsets that help them be effective doers of math.	• Students continue to make connections between math and the real world. They increase awareness of the mindsets that help them do math.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students understand that we each have our own math biography. Students investigate the role of math in our lives.	• Students develop proficiency with identifying their areas of strength in doing mathematics.	• Students apply their understanding of their math biography to target areas of strength in math.

Number Routine

Math Pictures 5–7 min

Build Fluency Students build fluency with number sense as they examine a photograph and think about the numbers that can describe the picture.

These prompts encourage students to talk about their reasoning:

- What can you count?
- What can you measure?
- What fractions do you see?
- What can you compare?

Launch 5–7 min

Sense-Making Routine

Purpose Students discuss what someone could be writing about, including one's own or another person's story.

Notice & Wonder™

- What do you notice?
- What do you wonder?

See Appendix for a full description of the sense-making routines.

Teaching Tip You may want to facilitate a think-pair-share in order to encourage student participation. This may help students feel more at ease sharing their initial thoughts about the image.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about why people write, what they write about, and what a writer would include in a biography or autobiography.

- Why do you think the person is writing?
- What do you think the person is writing? What genre?
- Have you ever written in a journal or diary? Have you ever written a story about your own or someone else's life?
- If you were going to write a biography or autobiography, what types of information would you want to include?
- Why is it important to share stories from our own lives?
- What can we learn from hearing stories from other people's lives?

Transition to Explore & Develop

If students wonder how writing stories relates to math, guide the discussion to explore what thoughts, feelings, and experiences people can have in relation to math. This will be explored further in the Explore & Develop.

ETP Establish Goals to Focus Learning

- Let's think about the thoughts and feelings people may have about math.

Lesson 1-1

Math Is Mine

Be Curious

What do you notice?
What do you wonder?

Be Curious

What do you notice?
What do you wonder?

Explore & Develop 20 min

Learn

Math is all around us. We use it every day—in school, at home, and in our neighborhood. We use it when we build projects, play games, or practice our hobbies. We all have a math story.

Let's learn about our teacher's math biography.

How have you used math in the past?

Math is... Mindset
When do I use math during my day?

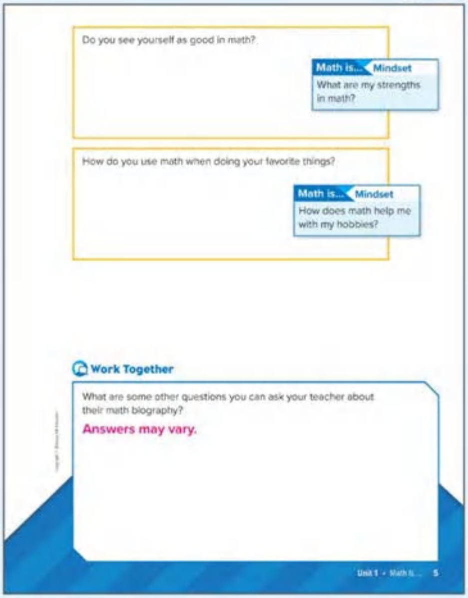
How do you use math now?

Math is... Mindset
How can I stay positive when I do math?

How do you think you will use math in your future?

Math is... Mindset
What do I want to learn about math?

4 Lesson 1 • Math Is Mine



Do you see yourself as good in math?

Math is... Mindset
What are my strengths in math?

How do you use math when doing your favorite things?

Math is... Mindset
How does math help me with my hobbies?

Work Together

What are some other questions you can ask your teacher about their math biography?

Answers may vary.

Unit 1 • Math Is... 5

❶ Pose the Problem

MLR Discussion Supports

As students talk about math stories, have them focus on how not only their story, but others' stories, can help aid them in their understanding of math. Restate statements they make as a question to seek clarification and provide vocabulary or grammar prompts for students who need more guidance.

In this lesson, students examine their attitudes about math. They listen to their teacher's math biography (or that of another adult) and then write about their math biography, focusing on their attitudes toward math and their perceived strengths in math.

ETP Pose Purposeful Questions

- **Think About It:** What does it mean to have a math biography?
- Why might we want to learn about other people's math biographies?

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How does understanding other people's math biographies help us think about our own math biography?
- How does understanding our own math biography help us do our best work in math?

Key Takeaway

- We each have our own math biography. There are no wrong or right math biographies. Our math biographies are always evolving and changing.

Work Together

Students pose additional questions to the teacher about their math biography. When appropriate, students can be given an opportunity to answer the questions themselves in order to start thinking about their own math biographies.

Common Misconception: Students may believe that there is a right and wrong way to feel about math, as well as right and wrong math biographies. Explain that all feelings about math are valid and that all math biographies are valuable. Reframe any attitudes about emotional or academic struggle with math as opportunities for a growth mindset. Remind students that even professional mathematicians and scientists must work through math challenges.

LOM Language of Math

Encourage students to use appropriate mathematics language when discussing their math biographies. Model the appropriate language when sharing your math biography as well.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students ask questions about their teacher's math story as they make connections between one's math biography and one's identity as a doer of math. Being honest in your answers will foster an open and accepting classroom culture and support constructive math communication moving forward.

Materials: bowl, letter-size paper cut into quarters (5 quarter pages per group)

Directions: Distribute a minimum of 5 pieces of paper to each group. After you answer each question on the student page, have each group brainstorm a follow-up question they would like to ask you. Each group decides on one follow-up question and writes this down on a slip of paper and places it in the bowl. Students may take turns being the recorder and writing the question for their group. Time permitting, try to make sure that each group has at least one follow-up question answered. Any unanswered questions may remain in the bowl and be answered at another time.

Activity Debrief: Have students share what they noticed and wondered about your math biography. As they share, ask them to think about the these questions.

Math is... Mindset

- How does your teacher use math during their day? When do you use math during your day?
- How does your teacher stay positive when they do math? How can you stay positive when you do math?
- What does your teacher want to learn about math? What do you want to learn about math?
- What are your teacher's strengths in math? What are your strengths in math?
- How does math help your teacher do their favorite things? How does math help you with your hobbies?

Guided Exploration

Students explore the role math plays in their teacher's and their own lives. An open-format question and answer session with the teacher may lead the conversation in a variety of directions. Help build a classroom culture of trust and acceptance by welcoming all questions and points of view shared by the students. As the teacher, be honest about your own story and accepting of students' feelings and thoughts about math.

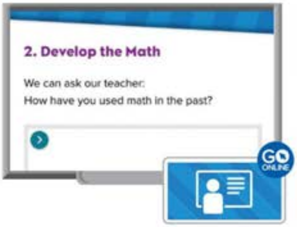
ETP Facilitate Meaningful Discourse

- What questions do you have about your teacher's feelings about math?
- Can you think of ways your teacher uses math that they may not be aware of?
- In what ways are you a doer of math in your daily life?

Have students work with a partner and ask each other questions about the other's math biography.

Math is... Mindset

- When do you use math during your day?
- How can you stay positive when you do math?
- What do you want to learn about math?
- What are your strengths in math?
- How does math help you with your hobbies?



2. Develop the Math

We can ask our teacher:
How have you used math in the past?

EL English Learner Scaffolds

Entering/Emerging Support students' understanding of *positive*. Smile confidently. Say *I'm being positive*. Next, slouch your shoulders, slightly frowning. Say *I'm not being positive*. Repeat once with new gestures, one positive and one negative, and then ask students *Am I being positive?*

Developing/Expanding Support students' understanding of *positive*. Smile confidently. Say *I'm being positive*. Next, slouch your shoulders, slightly frowning. Say *I'm not being positive*. Repeat once with new gestures and ask students to tell you about each one, eliciting answers containing *positive/not positive*. Provide sentence prompts for students who need more guidance.

Bridging/Reaching Ask students what things make them feel positive, and what they could do more often to keep positive instead of giving up. Then ask them to think of other words they may know that could be used instead of *positive*, such as *optimistic* and *cheerful*. Allow students to use a thesaurus or dictionary to find more similar words as well.

Practice & Reflect 10 min

On My Own

Name

What is my math biography?

Answers may vary.

Reflect

What about my math biography do I want someone else to know?

Answers may vary.

6 Lesson 1 • Math Is Mine

Practice

Build Fluency from Understanding

To help students write their math biography, have them consider these questions:

- What did you like about math last year? Why did you like that topic?
- What math topics did you find challenging last year? What made them challenging for you?
- What topics are you looking forward to learning this year?
- What is your favorite thing about math?
- What are your strengths in math?

Teaching Tip Remind students that math biographies can include both positive and negative feelings and experiences with math. Thinking about our strengths and what we like about math helps develop our identity as doers of math.

Reflect

Students complete the Reflect question.

- What about my math biography do I want someone else to know?

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

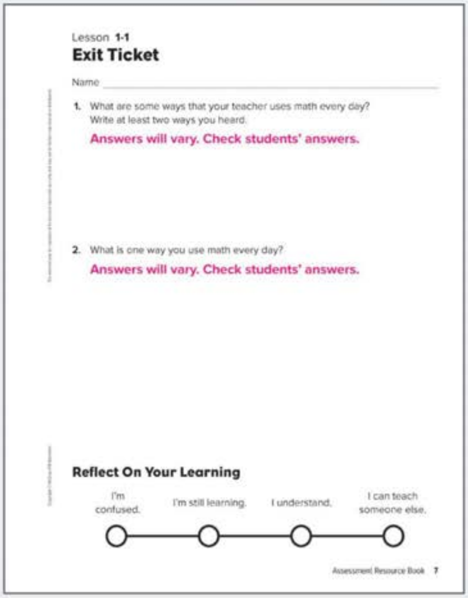
- I can tell my math biography.
- I can recognize the ways in which we are all doers of math.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.


Lesson 1-1

Exit Ticket

Name

1. What are some ways that your teacher uses math every day? Write at least two ways you heard.
Answers will vary. Check students' answers.

2. What is one way you use math every day?
Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 7

LESSON **1-2**

Math Is Exploring and Thinking

Learning Targets

- I can make sense of a problem and represent it in different ways.
- I can explain different ways to think about numbers.

Vocabulary

Math Terms	**Academic Terms**
strategy	analyze

Standards ◇ Major △ Supporting ○ Additional

Content

○ **4.NF.B.4** Apply and extend previous understandings of multiplication to multiply a fraction by a whole number.

○ **4.NF.B.4.c** Solve word problems involving multiplication of a fraction by a whole number, e.g., by using visual fraction models and equations to represent the problem.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Reason abstractly and quantitatively.

Materials

The materials may be for any part of the lesson.

- coins: nickels, dimes, quarters

Focus

Content Objectives	Language Objectives	SEL Objective
• Students discuss approaches for making sense of a problem and determining strategies for solving it. • Students look for connections among quantities.	• Students talk about making sense of a problem and represent it in different ways while answering *Wh-* questions and using *another way*. • To support optimizing output, ELs participate in MLR7: Compare and Connect.	• Students recognize when they feel frustration during math class.

Coherence

Previous	Now	Next
• Students considered their own and others' math biographies. They reflected on the mindsets that help them be effective doers of math.	• Students discuss approaches for making sense of a problem and determining strategies for solving it. They relate ways to represent quantities.	• Students consider strategies for constructing arguments to support their ideas and solutions.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students demonstrate understanding of the problem-solving process, with a focus on making sense of a problem and determining a viable solution plan.	• Students build proficiency with the problem-solving process.	• Students apply their understanding of the problem-solving process as they solve real-world problems.

Number Routine

Math Pictures

5–7 min

Build Fluency Students are shown some plastic ducks, all except one of which are yellow and respond to the prompt, "What fractions can you use to describe the picture?"

These prompts encourage students to talk about their reasoning:

- How can we show the fractional part of a set?
- What does the denominator represent?

Launch 5–7 min

Sense-Making Routine

Purpose Students speculate on the number and value of two stacks of coins: one of quarters and one of dimes.

Notice & Wonder

- What do you notice?
- What do you wonder?

See Appendix for a full description of the sense-making routines.

Teaching Tip Students may be inclined to go directly to determining the value of each stack of coins rather than spending time making observations and asking questions. You may want to share some non-math-related observations or questions to help expand the discussion beyond a simple calculation.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about how to approach a problem situation in order to make sense of the problem and determine a solution plan.

- Which stack has more coins?
- What explains why there are the fewer quarters yet the stacks are about the same height?
- What explains why there are the more dimes yet the stacks are about the same height?

Transition to Explore & Develop

Ask questions that get students thinking about the different attributes of the coins – thickness, size, value – that need to be taken into consideration when determining which stack has the greater value and more coins. If students mention the greater value and thickness of the quarter compared to the dime, incorporate these ideas into the discussion; however, do not bring it up if students do not mention it. This will be explored further in the Explore & Develop.

ETP Estabilish Goals to Focus Learning

- Let's think about the value of each coin as we determine the value of each stack.

Lesson 1-2

Math Is Exploring and Thinking

Be Curious

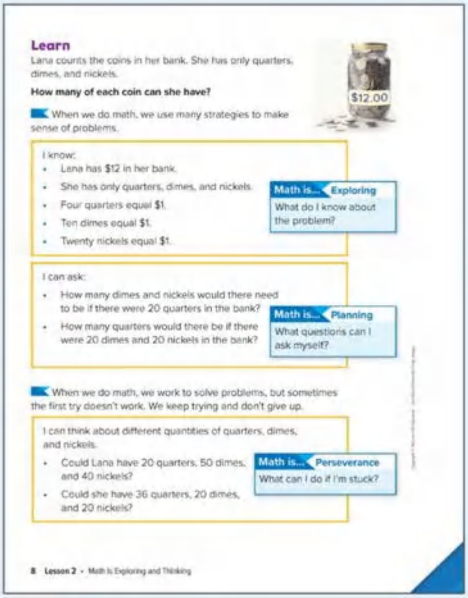
What do you notice?
What do you wonder?

Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

Lana counts the coins in her bank. She has only quarters, dimes, and nickels.

How many of each coin can she have?

When we do math, we use many strategies to make sense of problems.

I know:

- Lana has $12 in her bank.
- She has only quarters, dimes, and nickels.
- Four quarters equal $1.
- Ten dimes equal $1.
- Twenty nickels equal $1.

Math is... Exploring
What do I know about the problem?

I can ask:

- How many dimes and nickels would there need to be if there were 20 quarters in the bank?
- How many quarters would there be if there were 20 dimes and 20 nickels in the bank?

Math is... Planning
What questions can I ask myself?

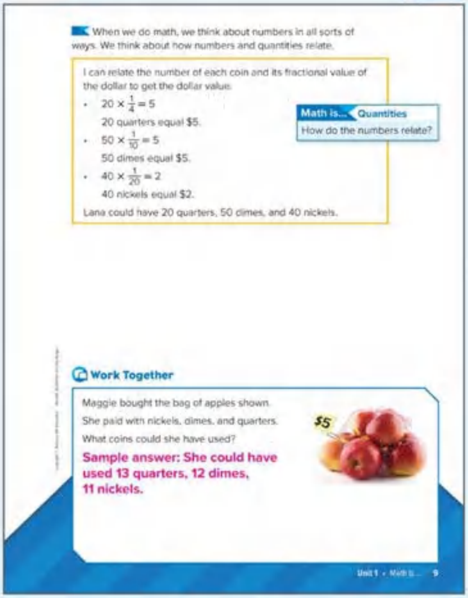
When we do math, we work to solve problems, but sometimes the first try doesn't work. We keep trying and don't give up.

I can think about different quantities of quarters, dimes, and nickels.

- Could Lana have 20 quarters, 50 dimes, and 40 nickels?
- Could she have 36 quarters, 20 dimes, and 20 nickels?

Math is... Perseverance
What can I do if I'm stuck?

8 Lesson 2 • Math Is Exploring and Thinking



When we do math, we think about numbers in all sorts of ways. We think about how numbers and quantities relate.

I can relate the number of each coin and its fractional value of the dollar to get the dollar value.

- $20 \times \frac{1}{4} = 5$
  20 quarters equal $5.
- $50 \times \frac{1}{10} = 5$
  50 dimes equal $5.
- $40 \times \frac{1}{20} = 2$
  40 nickels equal $2.

Lana could have 20 quarters, 50 dimes, and 40 nickels.

Math is... Quantities
How do the numbers relate?

Work Together

Maggie bought the bag of apples shown.

She paid with nickels, dimes, and quarters.

What coins could she have used?

Sample answer: She could have used 13 quarters, 12 dimes, 11 nickels.

Unit 1 • Math Is... 9

1 Pose the Problem

This is the first of four lessons that introduce students to the habits of mind that are foundational to doing math. In this lesson, the focus is on making sense of problem situations, formulating a solution plan, and representing quantities in different ways.

ETP Pose Purposeful Questions

- What questions could you ask about the problem?
- What information do we have that can help us solve the problem?

2 Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students and ask each to write a combination of coins for a given dollar value, such as $4.00. Have them work alone to form a combination, and then compare their combination with their partner. Revisit this activity throughout the lesson to help students build proficiency.

3 Bring It Together

ETP Elicit Evidence of Student Thinking

- If most of the coins are quarters, what does that tell you about the total number of coins?
- Could most of the coins be nickels? Explain your reasoning.

Key Takeaway

- There are different ways to solve problems, but a first step is always to make sense of the problem by asking questions about the problem. It is also important to be flexible in our thinking and implement alternate strategies as needed.

Work Together

Students solve a similar problem involving determining coins that sum to $5.

Common Error: Students may struggle to get started with the open-endedness of the problem. Suggest students determine the number of one of the coin types and from that determine how many of the other coin types there would need to be.

LOM Language of Math

Encourage students to talk of the fractional and decimal value of one dollar that each coin represents.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore the different parts of the problem-solving process, helping them develop flexibility and strategic thinking about problems and quantities.

Directions: Students work in pairs or small groups to solve the Pose the Problem.

Display these questions for students to ask themselves as they work on the problem presented:

- What do I know about the problem?
- What questions can I ask about the problem before looking to solve it?
- What might be another way to think about the problem if my first strategy does not help me solve the problem?
- How do the values and quantities in this problem relate?

ETP Support Productive Struggle

- How are you approaching the problem? What assumptions are you making?

Activity Debrief: Before students share their solutions, have them talk through the first two questions that were displayed.

Students should note that there are some nickels, some dimes, and some quarters in the bank.

Among the questions students might ask are, “Are the numbers of each coin equal?”

Ask students whether their first strategy for solving the problem worked, or if any student pair had to try a different strategy.

- How did you think differently about the numbers of each coin?
- How did your thinking about the values and quantities of the different coins help you solve the problem?

As students share their solutions, display some of their solutions. Then have students talk through their strategies for solving the problem, focusing especially on the decisions around how to represent the problem.

Guided Exploration

Students explore the different parts of the problem-solving process, helping them develop flexibility and strategic thinking about problems and quantities.

ETP Facilitate Meaningful Discourse

Engage students in a brief discussion for the first two “When we do math,...” statements.

- What does it mean to “make sense of a problem”?
- What do we do when we make sense of a problem?

Math is... Exploring

- What else do we know about the problem?

Math is... Planning

- Why is it important to ask questions before we solve a problem?

Math is... Perseverance

- Why should we always try to find another way to think about the problem?

ETP Facilitate Meaningful Discourse

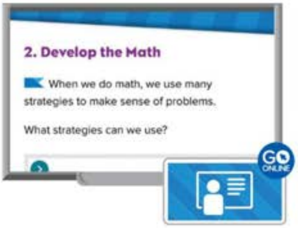
Engage students in a brief discussion of the third “When we do math,...” statement.

- What are some questions we can ask to determine the coins that are in the bank?

Math is... Quantities

- What are some other ways to think about the value of each coin?

Students can work in pairs or small groups to determine the possible number of each coin in the bank. As students share, ask them to explain their thinking.



2. Develop the Math

When we do math, we use many strategies to make sense of problems.

What strategies can we use?

EL English Learner Scaffolds

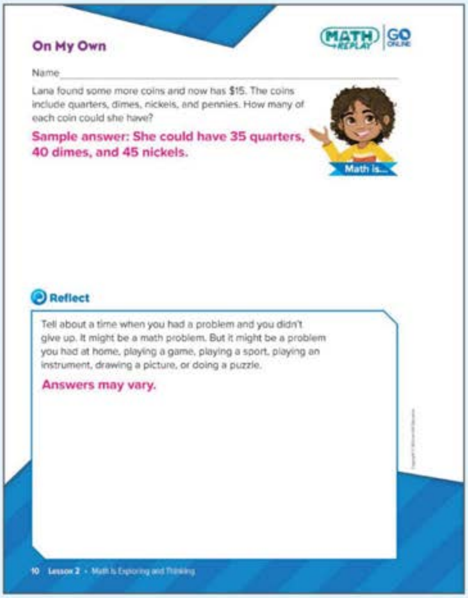
Entering/Emerging Support students understanding of *stuck, don’t give up*, and *keep trying* through gestures. For example, pretend to be stuck on a task. Say *I’m stuck*. Then say *I don’t give up*. *I keep trying*. Demonstrate not giving up and “completing” the task. Then ask students to first demonstrate *stuck* and then *don’t give up/keep trying*.

Developing/Expanding Support students understanding of *stuck, don’t give up*, and *keep trying* through gestures. For example, pretend to be stuck on a task. Say *I’m stuck*. Then say *I don’t give up*. *I keep trying*. Demonstrate not giving up and “completing” the task. Then ask students to demonstrate the task as well. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to think about how they handle times where they feel stuck. *Do you they give up, or do they keep trying?* Allow students to chime in with their thoughts. For example, *That’s a great way of handling....* or *When I get stuck, I...because....*

Practice & Reflect

10 min



On My Own

Name

Lana found some more coins and now has $15. The coins include quarters, dimes, nickels, and pennies. How many of each coin could she have?

Sample answer: She could have 35 quarters, 40 dimes, and 45 nickels.

Reflect

Tell about a time when you had a problem and you didn't give up. It might be a math problem. But it might be a problem you had at home, playing a game, playing a sport, playing an instrument, drawing a picture, or doing a puzzle.

Answers may vary.

Practice

Build Fluency from Understanding

To help students build proficiency with the habits of mind for problem solving, have them consider these questions:

- How is this problem similar to the one we did together? How is it different?
- What questions can you ask about this problem? How are the questions similar to the ones you asked for the other problems?

Reflect

Students complete the Reflect question.

- Tell about a time when you had a problem and you didn't give up. It might be a math problem. But it might be a problem you had at home, playing a game, playing a sport, playing an instrument, drawing a picture, or doing a puzzle.

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

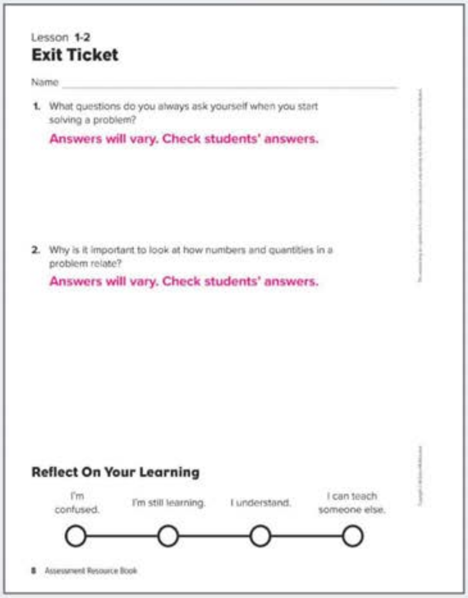
- I can make sense of a problem and represent it in different ways.
- I can explain different ways to think about numbers.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.



Lesson 1-2

Exit Ticket

Name ____________________

1. What questions do you always ask yourself when you start solving a problem?
   Answers will vary. Check students' answers.

2. Why is it important to look at how numbers and quantities in a problem relate?
   Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

8 Assessment Resource Book

LESSON **1-3**

Math Is in My World

Learning Targets

- I can represent a real-world situation using mathematics.
- I can describe tools I can use to solve a problem.

Vocabulary

Math Terms	Academic Terms
grid	visualize
model	

Standards ◆ Major ▲ Supporting ○ Additional

Content

○ **4.NF.B.3.d** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators, e.g., by using visual fraction models and equations to represent the problem.

Math Practices and Processes

MPP Model with mathematics.

MPP Use appropriate tools strategically.

Materials

none

Focus

Content Objective	Language Objective	SEL Objective
• Students consider different ways to use mathematics to represent a real-world situation.	• Students explain and show real-world phenomena with mathematical models while answering *Wh-* questions and using *visualize* and *represent* as needed. • To support optimizing output, ELs participate in MLR4: Info Gap.	• Students show appreciation for the different perspectives of their classmates.

Coherence

Previous	Now	Next
• Students discussed and refined their problem solving skills and process. They related ways to represent quantities.	• Students consider models to represent real-world situations and problems. They choose tools that are appropriate for solving a given problem.	• Students refine their skill in constructing arguments and in critiquing the reasoning of their classmates.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students demonstrate understanding of how real-world situations and problems can be modeled with mathematics.	• Students build proficiency with modeling with mathematics.	• Students apply their understanding of modeling with mathematics to model real-world problems with mathematics.

GO ONLINE

Number Routine

Math Pictures

5–7 min

Build Fluency Students are shown an image of pumpkin seeds on a tray and respond to the prompt “How could you estimate the number of seeds?”

Encourage students to talk about their reasoning:

- What are some strategies you can use to estimate the number of seeds?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore two wholes composed of different colors.

Notice & Wonder

- What do you notice?
- What do you wonder?

See Appendix for a full description of the sense-making routines.

Teaching Tip Some students may benefit from having physical versions of the two wholes available to explore.

Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about how real-world situations can be modeled using mathematics.

- Which color is used most in the first square? In the second square?
- How can you know which color is used most in each square?

Transition to Explore & Develop

Ask questions that get students thinking about comparing parts of a whole. If students comment that parts of a whole can have different shapes, incorporate that idea into the discussion; however, do not bring it up if students do not mention it. This will be explored further in the Explore & Develop.

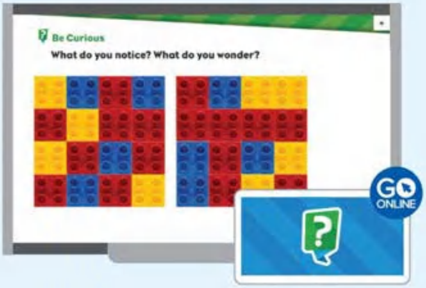
Establish Goals to Focus Learning

- Let's think about the different ways to represent what part of the whole each color is.

Lesson 1-3
Math Is in My World

Be Curious

What do you notice? What do you wonder?

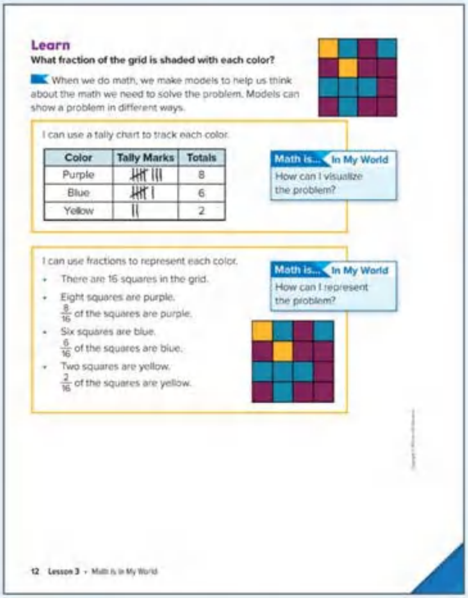


Be Curious

What do you notice? What do you wonder?

Explore & Develop

20 min



Learn

What fraction of the grid is shaded with each color?

When we do math, we make models to help us think about the math we need to solve the problem. Models can show a problem in different ways.

I can use a tally chart to track each color.

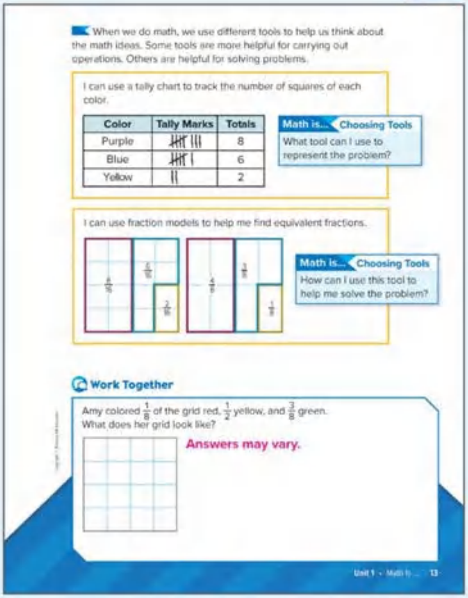
Color	Tally Marks	Totals
Purple	𝍸 |||	8
Blue	𝍸		6
Yellow	||	2

Math is... In My World
How can I visualize the problem?

I can use fractions to represent each color.

- There are 16 squares in the grid.
- Eight squares are purple.
  $\frac{8}{16}$ of the squares are purple.
- Six squares are blue.
  $\frac{6}{16}$ of the squares are blue.
- Two squares are yellow.
  $\frac{2}{16}$ of the squares are yellow.

Math is... In My World
How can I represent the problem?



When we do math, we use different tools to help us think about the math ideas. Some tools are more helpful for carrying out operations. Others are helpful for solving problems.

I can use a tally chart to track the number of squares of each color.

Color	Tally Marks	Totals
Purple	𝍸 |||	8
Blue	𝍸		6
Yellow	||	2

Math is... Choosing Tools
What tool can I use to represent the problem?

I can use fraction models to help me find equivalent fractions.

Math is... Choosing Tools
How can I use this tool to help me solve the problem?

Work Together

Amy colored $\frac{1}{8}$ of the grid red, $\frac{1}{2}$ yellow, and $\frac{3}{8}$ green. What does her grid look like?

Answers may vary.

❶ Pose the Problem

This is the second of four lessons that introduce students to the habits of mind that are foundational to doing math. In this lesson, students build proficiency with representing real-world situations with mathematics.

ETP Pose Purposeful Questions

- What do we know about the problem?
- How useful is the information presented? Explain your thinking.

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Info Gap

Pair students. Provide Partner A with a problem like the one on the Learn page. Provide Partner B with the information to carry out the problem. Instruct Partner B to ask Partner A what information they need, and for Partner A to respond, explaining why they need it. Have students continue until the problem is completed.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How did you represent the break down of colors for the grid?
- What other representations did you consider?
- What tools did you consider using? How did you decide which tool to use?

Key Takeaway

- There are different ways to model real-world situations. We can use pictures, tables, or equations.

Work Together

After students work in groups to solve the problem, ask them to share out their solutions and their thinking about their solutions.

Common Error: Students may forget to find equivalent fractions with 8 as the denominator and color in the incorrect number of squares to represent each color. Ask students to think about whether Amy colored in all of the squares in the grid.

LOM Language of Math

Be consistent in your use of accurate mathematical terms such as, *fraction*, *fractional part* so that students develop the habit of being precise when engaged in mathematical discourse.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore concepts related to modeling with mathematics. They expand understanding of the value of a mathematical model in understanding a problem or real-world phenomenon.

Materials: different-sized grids (4 × 4; 6 × 6; 10 × 10)

Directions: Students work in pairs. Each student colors in one grid using 3 different colors. Students swap their colored grids with their partner. Each partner comes up with different ways to represent the number of squares for each color. After each student has completed their representations, they can discuss their models and their thinking.

Display these questions for students to ask themselves as they work on the problem presented:

- How can I visualize the problem?
- How can I represent the problem?
- What tools can I use to represent and solve the problem?
- Which tool might work best for me to solve the problem?

ETP Support Productive Struggle

- How can you determine which fractional part of a whole part each color is?

Activity Debrief: Before students share their solutions, have them talk through some of the questions that were displayed. Encourage students to share how they visualize and represent the problem. As appropriate, ask them to explain why they might visualize the problem different from how they represent it. As students talk about the tools they used, make sure they explain their thinking for choosing the tools they chose. As students share their solutions, have them explain their reasoning.

Guided Exploration

Students explore concepts related to modeling with mathematics. They expand their understanding of the value of a mathematical model in understanding a problem or real-world phenomenon.

ETP Facilitate Meaningful Discourse

Engage students in a brief discussion for the first "When we do math,..." statement.

- What does it mean to make a model of a problem?
- How can different models show a problem in different ways?

Math is... In My World

- What might be another way to visualize the problem?
- What might be another way to represent the problem?

Students think about how real-world problems can be both visualized and represented with mathematics. Emphasize to students the role that math plays in helping people understand aspects of real-world phenomena.

Ask students how the grid would change if two of the purple squares were changed to yellow. Students can work in pairs or small groups to update the different models.

ETP Facilitate Meaningful Discourse

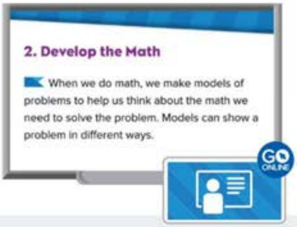
Engage students in a brief discussion for the second "When we do math,..." statement.

- What tools did we use last year when working with fractions?
- What were some uses of those tools?

Math is... Choosing Tools

- What other tools might we use for this problem?

Students consider which tools are best suited for solving this problem. Some may propose fraction bars.



2. Develop the Math

When we do math, we make models of problems to help us think about the math we need to solve the problem. Models can show a problem in different ways.

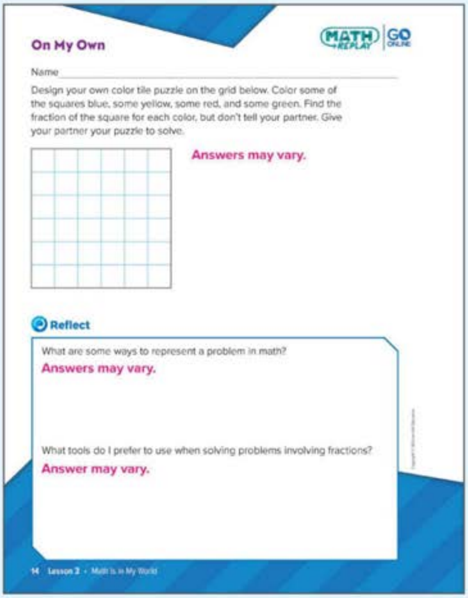
EL English Learner Scaffolds

Entering/Emerging Support students' understanding of *carry out*. Use manipulatives to carry out an operation. Say *I'm carrying out an operation*. Write a problem on the board and begin to solve it. Say *I'm carrying out an operation*. Turn to the Learn page and point to examples and non-examples of carrying out an operation. Ask each time *Does this show carrying out an operation?*

Developing/Expanding Support students' understanding of *carry out*. Use manipulatives to carry out an operation. Say *I'm carrying out an operation*. Write a problem on the board and begin to solve it. Say *I'm carrying out an operation*. Then ask students to demonstrate carrying out an operation. Be sure they say they're carrying out an operation while they do so.

Bridging/Reaching Ask students to explain how to carry out a math operation of their choice. Allow students to interject, providing correction as needed. For example, *I don't think you carried out the operation. For example, you didn't....* or *Are you sure...?*

Practice & Reflect 10 min



On My Own

Name

Design your own color tile puzzle on the grid below. Color some of the squares blue, some yellow, some red, and some green. Find the fraction of the square for each color, but don't tell your partner. Give your partner your puzzle to solve.

Answers may vary.

Reflect

What are some ways to represent a problem in math?

Answers may vary.

What tools do I prefer to use when solving problems involving fractions?

Answer may vary.

14 Lesson 2 • Math Is in My World

Practice

Build Fluency from Understanding

To help students build proficiency with the habits of mind for modeling with mathematics and selecting appropriate tools, have them consider these questions:

- How is this problem similar to the one we did together? How is it different?
- How can you represent this problem?
- What other tools could you use to solve this problem?

Reflect

Students complete the Reflect question.

- What are some ways to represent a problem in math?
- What tools do I prefer to use when solving problems involving fractions?

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to Reflect on the Learning Targets of the lesson.

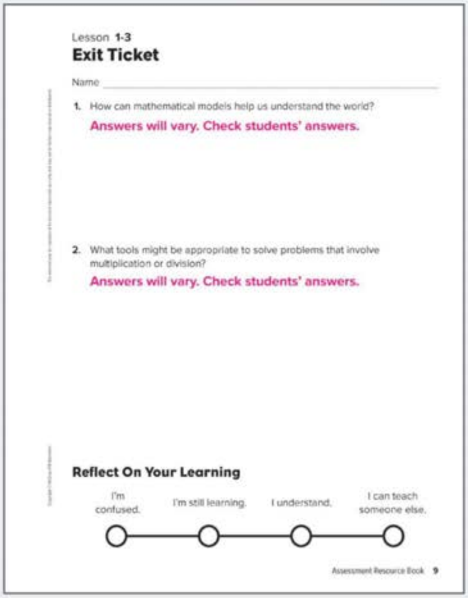
- I can represent a real-world situation using mathematics.
- I can explain tools I can use to solve a problem.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assess students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.



Lesson 1-3

Exit Ticket

Name

1. How can mathematical models help us understand the world?
   Answers will vary. Check students' answers.

2. What tools might be appropriate to solve problems that involve multiplication or division?
   Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 9

LESSON **1-4**

Math Is Explaining and Sharing

Learning Targets

- I can construct an argument to explain my thinking.
- I can explain my thinking with clear and appropriate terms.

Standards ◇ Major △ Supporting ○ Additional

Content

○ **4.NF.A.2** Compare two fractions with different numerators and different denominators, e.g., by creating common denominators or numerators, or by comparing to a benchmark fraction such as ½. Recognize that comparisons are valid only when the two fractions refer to the same whole. Record the results of comparisons with symbols >, =, or <, and justify the conclusions, e.g., by using a visual fraction model.

Math Practices and Processes

MPP Construct arguments and critique the reasoning of others.

MPP Attend to precision.

Vocabulary

Math Terms	Academic Terms
fractional	critique defend justify

Materials

none

Focus

Content Objectives	Language Objectives	SEL Objective
• Students refine their skills in constructing arguments to support their thinking. • Students respond to the ideas and arguments of others.	• Students discuss arguments to support their thinking while answering *Wh-* questions and using *carefully* as needed and able. • To support optimizing output, ELs participate in MLR1: Stronger and Clearer Each Time.	• Students practice showing respect for classmates as they share ideas and thinking.

Coherence

Previous	Now	Next
• Students considered models to represent real-world situations and problems. They choose appropriate tools for solving a given problem.	• Students refine their skill in constructing arguments and in critiquing the reasoning of their classmates.	• Students analyze and generate patterns.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students demonstrate understanding of the importance of supporting their solutions and ideas with viable arguments and responding constructively to the arguments of others.	• Students build proficiency with building viable arguments.	• Students apply their understanding of argumentations to evaluate the reasonableness of the arguments of others.

Number Routine

Math Pictures

5–7 min

Build Fluency Students are shown an image of two pea pods, one open to show the peas inside and the second closed. Students respond to the prompt "About how many seeds are in 125 pods?"

Encourage students to talk about their reasoning:

- What are some strategies you can use to estimate the number of seeds?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore four wholes partitioned into different parts.

Which Doesn't Belong?

- Which doesn't belong?

See Appendix for a full description of the sense-making routines.

Teaching Tip You may want to model your thinking around one solution for *Which Doesn't Belong?* since this is the first time students have seen this routine this year. Remind students that for this routine there are always multiple solutions, so encourage students to find as many solutions as they can.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about how real-world situations can be modeled using mathematics.

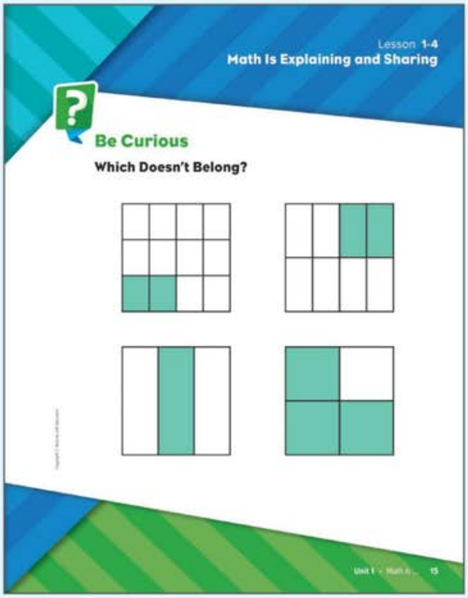
- If one more section is shaded in each whole, how does that change which doesn't belong?
- If two more sections are shaded in each whole, how does that change which doesn't belong?
- What are some ways to describe the shaded part of each square?

Transition to Explore & Develop

Ask questions that get students thinking about what part of the whole is shaded in each square. If students mention benchmark fractions, incorporate that idea into the discussion; however, do not bring it up if students do not mention it. This will be explored further in the Explore & Develop.

ETP Establish Goals to Focus Learning

- Let's think about the different ways we can use to compare parts of a whole.


Lesson 1-4
Math Is Explaining and Sharing

Be Curious

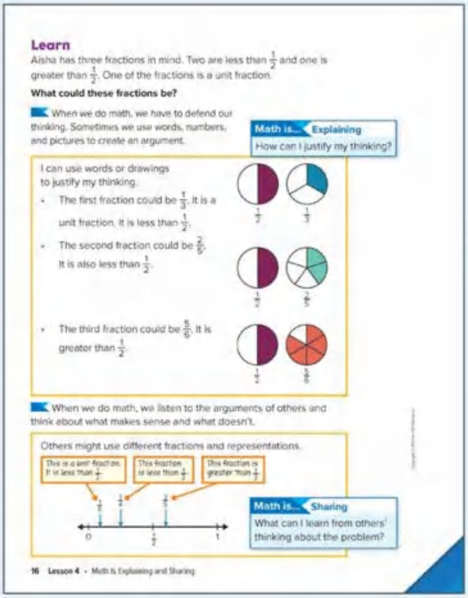
Which Doesn't Belong?


Be Curious

Which Doesn't Belong?

Explore & Develop

20 min



Learn

Aisha has three fractions in mind. Two are less than $\frac{1}{2}$ and one is greater than $\frac{1}{2}$. One of the fractions is a unit fraction.

What could these fractions be?

When we do math, we have to defend our thinking. Sometimes we use words, numbers, and pictures to create an argument.

Math is... Explaining
How can I justify my thinking?

I can use words or drawings to justify my thinking.

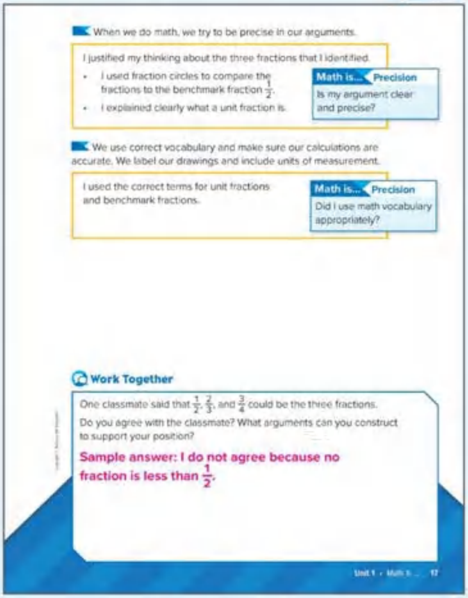
- The first fraction could be $\frac{1}{3}$. It is a unit fraction. It is less than $\frac{1}{2}$.
- The second fraction could be $\frac{2}{5}$. It is also less than $\frac{1}{2}$.
- The third fraction could be $\frac{5}{6}$. It is greater than $\frac{1}{2}$.

When we do math, we listen to the arguments of others and think about what makes sense and what doesn't.

Others might use different fractions and representations.

Math is... Sharing
What can I learn from others' thinking about the problem?

16 Lesson 4 • Math Is Explaining and Sharing



When we do math, we try to be precise in our arguments.

I justified my thinking about the three fractions that I identified.

- I used fraction circles to compare the fractions to the benchmark fraction $\frac{1}{2}$.
- I explained clearly what a unit fraction is.

Math is... Precision
Is my argument clear and precise?

We use correct vocabulary and make sure our calculations are accurate. We label our drawings and include units of measurement.

I used the correct terms for unit fractions and benchmark fractions.

Math is... Precision
Did I use math vocabulary appropriately?

Work Together

One classmate said that $\frac{1}{2}$, $\frac{2}{3}$, and $\frac{3}{4}$ could be the three fractions. Do you agree with the classmate? What arguments can you construct to support your position?

Sample answer: I do not agree because no fraction is less than $\frac{1}{2}$.

Unit 1 • Math Is... 17

❶ Pose the Problem

This is the third of four lessons that introduce students to the habits of mind that are foundational to doing math. In this lesson, students develop proficiency with constructing arguments to explain and defend their thinking and with responding to arguments of their classmates.

ETP Pose Purposeful Questions

- What do we know about the problem?
- How useful is the information presented? Explain your thinking.

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and have them justify their thinking on a fraction problem like the one on the Learn page. Ask each to work individually and write what the two fractions could be and why. Then have students compare their writing and revise if needed. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How often were your arguments similar to your classmates'?
- What does that tell you?
- What new ideas or thinking did you gain from hearing your classmates' arguments?

Key Takeaway

- Constructing mathematical arguments and responding to the thinking and arguments of others are both important parts of doing mathematics.

Work Together

As students share out their responses, ask their classmates to evaluate the reasonableness of the argument presented.

Common Error: Students may think that there is just one argument in response to the solution presented. As students share their arguments, challenge others in the class to present a different argument.

LOM Language of Math

Be consistent in your use of the term *argument* so that it becomes part of your students' active math discourse.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students refine their proficiency with constructing arguments to support their reasoning around the concept of comparing fractions. Students also analyze the arguments of their classmates to assess their validity.

Directions: Students work in pairs or small groups on the task in the Pose the Problem.

Aisha has three fractions in mind.
Two are less than ½ and one is greater than ½.
One of the fractions is a unit fraction.
What could these fractions be?

Display these questions for students to ask themselves as they work on the problem presented:

- How can I explain your thinking?
- Do I need an exact answer or an estimate?
- How can I make sure my thinking is clear and precise?

ETP Support Productive Struggle

- What questions can you ask yourself to determine what the three fractions could be?

Activity Debrief: Before students share their solutions, have them talk through some of the questions that were displayed. Encourage students to share how they explained their thinking, whether they used words, drawings, or equations. Students can also share how they made sure their thinking is clear and precise.

Have one group share their solution with justification followed by the other groups responding to the presented solution in a respectful way. As students share their arguments, check that they are using appropriate mathematical terms. When students respond to the argument, remind them to address specifically the argument. Offer sentence starters, such as “I agree/disagree with your argument because...”

Guided Exploration

Students explore constructing of arguments to support their reasoning around the concept of comparing fractions. Students also analyze the arguments of their classmates to assess their validity.

ETP Facilitate Meaningful Discourse

Engage students in a brief discussion for the first two “When we do math,...” statements.

- What does it mean defend our thinking?
- What are some ways to defend our thinking?

Math is... Explaining

- Which way of explaining your thinking do you find most useful?

Students reflect on the importance of explaining their thinking around mathematical strategies and processes.

Students can work in pairs or small groups to find a different solution to the problem.

Math is... Sharing

- What are some strategies we can use to determine whether an argument makes sense to use?

Students consider how to evaluate an argument.

ETP Facilitate Meaningful Discourse

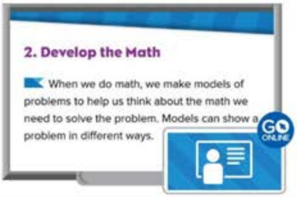
Engage students in a brief discussion for the next two “Whenwe do math,...” statements.

- Why is it important to be clear and specific when we explain our thinking?

Math is... Precision

- What are some strategies for making our arguments clear and precise?

Students consider how to communicate precisely when constructing arguments.



2. Develop the Math

When we do math, we make models of problems to help us think about the math we need to solve the problem. Models can show a problem in different ways.

EL English Learner Scaffolds

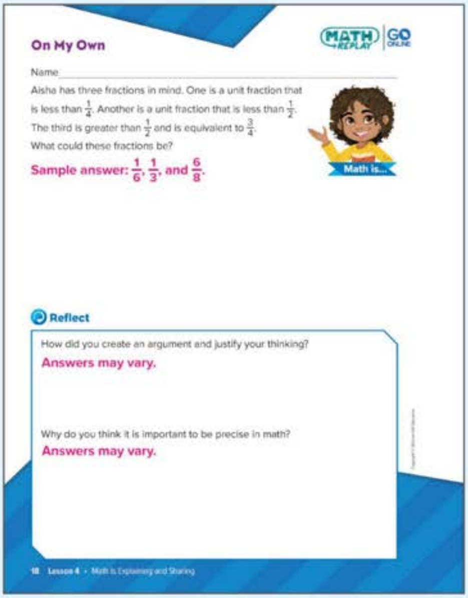
Entering/Emerging Support students in understanding the word *argument*. Point to the first box on the Learn page. Point to each argument listed and say *This is one argument. This is another argument*. Then point to other parts of the Learn page, some that show arguments and some that don’t. Ask *Is this an argument?*

Developing/Expanding Support students in understanding the word *argument*. Point to the first box on the Learn page. Point to each argument listed and say *This is one argument. This is another argument.* Then ask students to find other examples of arguments on the Learn page (second box).

Bridging/Reaching Ask students to provide arguments to justify their work on an assigned math problem. Then ask students to come up with similar words for *argument*, such as *reasoning, logic,* and *explanation*. Allow students to use a thesaurus or dictionary to find more similar words as well.

Practice & Reflect

10 min



On My Own

Name

Aisha has three fractions in mind. One is a unit fraction that is less than $\frac{1}{4}$. Another is a unit fraction that is less than $\frac{1}{2}$. The third is greater than $\frac{1}{2}$ and is equivalent to $\frac{3}{4}$. What could these fractions be?

Sample answer: $\frac{1}{6}$, $\frac{1}{3}$, and $\frac{6}{8}$.

Reflect

How did you create an argument and justify your thinking?

Answers may vary.

Why do you think it is important to be precise in math?

Answers may vary.

18 Lesson 4 • Math is Explaining and Sharing

Practice

ETP Build Fluency from Understanding

To help students build proficiency with the habits of mind for constructing arguments and critiquing the reasoning of others, have them consider these questions:

- What arguments can you construct to support your thinking?
- What terms can you use in your arguments?

Reflect

Students complete the Reflect question.

- How did you create an argument and justify your thinking?
- Why do you think it is important to be precise in math?

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

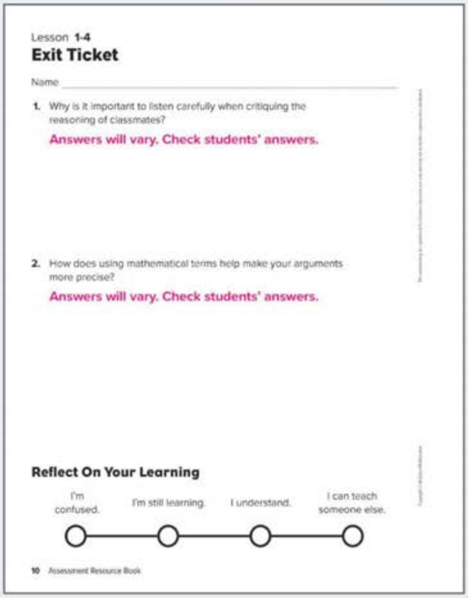
- I can construct an argument to explain my thinking.
- I can explain my thinking with clear and appropriate terms.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assess students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.


Lesson 1-4

Exit Ticket

Name ______________________

1. Why is it important to listen carefully when critiquing the reasoning of classmates?
   Answers will vary. Check students' answers.

2. How does using mathematical terms help make your arguments more precise?
   Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

10 Assessment Resource Book

LESSON **1-5**

Math Is Finding Patterns

Learning Targets

- I can use patterns to develop efficient strategies to solve problems.
- I can explain why patterns are useful to solve problems.

Standards ◆ Major ▲ Supporting ● Additional

Content

○ **4.OA.C.5** Generate a number or shape pattern that follows a given rule. Identify apparent features of the pattern that were not explicit in the rule itself.

Math Practices and Processes

MPP Look for and make use of structure.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	Academic Terms
	efficient generalizations

Materials

none

Focus

Content Objectives	Language Objectives	SEL Objective
• Students consider strategies for uncovering patterns and for using patterns to solve problems. • Students consider efficient strategies derived from repeated reasoning.	• Students talk about strategies for uncovering patterns and for using patterns to solve problems while answering *Wh-* and Yes/No questions and using the verb *can* as needed. • To support sense-making, ELs participate in MLR2: Collect and Display.	• Students practice self-control as they learn to take turns when sharing ideas with a partner or in a group.

Coherence

Previous	Now	Next
• Students refined their skill in constructing arguments and in critiquing the reasoning of their classmates.	• Students analyze and generate patterns.	• Students determine classroom norms for a productive math learning environment.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students demonstrate understanding of pattern analysis.	• Students build proficiency with analyzing and generating patterns.	• Students apply their understanding of patterns to solve problems.

Number Routine

Math Pictures 5–7 min

Build Fluency Students are shown an image of a stack of rolls of pennies. Direct students respond to the prompt, "If there are 50 pennies in a roll, are there more or fewer than 400 pennies in the picture?"

Encourage students to talk about their reasoning:

- What are some strategies you can use to estimate the number of pennies?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore the different patterns that can be seen in a sunflower.

Notice & Wonder

- What do you notice?
- What do you wonder?

See Appendix for a full description of the sense-making routines.

Teaching Tip Students may not be used to thinking about patterns in plants or animals, so you may want to model observations and questions about the pattern that can be seen in the sunflower.

ETP Pose Purposeful Questions

The questions that follow can be used in any order. They are meant to help advance students' thinking about analyzing and generating patterns and are based on possible comments and questions students may make during the share out.

- What are other examples of patterns in nature?
- What are some considerations when thinking about patterns?

Transition to Explore & Develop

Ask questions that get students thinking about patterns in our everyday lives. If students mention number patterns, incorporate those concepts into the discussion, but do not introduce number patterns otherwise. These will be explored further in the Explore & Develop.

ETP Establish Goals to Focus Learning

- Let's think about the patterns that we see in mathematics.

Lesson 1-5
Math Is Finding Patterns

Be Curious

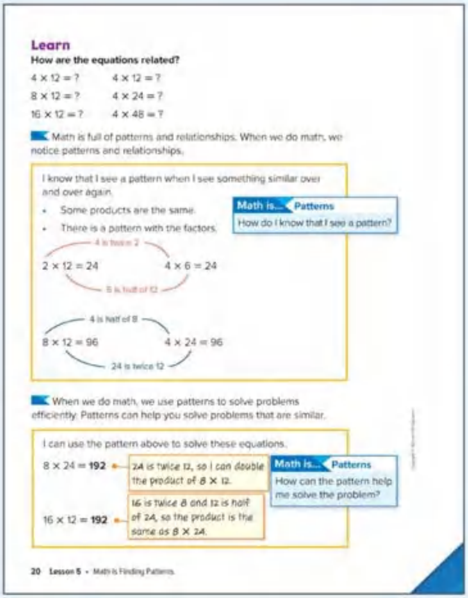
What do you notice? What do you wonder?

Be Curious

What do you notice? What do you wonder?

Explore & Develop

20 min



Learn

How are the equations related?

$4 \times 12 = ?$	$4 \times 12 = ?$
$8 \times 12 = ?$	$4 \times 24 = ?$
$16 \times 12 = ?$	$4 \times 48 = ?$

Math is full of patterns and relationships. When we do math, we notice patterns and relationships.

I know that I see a pattern when I see something similar over and over again.

- Some products are the same.
- There is a pattern with the factors.

Math is... Patterns
How do I know that I see a pattern?

$2 \times 12 = 24$ $4 \times 6 = 24$

4 is twice 2

6 is half of 12

$8 \times 12 = 96$ $4 \times 24 = 96$

4 is half of 8

24 is twice 12

When we do math, we use patterns to solve problems efficiently. Patterns can help you solve problems that are similar.

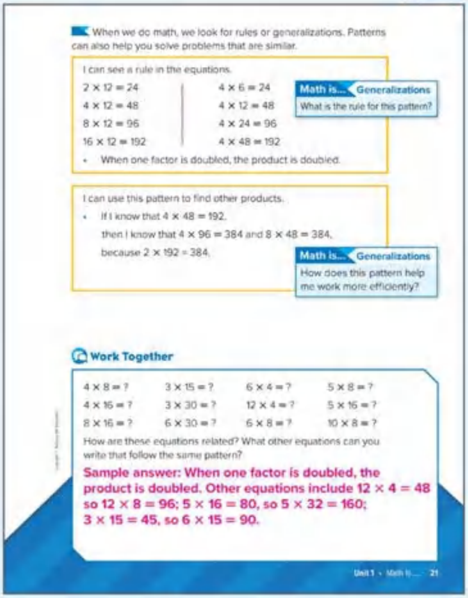
I can use the pattern above to solve these equations.

$8 \times 24 = $ **192** — 24 is twice 12, so I can double the product of 8×12.

$16 \times 12 = $ **192** — 16 is twice 8 and 12 is half of 24, so the product is the same as 8×24.

Math is... Patterns
How can the pattern help me solve the problem?

20 Lesson 5 • Math is Finding Patterns



When we do math, we look for rules or generalizations. Patterns can also help you solve problems that are similar.

I can see a rule in the equations.

$2 \times 12 = 24$	$4 \times 6 = 24$
$4 \times 12 = 48$	$4 \times 12 = 48$
$8 \times 12 = 96$	$4 \times 24 = 96$
$16 \times 12 = 192$	$4 \times 48 = 192$

- When one factor is doubled, the product is doubled.

Math is... Generalizations
What is the rule for this pattern?

I can use this pattern to find other products.

- If I know that $4 \times 48 = 192$,
  then I know that $4 \times 96 = 384$ and $8 \times 48 = 384$,
  because $2 \times 192 = 384$.

Math is... Generalizations
How does this pattern help me work more efficiently?

Work Together

$4 \times 8 = ?$	$3 \times 15 = ?$	$6 \times 4 = ?$	$5 \times 8 = ?$
$4 \times 16 = ?$	$3 \times 30 = ?$	$12 \times 4 = ?$	$5 \times 16 = ?$
$8 \times 16 = ?$	$6 \times 30 = ?$	$6 \times 8 = ?$	$10 \times 8 = ?$

How are these equations related? What other equations can you write that follow the same pattern?

Sample answer: When one factor is doubled, the product is doubled. Other equations include $12 \times 4 = 48$ so $12 \times 8 = 96$; $5 \times 16 = 80$, so $5 \times 32 = 160$; $3 \times 15 = 45$, so $6 \times 15 = 90$.

Unit 1 • Math Is... 21

❶ Pose the Problem

MLR Collect and Display

As students discuss the question, record relevant words they may use such as *patterns, relationships, products*, and *factors*. Display the words for student reference. Use the student-generated expressions to help students make connections between student language and math vocabulary.

This is the fourth of four lessons that introduce students to the habits of mind that are foundational to doing math. In this lesson, students build proficiency with analyzing patterns and making generalizations so that computation is more efficient.

ETP Pose Purposeful Questions

- What do we know about the problem?

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How did you use patterns to make generalizations?
- How did you use rules or generalizations to help you solve the equations efficiently?

Key Takeaway

- Patterns and relationships are foundational to mathematics. Helping students recognize the importance of looking for patterns and making use of these patterns in problem solving will help them become more proficient doers of math.

Work Together

Students' share out should focus mostly on the patterns in the equations.

Common Error: Students may think that doubling both factors results in a product that is just double the original product. Have students work through the product when both factors are doubled by doubling first factor and solving, then doubling the second factor.

LOM Language of Math

Check students' use of terms *patterns* and *relationships* as they describe the patterns.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore patterns in multiplication equations. Students look to make generalizations that can lead to efficient strategies.

Directions: Students work in pairs or small groups. Each group develops a series of up to 10 multiplication equations that follow a pattern. (The equations should not have solutions.)

Groups then trade their equations with those of another group. Each group describes the pattern that the equations show and a rule for solving equations efficiently using the pattern.

Display these questions for students to ask themselves as they work on the problem presented:

- What patterns can I see in the equations?
- How can the pattern help me solve the problem?
- Can this pattern help me work more efficiently?

Support Productive Struggle

- How can you sort the equations?
- Does that help you see a pattern?

Activity Debrief: Before students share their solutions, have them talk through some of the questions that were displayed. Encourage students to share the pattern(s) they noticed in the equations. Students can also share their thinking on how the patterns they noticed helped them to solve the problem.

As groups share their solutions and their reasoning based on any patterns they noticed, encourage others to respond to the reasoning presented.

Guided Exploration

Students explore patterns in multiplication equations. Students look to make generalizations that can lead to efficient strategies.

Facilitate Meaningful Discourse

Engage students in a brief discussion for the first two “When we do math,...” statements.

- How can we recognize a pattern?
- What kinds of patterns do we see in math?

Math is... Patterns

- How do we know when we see a pattern?
- How can we use the pattern to help us solve problems?

Students reflect on defining different kinds of patterns and thinking about their uses in problem solving.

Students can work in pairs or small groups to determine additional relationships between the equations.

Facilitate Meaningful Discourse

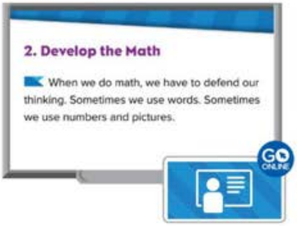
Engage students in a brief discussion for the next two “When we do math,...” statements.

- Why should we always look for patterns when solving a problem or an equation?

Math is... Generalizations

- Are there generalizations we can make about the patterns that can help us work more efficiently?

Students consider the applicability of generalizations to problem solving.



2. Develop the Math

When we do math, we have to defend our thinking. Sometimes we use words. Sometimes we use numbers and pictures.

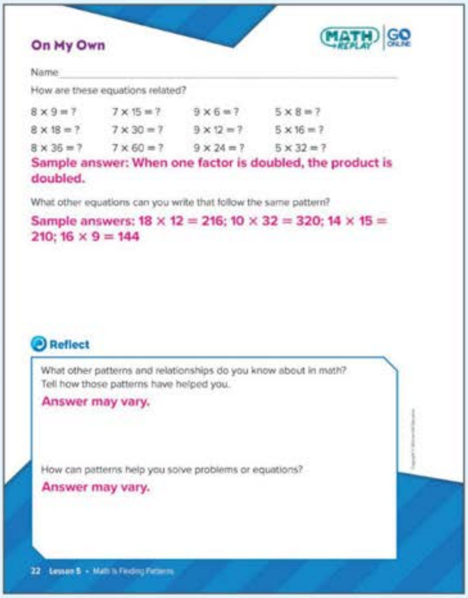
English Learner Scaffolds

Entering/Emerging Support students in understanding *If..., then.....* Go to your desk. Point to a drawer handle and say *If I pull this, it will open*. Demonstrate. Repeat the task with another object. Then go to the door and point to the doorknob. Ask *If I turn this, will the door open?* Then open a book and ask *If I close this, can I read it?*

Developing/Expanding Support students in understanding *If..., then.....* Go to your desk. Point to a drawer handle and say *If I pull this, it will open*. Demonstrate. Repeat the task with another object. Then go to the door and point to the doorknob. Ask *What will happen if I turn this?* Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to form a sentence using *If...., then....* and to demonstrate. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, that's not correct because....* or *No, if you..., then....*

Practice & Reflect 10 min



On My Own

Name

How are these equations related?

8 × 9 = ? 7 × 15 = ? 9 × 6 = ? 5 × 8 = ?
8 × 18 = ? 7 × 30 = ? 9 × 12 = ? 5 × 16 = ?
8 × 36 = ? 7 × 60 = ? 9 × 24 = ? 5 × 32 = ?

Sample answer: When one factor is doubled, the product is doubled.

What other equations can you write that follow the same pattern?

Sample answers: 18 × 12 = 216; 10 × 32 = 320; 14 × 15 = 210; 16 × 9 = 144

Reflect

What other patterns and relationships do you know about in math? Tell how those patterns have helped you.

Answer may vary.

How can patterns help you solve problems or equations?

Answer may vary.

22 Lesson 5 • Math Is Finding Patterns

Practice

Build Fluency from Understanding

To help students build proficiency with the habits of mind for analyzing patterns and making generalizations, have them consider these questions:

- What patterns do you notice?
- How can the patterns help you solve equations more efficiently?

Reflect

Students complete the Reflect questions.

- What other patterns and relationships do you know about in math? Tell how those patterns have helped you.
- How can patterns help you solve problems or equations?

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use patterns to develop efficient strategies to solve problems.
- I can explain why patterns are useful to solve problems.

Assess

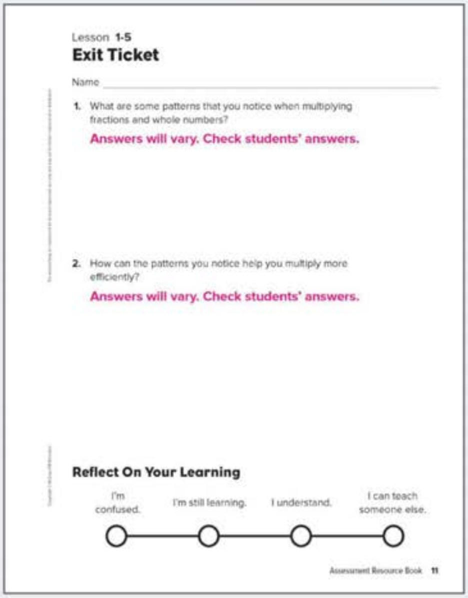
10 min

Exit Ticket

Formative Assessment

The *Exit Ticket* assess students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.



Lesson 1-5

Exit Ticket

Name ______________________

1. What are some patterns that you notice when multiplying fractions and whole numbers?

   Answers will vary. Check students' answers.

2. How can the patterns you notice help you multiply more efficiently?

   Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 11

LESSON **1-6**

Math Is Ours

Learning Targets

- I can recognize the behaviors and attitudes that support a productive classroom learning environment.
- I can identify the mindsets that help me problem solve.

Vocabulary

Math Terms	**Academic Terms**
	norms
	responsibility

Standards ◆ Major ▲ Supporting ● Additional

Content

○ **4.NF.B.3.d** Solve word problems involving addition and subtraction of fractions referring to the same whole and having like denominators.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Construct viable arguments and critique the reasoning of others.

MPP Use appropriate tools strategically.

Materials

The materials may be for any part of the lesson.

- geoboards or *Dot Paper* Teaching Resource
- pattern blocks or *Pattern Blocks 2* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students discuss classroom norms of interaction for a productive learning environment.	• Students talk about the behaviors and mindsets that contribute to a productive learning environment while answering *Wh-* and Yes/No questions and using the verb *disagree* and the adverb *respectfully* as needed. • To optimize output, ELs participate in MLR7: Compare and Contrast.	• Students make decisions about classroom norms for working productively with classmates.

Coherence

Previous	Now	Next
• Students identified the classroom norms that lead to productive math work.	• Students discuss classroom norms of interaction for a productive math learning environment. They reflect on how to problem solve effectively.	• Students continue to reflect on the behaviors and mindsets that help them work collaboratively and independently on challenging math tasks.

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students demonstrate an understanding of the expectations and agreements that promote a productive and positive learning environment	• Students develop proficiency in recognizing and reflecting upon the behaviors that support their work as doers of math.	• Students apply their understanding of a productive learning environment to contribute to a positive classroom culture.

GO ONLINE

Number Routine

Math Pictures

5–7 min

Build Fluency Students examine a photograph of decorations on hooks and estimate what fraction of the decorations are missing.

These prompts encourage students to talk about their reasoning:

- How does the word “about” in the question affect how you will find the answer?
- Is there one correct answer to this question?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about behaviors of productive group work.

Notice & Wonder

- What do you notice?
- What do you wonder?

See Appendix for a full description of the sense-making routine.

Teaching Tip You may want to facilitate a think-pair-share in order to encourage student participation. This may help students feel more at ease sharing their initial thoughts about the image.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about the mindsets and behaviors that facilitate group work, both in general and when learning math and are based on possible comments and questions students may make during the share out.

- What might the students be working on?
- If this image became a video (in other words, went from a still shot into a video recording), what do you think you would see and hear?
- What is hard about sharing a device with another student? What is fun about it?
- What do you like about group work? What do you like about individual work?

Transition to Explore & Develop

Ask questions to get students thinking about the factors that help make the classroom a productive learning environment.

ETP Establish Goals to Focus Learning

- Let's think about what helps make our classroom a positive and productive place to learn.

Lesson 1-6
Math Is Ours

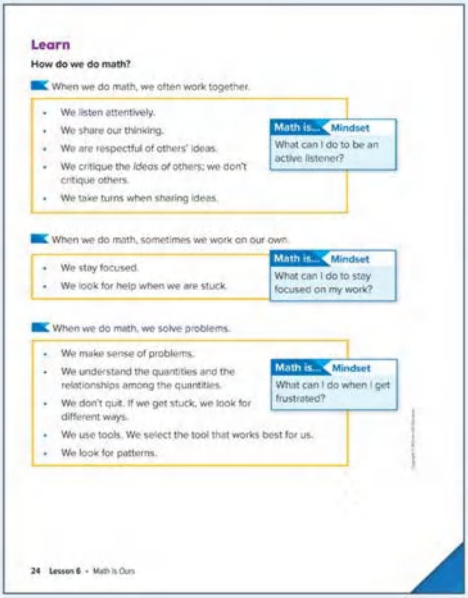
Be Curious

What do you notice?
What do you wonder?

Be Curious

What do you notice?
What do you wonder?

Explore & Develop 20 min



Learn

How do we do math?

When we do math, we often work together.

- We listen attentively.
- We share our thinking.
- We are respectful of others' ideas.
- We critique the *ideas of others*; we don't critique others.
- We take turns when sharing ideas.

Math is... Mindset
What can I do to be an active listener?

When we do math, sometimes we work on our own.

- We stay focused.
- We look for help when we are stuck.

Math is... Mindset
What can I do to stay focused on my work?

When we do math, we solve problems.

- We make sense of problems.
- We understand the quantities and the relationships among the quantities.
- We don't quit. If we get stuck, we look for different ways.
- We use tools. We select the tool that works best for us.
- We look for patterns.

Math is... Mindset
What can I do when I get frustrated?

24 Lesson 6 • Math Is Ours

Work Together

1. What rules should we have when we share our thinking with classmates?
   Answers may vary.
2. What can you do to help all classmates feel comfortable in math class?
   Answers may vary.
3. How do we use tools responsibly?
   Answers may vary.
4. How can I know when I need help?
   Answers may vary.

Unit 1 • Math Is... 25

❶ Pose the Problem

In this lesson, students establish the classroom norms that foster the development of the mathematical habits of mind and thinking habits that have been focus of previous lessons.

ETP Pose Purposeful Questions

- **Think About It:** How do we do math?
- What behaviors and mindsets help us do math?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Contrast

Pair students and prompt them to identify and explain ways they can do math, e.g. work together, work on their own, and solve problems. Have them compare the strategies, reflect on how they are the same and different, then discuss their preferences for one or the other approach.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- What class agreements can help us do our best math work?
- What attitudes help us as doers of math?

Key Takeaways

- For group work to be productive, we must listen attentively, share our thinking, and be respectful of others.
- To productively work on our own, we should stay focused and ask for help when we are stuck.
- A natural part of doing math is working through challenges. Certain mindsets and behaviors can help us as we work through challenges.

Work Together

Students think further about rules and practices that support classroom math work. You may want to have students work in pairs on the activity before sharing their work.

Common Misconception: Students may believe that successful groups do not ever disagree. Explain that disagreements can lead to new ideas and creative group problem-solving.

LOM Language of Math

Model for students appropriate mathematical language around problem solving, making clear the difference between a problem and an exercise or an assessment item.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students work in groups on an open-ended math problem and reflect upon the process of working collaboratively.

Materials:

Option 1: pattern blocks, virtual pattern blocks, or *Pattern Blocks 2* Teaching Resource

Option 2: geoboards and rubber bands (1 board and 16 bands per group), virtual geoboards, or *Dot Paper* Teaching Resource

Directions: Groups work together on one of the following problems:
Option 1: Pattern Block Challenge The hexagon is worth 1 whole. Use pattern blocks to create a design that is equal to 10 wholes.

Option 2: Geoboard Challenge Using 12 to 16 rubber bands, create a design that appears the same as you turn it, no matter which side of the geoboard is up.

As students work in groups, encourage them to observe how their groups communicate, cooperate, cultivate inclusivity, and deal with conflict.

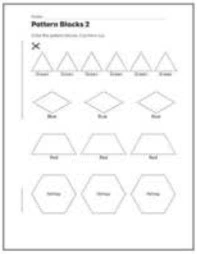
Support Productive Struggle

- How are you communicating your ideas when you disagree?
- How can you work through conflict when collaborating with others?
- Is the finished work going to the look the same as it would have if you had worked on it by yourself?

Activity Debrief: Review the classroom behaviors and skills that support productive learning. As students share, ask them to think about these questions.

Math is... Mindset

- What can you do to be an active listener?
- What can you do to stay focused on your work?
- What can you do when you feel frustrated?



PDFs of the Teaching Resources are available in the Digital Teacher Center.

Guided Exploration

Students think about what behaviors and attitudes support productive group work and individual work. They also consider strategies that help them work through challenging math problems. Model active listening and allow students to share any thoughts or feelings they have about the topics being discussed. Explore with students the role of conflict in group work and the skills students can use to work through disagreements as they arise.

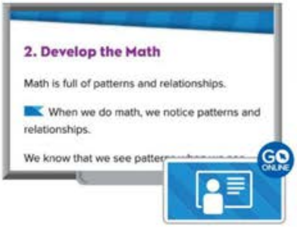
Facilitate Meaningful Discourse

- What are the benefits of group work? What are the challenges?
- How can we ensure that all members of a group are included?
- What does respect look like when working with others on math?
- How can we disagree while remaining respectful?
- What habits help us work independently?
- What can we do when we get stuck on a challenging math problem?

Have students discuss with a partner what they do when they get frustrated doing math.

Math is... Mindset

- What can you do to be an active listener?
- What can you do to stay focused on your work?
- What can you do when you feel frustrated?



2. Develop the Math

Math is full of patterns and relationships.

When we do math, we notice patterns and relationships.

We know that we see patte

English Learner Scaffolds

Entering/Emerging Support students' understanding of *work together* and *on your own*. Work on a task by yourself. Say *I'm working on my own*. Have a student help you. Say *We're working together*. Group students, some individually and others in pairs or groups, and assign them a task. Say *Point to a student who is working on their own*. Then say *Point to students who are working together.*

Developing/Expanding Support students' understanding of *work together* and *on your own*. Work on a task by yourself. Say *I'm working on my own*. Have a student help you. Say *We're working together*. Then ask students to repeat the task, using *on my own* and *working together.* Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to talk about the pros and cons of both *working together* and *on your own* and to explain their reasoning. Provide sentence prompts when necessary and suggest to students that they think of similar-meaning words and phrases that may help them with their explanations, such as *individually/by myself* or *working in pairs/groups.*

Practice & Reflect

10 min

On My Own

Name

What are two promises our class can make so that we always work well together?

Answers may vary.

Reflect

What are my responsibilities to make sure we can all learn math productively?

Answers may vary.

26 Lesson 6 • Math Is Ours

Practice

Build Fluency from Understanding

To help students think about promises the class can make in order to work well together, have them consider these questions:

- Imagine you are observing a group working well together. What would you see and hear?
- What helps you focus when working on your own?
- What steps can you take when you are working on a challenging math problem?

Reflect

Students complete the Reflect question.

- What are my responsibilities to make sure we can all learn math productively?

Ask students to share their reflections with their classmates.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

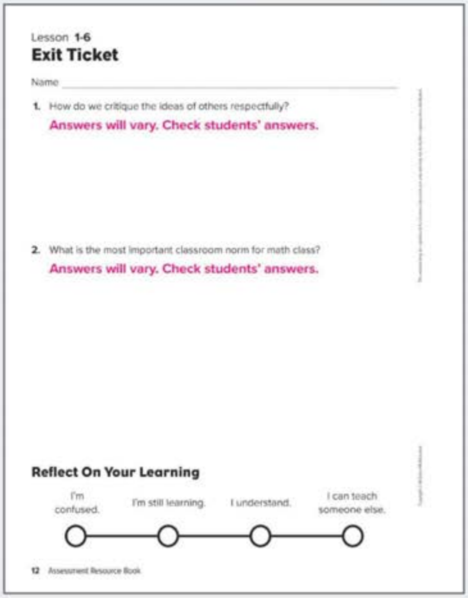
- I can recognize the behaviors and attitudes that support a productive classroom learning environment.
- I can identify the mindsets that help me problem solve.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assess students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.



Lesson 1-6

Exit Ticket

Name ______________________________

1. How do we critique the ideas of others respectfully?

   Answers will vary. Check students' answers.

2. What is the most important classroom norm for math class?

   Answers will vary. Check students' answers.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

12 Assessment Resource Book

Unit Review

Unit Review Name

Vocabulary Review

1. What does it mean to defend your thinking?
   Answers may vary.
2. Why is a plan to solve a problem important?
   Answers may vary.
3. How can we decide which tool to use to solve a problem?
   Answers may vary.
4. What are some examples of patterns in the math you did last year?
   Answers may vary.

Unit 1 • Math is... 27

Review

What should be our classroom norms for doing math?
Write up to 5 norms. Answers may vary.

1.
2.
3.
4.
5.

Reflect

Choose one of the norms you wrote and tell why it is important.
Answers may vary.

28 Unit 1 • Review

Students can complete the **Unit Review** to review concepts presented in the unit. Students may complete the Review in their Interactive eBook in the Digital Student Center.

Fluency Practice

Fluency practice helps students develop procedural fluency, that is, the "ability to apply procedures accurately, efficiently, and flexibly." Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students practice using partial sums to add.

Fluency Progression

Unit	Skill	Standard
1	**Use Partial Sums to Add**	**4.NBT.B.4**
2	Decompose by Place Value to Subtract	4.NBT.B.4
3	Use an Algorithm to Add	4.NBT.B.4
4	Use an Algorithm to Subtract	4.NBT.B.4
5	Choose a Strategy to Add	4.NBT.B.4
6	Choose a Strategy to Subtract	4.NBT.B.4
7	Multiply by Multiples of 10	5.NBT.B.5
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4

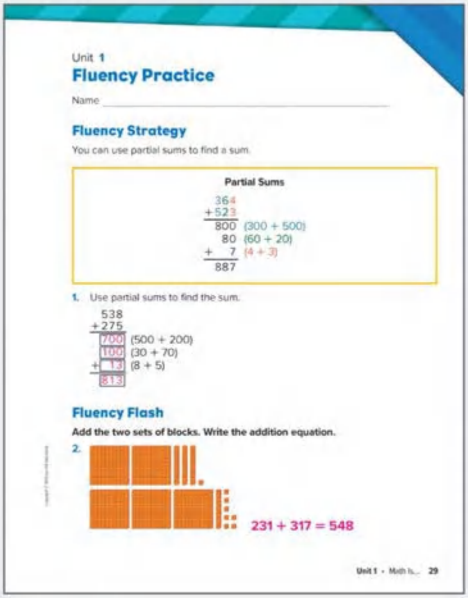
- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.



Unit 1

Fluency Practice

Name ____________________

Fluency Strategy

You can use partial sums to find a sum.

Partial Sums

$$\begin{array}{rl} 364 & \\ +523 & \\ \hline 800 & (300+500) \\ 80 & (60+20) \\ +\quad 7 & (4+3) \\ \hline 887 & \end{array}$$

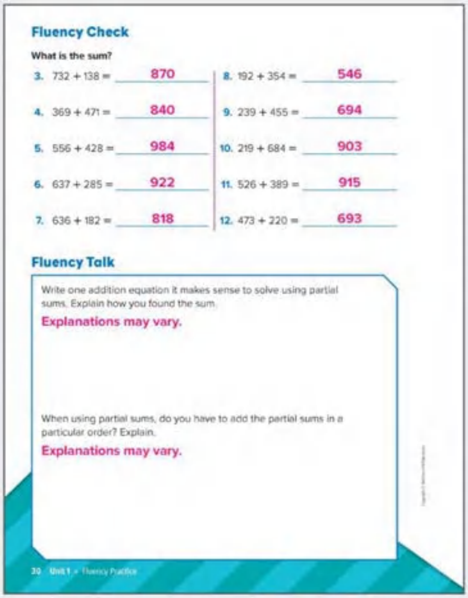
1. Use partial sums to find the sum.

$$\begin{array}{rl} 538 & \\ +275 & \\ \hline \boxed{700} & (500+200) \\ \boxed{100} & (30+70) \\ +\boxed{13} & (8+5) \\ \hline \boxed{813} & \end{array}$$

Fluency Flash

Add the two sets of blocks. Write the addition equation.

2. 231 + 317 = 548



Fluency Check

What is the sum?

3. 732 + 138 = 870
4. 369 + 471 = 840
5. 556 + 428 = 984
6. 637 + 285 = 922
7. 636 + 182 = 818
8. 192 + 354 = 546
9. 239 + 455 = 694
10. 219 + 684 = 903
11. 526 + 389 = 915
12. 473 + 220 = 693

Fluency Talk

Write one addition equation it makes sense to solve using partial sums. Explain how you found the sum.

Explanations may vary.

When using partial sums, do you have to add the partial sums in a particular order? Explain.

Explanations may vary.

30 Unit 1 • Fluency Practice

UNIT 2 PLANNER
Volume

PACING: 10 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! Painted Cubes Students use connecting cubes to build a cube. They relate what they build to volume.			
2-1 Understand Volume	Students understand volume is a measurable attribute of 3-dimensional figures. Students understand that a rectangular prism can be packed using unit cubes with no gaps or overlaps to establish volume.	• Students talk about ways to measure volume using the verb *find*.	Students use prior knowledge and new understanding of mathematical concepts to complete a task, building stronger self-efficacy.
2-2 Use Unit Cubes to Determine Volume	Students determine the volume of a rectangular prism by counting unit cubes. Students determine the volume of a retangular prism by multiplying the number of unit cubes in one layer by the number of layers.	• Students discuss how to determine the volume of any 3-dimensional solid by counting unit cubes while answering *Wh-* questions.	Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing thoughtful and constructive feedback.
2-3 Use Formulas to Determine Volume	Students determine the volume of rectangular prisms using formulas.	• Students explain how to determine the volume of rectangular prisms using formulas while answering *Wh-* and Yes/No questions and using the term *dimensions*.	Students practice strategies for persisting at a mathematical task, such as setting a small goal or setting timers for remaining focused.
Math Probe Volume of Rectangular Prisms Gather data on students' understanding of determining volume of rectangular prisms.			
2-4 Determine Volume of Composite FIgures	Students determine the volume of composite solid figures.	• Students discuss how to determine the volume of composite solid figures while answering *Wh-* questions.	Students engage in active listening and work collaboratively with a partner to complete mathematical tasks.
2-5 Solve Problems Involving Volume	Students apply the volume formulas to solve real-world problems involving rectangular prisms.	• Students talk about applying the volume formula to solve real-world problems using the adjective *given*.	Students determine the strategies and analyses necessary to make informed decisions when engaging in mathematical practices.
Unit Review **Fluency Practice**			
Unit Assessment **Performance Task**			

FOCUS QUESTION:
How can I find the volume of rectangular prisms?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	Academic Terms			
2-1	rectangular prism unit cube volume	analyze establish	• *Nets* Teaching Resource • centimeter cubes • marbles, beans, or other measurement units	Conceptual Understanding	5.MD.C.3 5.MD.C.3.a
2-2	cubic unit unit cube volume	debate suggest	• centimeter cubes • *Nets* Teaching Resource	Conceptual Understanding Procedural Skill & Fluency	5.MD.C.3.a 5.MD.C.3.b 4.MD.C.4
2-3	base (of a solid) formula	assert evaluate	• cubes	Conceptual Understanding Procedural Skill & Fluency Application	5.MD.C.5.a 5.MD.C.5.b
2-4	composite solid figure formula	complex speculate	• *Nets* Teaching Resource • ruler • unit cubes	Conceptual Understanding Procedural Skill & Fluency Application	5.MD.C.5.c
2-5	equation formula unknown variable	relevant valid	• *Problem-Solving Tool* Teaching Resource	Procedural Skill & Fluency Application	5.MD.C.5.b

Unit Overview

Focus

Volume

In this unit, students explore measurable attributes of different figures and discover that all 3-dimensional figures have a measurable attribute of the space inside, which is called volume. They discover that volume can be measured by packing the figure with unit cubes and that there must be no gaps or overlaps of the unit cubes.

Students extend their understanding of multiplication as equal groups to discovered that the volume of a rectangular prism can be calculated by multiplying the number of unit cubes in one layer by the number of layers. Students generalize methods for calculating volume of rectangular prisms to derive the formulas $V = l \times w \times h$ and $V = B \times h$.

Students discover that volume is additive. They can calculate the volume of composite solid figures by decomposing the figure into rectangular prisms, then add the volumes.

Students apply the volume formulas to solve real-world problems, including problems involving unknown dimensions.

Coherence

What Students Have Learned

- **Area** Students described area as an attribute of plane figures and understood concepts of area measurement. (Grade 3)

What Students Are Learning

- **Volume** Students describe volume as an attribute of solid figures and understand concepts of volume measurement.
- **Determining Volume** Students determine volumes by counting unit cubes and using formulas.
- **Composite Solid Figures** Students determine volumes of composite solid figures.
- **Real-World Problems** Students solve real-world volume problems.

What Students Will Learn

- **Volume** Students find the volume of a right rectangular prism with fractional edge lengths. (Grade 6)

Rigor

Conceptual Understanding

Students develop understanding of
- volume as an attribute;
- concepts of volume measurement.

Procedural Skill and Fluency

Students build proficiency with
- counting cubes to determine volume;
- using formulas to determine volume;
- determining the volume of composite solid figures.

Application

Students apply their knowledge of
- using volume formulas to solve real-world volume problems;
- decomposing figures to solve real-world volume problems.

ETP Effective Teaching Practices

Elicit and Use Evidence of Student Thinking

Look for evidence of student thinking and evaluate their growth toward conceptual understanding. Before, during, and after learning a new skill or concept, students should be assessed to see if they are understanding the new information or if they have any misconceptions of past information. Collecting evidence of students' thinking can be as simple as asking clarifying questions or it can be as complex as having students complete an in-depth project.

Assessment is continuous because students' understanding drives instruction. Sometimes topics that have been previously covered need to be approached in a different way because students may be struggling with a prior topic that is stopping future learning from occurring.

As you encounter different concepts in these lessons, spend time using evidence of student thinking to advance instruction.

- Determine what evidence you will be looking for and how you will respond based on students' learning trajectories. Use this evidence in planning next steps in your instruction.
- Ask students why they chose a particular strategy to represent their work. Take note of their reasoning and equations in order to facilitate the share portion of the lesson.
- As students engage in mathematical discourse, determine how to respond to what they say in order to deepen their conceptual understanding.

MPP Mathematical Practices and Processes

Model With Mathematics

Using and connecting multiple mathematical representations is an important first step in helping students build proficiency with using models in math.

When students model with mathematics, they use different representations, especially visual and concrete representations, to help them solve problems. As they model the mathematics, they build an understanding of which representations better help them reach a solution. Building proficiency with modeling the mathematics using different representations provides a strong foundation to help students become problem-solvers. Building the foundation for modeling with mathematics prepares students for their middle and high school work.

To help students build proficiency with modeling, students need opportunities to interact with different representations. Some suggestions for building proficiency include:

- Students should recognize that if a rectangular prism were packed with unit cubes, the area of the base represents the number of cubes in each layer, and the height represents the number of layers.
- Students use unit cubes to build 3-dimensional figures, allowing them to apply the mathematics necessary to solve problems.
- As students seek to determine the volume of rectangular prisms or a missing dimension given the volume, they need to consider what information they have. Encourage students to state the formula they are using and the variables whose values they know before solving for an unknown variable.

SEL Social and Emotional Learning

What Skills Will We Develop?

- **Self-Awareness: Self-Efficacy** (Lesson 2-1) Students with high self-efficacy are more likely to persevere to complete a challenging task.
- **Social Awareness: Appreciate Diversity** (Lesson 2-2) Diversity appreciation can help students collaborate well with peers.
- **Self-Management: Control Impulses** (Lesson 2-3) Students who can control their impulses are more likely to persist through challenging tasks.
- **Relationship Skills: Build Relationships** (Lesson 2-4) Building positive relationships can help establish a strong classroom community.
- **Responsible Decision-Making: Solve Problems** (Lesson 2-5) Efficient problem solvers can make informed decisions that lead to solutions.

Unit Overview

Language of Math

Vocabulary

Students will be using these key terms in this unit:

- **Volume*** (Lesson 2-1): This is a new term. It is a measure of the amount of space occupied by a 3-dimensional figure.
- **Unit cube*** (Lesson 2-1): This is also new term. Students were introduced to unit squares when determining area in Grade 3.
- **Cubic unit*** (Lesson 2-2): This is also a new term. Students were introduced to different kinds of units when determining area in Grade 3. They may be more familiar with square units.
- **Formula*** (Lesson 2-3): This is also a new term. A formula is an equation that represents the relationship between two or more quantities. Students may recall the area formula used in Grade 4.
- **Rectangular prism*** (Lesson 2-3): This is also a new term. A rectangular prism has six rectangular faces.
- **Composite solid figure*** (Lesson 2-4): This is also a new term. Students found the area of composite 2-dimensional figures in Grade 3.

*This is a new term.

Math Language Development

A Focus on Listening

Listening to mathematical concepts can be extremely helpful because listening to other strategies and explanations can be eye-opening and informative. Students may have never even considered a certain approach to a problem or may discover that they did not understand the problem or concept correctly.

However, listening to other strategies and explanations can also be difficult if students do not agree with the explanations, if the explanations are more complex than they need to be, or if students cannot grasp the concepts. In these cases, students may need alternate explanations of concepts and problems or discussions about whether the strategies are correct.

In this unit, students can listen to explanations about mathematical topics in order to gain a better understanding about

- how to find volume using the terms unit cubes and cubic units correctly;
- how to find the volume of a rectangular prism using key terms;
- the decision-making process involved with decomposing figures;
- how to find unknown edge lengths;
- what strategies worked and what strategies did not work as students attempted to solve volume problems.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain volume. Because many of the words and phrases used in this section are likely unfamiliar or unknown, students are supported in understanding and using these words.

Lesson 2-1 – *fill, pack*
Lesson 2-2 – *gap, overlaps*
Lesson 2-3 – *dimensions*
Lesson 2-4 – *that compose it*
Lesson 2-5 – *given*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

Would You Rather?

Purpose: Build flexility with number sense and mental math operations; enhance decision-making.
Overview: Students choose between two options, both of which require mental computation. Students explain their choice and their rationale for their choice.

Can You Make the Number?

Purpose: Build flexibility with numbers.
Overview: Students use all the given numbers to build expressions with a value matching the target number. Students can use a range of operations in their expressions. The teacher records students' expressions, then facilitates a discussion about students' expressions.

Where Does It Go?

Purpose: Build estimating skills using benchmarks.
Overview: Students place a target number on number lines with different endpoints and justify their placement. In some instances, as a challenge, the target number may not actually belong on one of the number lines.

Sense-Making Routines

Notice and Wonder™: How are they the same? How are they different? (Lessons 2-1, 2-4, 2-5) In Lesson 2-1, students discuss and share their thoughts about similarities and differences among 2-dimensional and 3-dimensional objects.

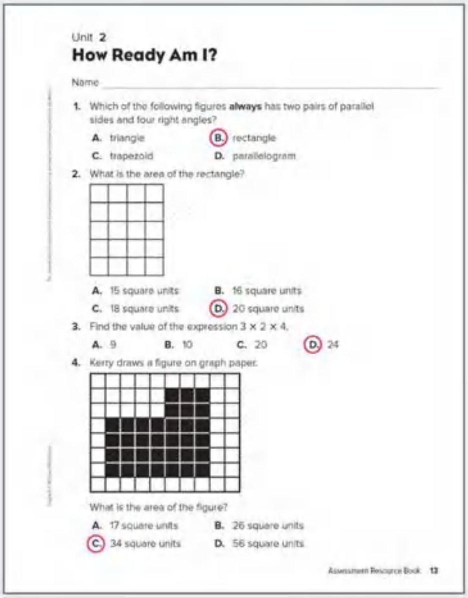
Notice and Wonder™: What do you notice? What do you wonder? (Lessons 2-2, 2-3) In Lesson 2-2, students discuss and share their thoughts about filling a space with objects so that there are no gaps or overlaps.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. These routines can also be used as formative assessment opportunities as students develop proficiency in English and mathematical language. They can be used in ways that support real-time-, peer-, and self-assessment. For more information on the Mathematical Language Routines, see the Appendix.

- **Lesson 2-1** – In order to support sense-making and maximize linguistic, students participate in MLR2: Collect and Display so that students' oral words and phrases can be captured into a stable, collective reference.
- **Lesson 2-2** – In order to optimize output, students participate in MLR3: Critique, Correct, and Clarify so that they have an opportunity to analyze, reflect on, and develop a piece of mathematical writing that is not their own.
- **Lesson 2-3** – In order to support cognitive meta-awareness and optimize output, students participate in MLR1: Stronger and Clearer Each Time so that students have a structured and interactive opportunity to revise and refine both their ideas and their verbal and written output while solving such problems.
- **Lesson 2-4** – In order to optimize output, students participate in MLR5: Co-Craft Questions and Problems so that they have a structured and interactive opportunity to create, solve, and share their own problems for determining the volume of composite solid figures.
- **Lesson 2-5** – In order to cultivate conversation and optimize output, students participate in MLR8: Discussion Supports so that they can have a rich and inclusive discussion about the tools and strategies they can use to apply volume to solve real-world problems.

Readiness Diagnostic



Unit 2

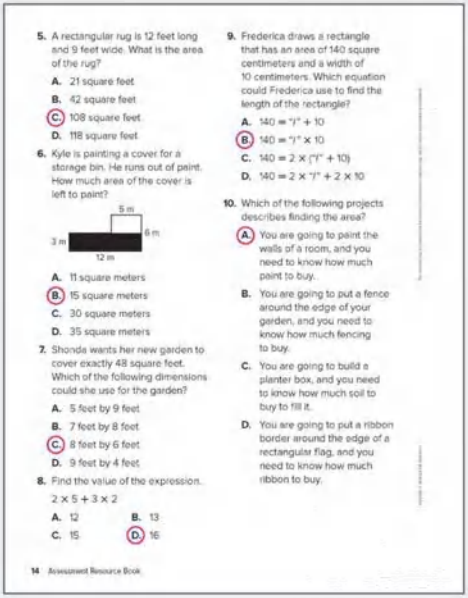
How Ready Am I?

Name ______________________

1. Which of the following figures **always** has two pairs of parallel sides and four right angles?
   - A. triangle
   - [✓ B.] rectangle
   - C. trapezoid
   - D. parallelogram
2. What is the area of the rectangle?
   - A. 15 square units
   - B. 16 square units
   - C. 18 square units
   - [✓ D.] 20 square units
3. Find the value of the expression 3 × 2 × 4.
   - A. 9
   - B. 10
   - C. 20
   - [✓ D.] 24
4. Kerry draws a figure on graph paper.

   What is the area of the figure?
   - A. 17 square units
   - B. 26 square units
   - [✓ C.] 34 square units
   - D. 56 square units

Assessment Resource Book 13



5. A rectangular rug is 12 feet long and 9 feet wide. What is the area of the rug?
   - A. 21 square feet
   - B. 42 square feet
   - [✓ C.] 108 square feet
   - D. 118 square feet
6. Kyle is painting a cover for a storage bin. He runs out of paint. How much area of the cover is left to paint?

   5 m, 6 m, 3 m, 12 m
   - A. 11 square meters
   - [✓ B.] 15 square meters
   - C. 30 square meters
   - D. 35 square meters
7. Shonda wants her new garden to cover exactly 48 square feet. Which of the following dimensions could she use for the garden?
   - A. 5 feet by 9 feet
   - B. 7 feet by 8 feet
   - [✓ C.] 8 feet by 6 feet
   - D. 9 feet by 4 feet
8. Find the value of the expression.

   2 × 5 + 3 × 2
   - A. 12
   - B. 13
   - C. 15
   - [✓ D.] 16
9. Frederica draws a rectangle that has an area of 140 square centimeters and a width of 10 centimeters. Which equation could Frederica use to find the length of the rectangle?
   - A. 140 = "l" + 10
   - [✓ B.] 140 = "l" × 10
   - C. 140 = 2 × ("l" + 10)
   - D. 140 = 2 × "l" + 2 × 10
10. Which of the following projects describes finding the area?
    - [✓ A.] You are going to paint the walls of a room, and you need to know how much paint to buy.
    - B. You are going to put a fence around the edge of your garden, and you need to know how much fencing to buy.
    - C. You are going to build a planter box, and you need to know how much soil to buy to fill it.
    - D. You are going to put a ribbon border around the edge of a rectangular flag, and you need to know how much ribbon to buy.

14 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

Targeted Intervention

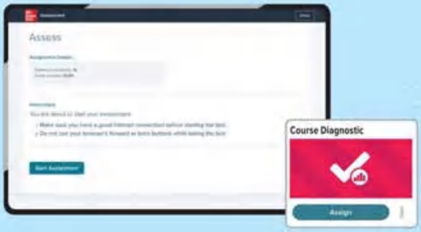
Use Guided Support Intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	3	Identify 2-D figures	Use Lines to Classify Shapes	4.G.A.2
2	1	Find area of rectangles by counting tiles	Area Using Tiling and Counting	3.MD.C.6
3	1	Evaluate expressions using Associative Property of Multiplication	Multiply Three Numbers	3.OA.B.5
4	2	Decompose composite figures to find area	Decompose Shapes to Find Area (Grids)	3.MD.C.7.d
5	2	Use a formula to find area	Area of Rectangles and Squares	4.MD.A.3
6	2	Find area in composite figures	Decompose Shapes to Find Area	3.MD.C.7.d
7	2	Understand area	Area of Rectangles and Squares	4.MD.A.3
8	1	Evaluate expressions	Reorder Factors	3.OA.B.5
9	2	Write equations to find unknown dimension	Area of Rectangles and Squares	4.MD.A.3
10	2	Identify finding area situations	Calculate Perimeter and Area	4.MD.A.3

GO ONLINE

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.



Focus Question

Introduce the Focus Question, *How can I find the volume of rectangular prisms?*

Ask students to think about what they know about volume of rectangular prisms.

- Do you know what it means to find the volume of rectangular prisms?
- What do you already know about finding volume of rectangular prisms?
- What do you think you will be doing in the unit?

Remind students that at the end of the unit, they will reflect back on what they learned in this unit.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.

Unit 2

Volume

Focus Question

How can I find the volume of rectangular prisms?

Hi, I'm Hiro.

I want to be an ocean engineer. Ocean engineers help build devices to explore the ocean. An ocean engineer might build a waterproof case for a camera. After they determine the camera's volume, they know that the case should be at least that big!

STEM video GO ONLINE

31

STEM in Action

Videos

Students can watch the two STEM videos.

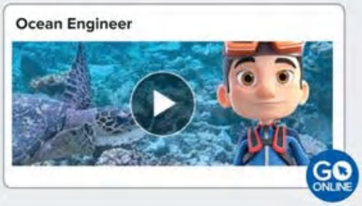
Ocean Engineer Hiro talks about the work of an ocean engineer.

Hiro Finds the Volume of a Waterproof Case Hiro explains how to find the volume of his camera.

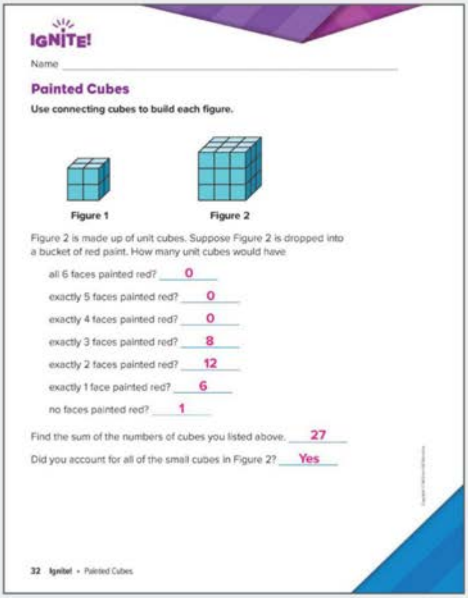
STEM Project

Students can complete the STEM project during their workstation time.

Ocean Engineer



Hiro Finds the Volume of a Waterproof Case



IGNITE!

Name ____________________

Painted Cubes

Use connecting cubes to build each figure.

Figure 2 is made up of unit cubes. Suppose Figure 2 is dropped into a bucket of red paint. How many unit cubes would have

all 6 faces painted red? 0

exactly 5 faces painted red? 0

exactly 4 faces painted red? 0

exactly 3 faces painted red? 8

exactly 2 faces painted red? 12

exactly 1 face painted red? 6

no faces painted red? 1

Find the sum of the numbers of cubes you listed above. 27

Did you account for all of the small cubes in Figure 2? Yes

32 Ignite! • Painted Cubes

Ignite!

Painted Cubes

Students use connecting cubes to build a larger cube. They relate what they build to faces and volume.

Material: 30 connecting cubes for each group

1. Direct students to Figure 1.
   - What are the dimensions of the large cube?
2. Have students work in pairs to build a 2 × 2 × 2 cube using connecting cubes.
   - How many connecting cubes are needed to make a 2 × 2 × 2 cube?
   - How could you determine the number of connecting cubes needed without counting them one-by-one?
3. Have students imagine dipping the entire 2 × 2 × 2 cube into a bucket of red paint. The entire outer surface of the cube would now be red.
   - For each cube, how many of its faces would be red? How many would not be red?
4. Direct students to Figure 2.
   - How could you determine the total number of small cubes in Figure 2 without counting them one-by-one?
   - Based on your findings for Figures 1 and 2, how could you determine the total number of small cubes needed to make 4× 4 × 4 cube?
5. Have students use connecting cubes to build a 3 × 3 × 3 cube.
   - Are there any connecting cubes in the cube you built that cannot be seen at all? Explain.
6. Have students answer the questions on the student page for Figure 2 for dipping a 3 × 3 × 3 cube into a bucket of red paint.
   - How many connecting cubes would have ... all 6 faces painted red? Where are they? exactly 5 faces painted red? Where are they? exactly 4 faces painted red? Where are they? exactly 3 faces painted red? Where are they?

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

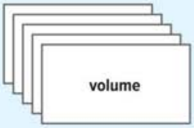
	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with finding the volume of rectangular prisms.	
		• **Volume Sort**	2-1
		• **Volume Sort**	2-2
		• **Volume Showdown**	2-3
		• **Additive Volume Task Cards**	2-4
		• **Volume Situation Concentration**	2-5
Digital Station	Digital Game	**Dino Dig** Students practice multiplying to find area.	2-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**Developing and Using Models** Students create a scale model of a kitchen cabinet.	2-5
	Connection Card	**Harvesting Water** Students plan and build a model of a rainwater harvesting reservoir.	2-4
	Real World Card	**You Are a Computer Programmer** Students design a computer program to find the volume of a rectangular prism.	2-3

Additional Resources

Use the resources below to provide additional support for this unit.

Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the key terms on the front side of the card.



Foldables

Use the unit foldables with Lessons 2-3 and 2-4.

Spiral Review

Students can complete the Spiral Review at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
2-1	4.OA.A
2-2	4.NBT.A
2-3	4.NBT.B
2-4	4.NF.A
2-5	4.NF.B

LESSON **2-1**

Understand Volume

Learning Targets

- I can describe volume as an attribute of solid figures.
- I can describe how rectangular prisms can be packed using unit cubes with no gaps or overlaps.

Standards ◇ Major △ Supporting ● Additional

Content

◇ **5.MD.C** Geometric measurement: understand concepts of volume and relate volume to multiplication and to addition.

◇ **5.MD.C.3** Recognize volume as an attribute of solid figures and understand concepts of volume measurement.

◇ **5.MD.C.3.a** A cube with side length 1 unit, called a "unit cube," is said to have "one cubic unit" of volume, and can be used to measure volume.

Mathematical Practices and Processes

MPP Attend to precision.

MPP Look for and make use of structure.

Vocabulary

Math Terms	Academic Terms
rectangular prism	analyze
unit cube	establish
volume	

Materials

The materials may be for any part of the lesson.

- centimeter cubes
- marbles, beans, or other measurement units
- *Nets* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students understand volume is a measurable attribute of 3-dimensional figures. • Students understand that a rectangular prism can be packed using unit cubes with no gaps or overlaps to establish volume.	• Students talk about ways to measure volume using the verb *find*. • In order to support sense-making and maximizing linguistic, ELs will participate in MLR2: Collect and Display.	• Students use prior knowledge and new understanding of mathematical concepts to complete a task, building stronger self-efficacy.

Coherence

Previous	Now	Next
• Students described area as an attribute of plane figures and explained concepts of area measurement (Grade 3).	• Students describe volume as an attribute of solid figures and understand concepts of volume measurement.	• Students measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units (Unit 2). • Students find the volume of a right rectangular prism with fractional edge lengths (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students develop understanding of volume as the amount of space taken up by a solid object.	• Students develop proficiency with determining volume. *Procedural skill and fluency is not a targeted element of rigor for this standard.*	• Students apply their understanding of volume in different situations. *Application is not a targeted element of rigor for this standard.*

Number Routine
Would You Rather?

Build Fluency Students build skills with multiplication and finding area as they compare measurements.
These prompts encourage students to talk about their reasoning:

- What strategies did you use in finding your answer?
- What do you know about the sizes of the yards?

Launch 5–7 min

Sense-Making Routine

Purpose Students notice similarities and differences among 2-dimensional and 3-dimensional objects.

Notice & Wonder™

- How are they the same?
- How are they different?

Teaching Tip You may wish to have students use physical objects in the classroom, such as a tissue box, pencil box, and construction paper, to compare and contrast attributes of 2-dimensional and 3-dimensional objects.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' recognition of volume as a measurable attribute of solid figures and are based on possible comments students may make during the share out.

- How can you establish if a figure has length, width, and height?
- How can you measure a 2-dimensional figure?
- How can you measure a 3-dimensional figure?

Math is... Mindset

- What do you already know that can help you with today's work?

SEL Self-Awareness: Self-Efficacy

As students work through the Notice & Wonder™ routine, provide specific, constructive feedback that can help guide each student toward task-completion. This sense of completion can enhance feelings of self-efficacy in mathematics as well as provide models for peers. As students work with understanding volume throughout the lesson, encourage them to connect and use their prior knowledge of area. Encouraging use of prior knowlede can help students feel more competent and promote stronger self-efficacy.

Transition to Explore & Develop

ETP Establish Goals to Focus Learning

Help focus students' attention on the attributes of the shelves and the pictures, specifically, their measurable attributes,

- Let's analyze the measurable attributes of 2-dimensional and 3-dimensional figures.

Lesson 2-1

Understand Volume

Be Curious

How are they the same? How are they different?

Math is... Mindset

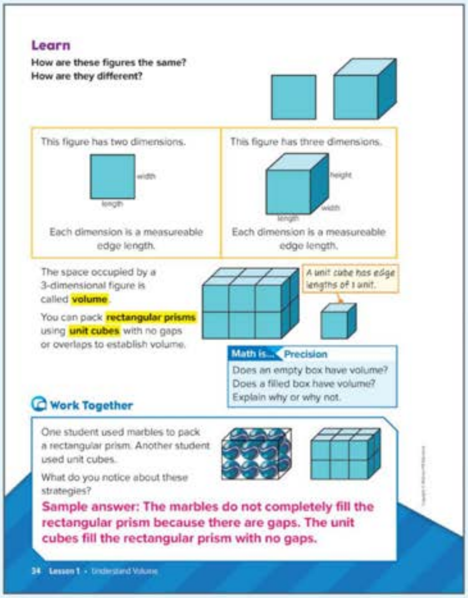
What do you already know that can help you with today's work?

Unit 2 • Volume 33

Be Curious

How are they the same? How are they different?

Explore & Develop 20 min



Learn

How are these figures the same?
How are they different?

This figure has two dimensions.

Each dimension is a measureable edge length.

This figure has three dimensions.

Each dimension is a measureable edge length.

The space occupied by a 3-dimensional figure is called **volume**.

You can pack **rectangular prisms** using **unit cubes** with no gaps or overlaps to establish volume.

A unit cube has edge lengths of 1 unit.

Math is... Precision

Does an empty box have volume? Does a filled box have volume? Explain why or why not.

Work Together

One student used marbles to pack a rectangular prism. Another student used unit cubes.

What do you notice about these strategies?

Sample answer: The marbles do not completely fill the rectangular prism because there are gaps. The unit cubes fill the rectangular prism with no gaps.

34 **Lesson 1** • Understand Volume

❶ Pose the Problem

MLR Collect and Display

As students discuss the questions, make a list of key words you hear, such as *alike, different, width, length, dimensional, volume,* and *area*. Display the list and use it to help students connect words they already know and math vocabulary.

ETP Pose Purposeful Questions

- What do you think are the mathematically important attributes of the figures?
- How can you use a tool to organize your answers?
- What words can you use to help you organize your answers?
- How can you use mathematical categories to solve this problem?

❷ Develop the Math

Choose the option that best meets your instructional goal.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How is volume similar to area? How is it different?
- Could you pack a rectangualr prism with a length of $3\frac{1}{2}$ units using unit cubes with no gaps or overlaps? Explain why or why not.
- Can you think of figures other than rectangular prisms that could be packed using unit cubes without gaps or overlaps? Explain why theu could be packed that way.

Key Takeaways

- Volume is an attribute of 3-dimensional figures.
- Volume is the space occupied by a 3-dimensional figure.
- Rectangular prisms can be packed using unit cubes with no gaps or overlaps to establish volume.

Work Together

Students explore which figures can pack a rectangular prism without gaps. Students can work on the problem in pairs before sharing their work.

Common Misconception: Make sure students understand that the marbles do not fill the rectangular prism completely. When packing a 3-dimensional figure to determine volume, there must be no gaps.

LOM Language of Math

Make sure students see the *cube* connections in volume. Packing with unit *cubes* is used to determine volume in *cubic* units.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore the concept of volume by filling a paper rectangular prism with different units, such as unit cubes, marbles, and beans.

Materials: *Nets* Teaching Resource, unit cubes, marbles, beans, or other measurement units

Directions: Provide each pair or small group a copy of *Nets* Teaching Resource and various measurement units. Demonstrate how to form rectangular prisms using the nets. Have students determine how many of each unit can fit inside the rectangular prism.

ETP Support Productive Struggle

- How would you explain what you are trying to determine?
- Explain why there are different numbers for each unit used to fill the rectangular prism.
- What is different about the way the beans/marbles fill the rectangular prism when compared to the way the unit cubes fill the rectangular prism?

Math is... Precision

- Does an empty box have volume? Does a filled box have volume? Explain why or why not.

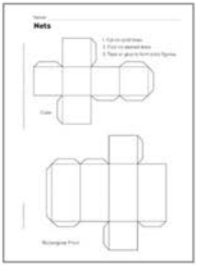
Students try to use clear definitions in discussion with others and in their own reasoning.

Activity Debrief: After students have completed the activity, facilitate a discussion to ensure students understand the terms *volume, unit cubes,* and *rectangular prism*.

Have students revisit the Pose the Problem question and discuss answers.

- How are these figures alike? How are they different?

A PDF of the Teaching Resource is available in the Digital Teacher Center.



Nets

Guided Exploration

Students develop an understanding that 3-dimensional figures also have a measurable attribute called *volume*, and that volume can be measured by packing *rectangular prisms* with *unit cubes*.

ETP Pose Purposeful Questions

- **Think About It:** Why is the width a length?
- **Think About It:** Why is the height a length?

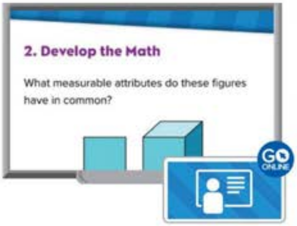
Have students build rectangular prisms and other figures using unit cubes with no gaps or overlaps to gain a deeper understanding of the idea of packing with unit cubes with no gaps or overlaps.

- What solid could be filled without gaps ot overlaps using cylinders? Explain why.

Math is... Precision

- Does an empty box have volume? Does a filled box have volume? Explain why or why not.

Students use clear definitions in discussion with others and in their own reasoning.



2. Develop the Math

What measurable attributes do these figures have in common?

EL English Learner Scaffolds

Entering/Emerging Support students in understanding the terms *fill* and *pack*. Fill a small box with similar objects, such as counting chips. Say, *I'm filling the box*. Shake the box so it's clear that the objects don't encompass the entire volume of the box. Next, using cubes or any like object, completely pack the box, saying, *I'm packing the box*. Shake the box so it's clear that the objects completely pack the entire box (there should be no movement). Repeat with new objects, both filling and completely packing the box. Ask *Did I pack this box?*

Developing/Expanding Support students in understanding the terms *fill* and *pack*. Fill a small box with similar objects, such as counting chips. Say *I'm filling the box*. Shake the box so it's clear that the objects don't encompass the entire volume of the box. Next, using cubes or any like object, completely pack the box, saying, *I'm packing the box*. Shake the box so it's clear that the objects completely pack the entire box (there should be no movement). Ask students to repeat the task with similar objects to demonstrate *fill* and *pack*, stating which they are doing each time. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to explain what it means to both fill and pack something. As students provide their explanations, listen for key words such as *gaps*, *overlaps*, and *volume*, and prompt students to explain how they know if an object is packed or not.

Practice & Reflect 10 min

On My Own

Name ____________

1. Which of these figures have volume? Justify your reasoning.

Sample answer:
Only 3-dimensional figures have volume.

For the situation, would you measure the *length, area,* or *volume*? Explain.

2. the amount of soil needed to fill a flower pot

volume; Sample answer: You are filling a 3-dimensional figure.

3. the distance of a bike ride

length; Sample answer: Distance is length.

4. the amount of wall space covered by a poster

area; Sample answer: You are covering a 2-dimensional figure.

5. the amount of concrete needed to fill a patio

volume; Sample answer: The concrete is filling a 3-dimensional figure.

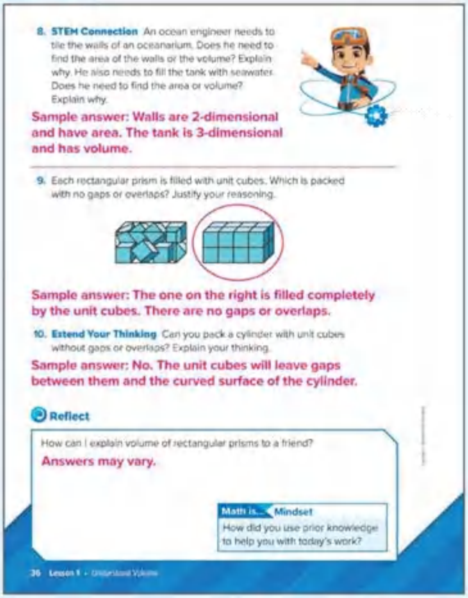
6. the space inside a moving truck

volume; Sample answer: You are packing a 3-dimensional figure.

7. the distance around a building

length; Sample answer: Perimeter is length.

Unit 2 • Volume 35



8. **STEM Connection** An ocean engineer needs to tile the walls of an oceanarium. Does he need to find the area of the walls or the volume? Explain why. He also needs to fill the tank with seawater. Does he need to find the area or volume? Explain why.

Sample answer: Walls are 2-dimensional and have area. The tank is 3-dimensional and has volume.

9. Each rectangular prism is filled with unit cubes. Which is packed with no gaps or overlaps? Justify your reasoning.

Sample answer: The one on the right is filled completely by the unit cubes. There are no gaps or overlaps.

10. **Extend Your Thinking** Can you pack a cylinder with unit cubes without gaps or overlaps? Explain your thinking.

Sample answer: No. The unit cubes will leave gaps between them and the curved surface of the cylinder.

Reflect

How can I explain volume of rectangular prisms to a friend?

Answers may vary.

Math is... Mindset

How did you use prior knowledge to help you with today's work?

36 Lesson 1 • Understand Volume

Practice

Build Fluency from Understanding

Common Error: Exercise 5 Students may assume that a concrete patio consists just of its surface. Point out that a concrete patio has depth in addition to length and width.

Practice Item Analysis

Item	DOK	Rigor
1	2	Conceptual Understanding
2–7	2	Conceptual Understanding
8	3	Conceptual Understanding
9	4	Conceptual Understanding
10	4	Conceptual Understanding

Reflect

Students complete the Reflect Question.

- How can I explain volume of rectangular prisms to a friend?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What do you already know that can help you with today's work?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can describe volume as an attribute of solid figures.
- I can describe how rectangular prisms can be packed using unit cubes with no gaps or overlaps.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Understand volume	5.MD.C.3.a
2	1	Understand volume	5.MD.C.3.a
3	2	Understand volume	5.MD.C.3.a

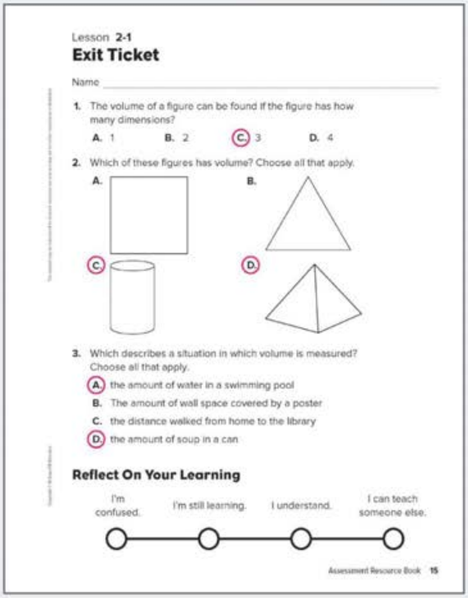
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking



Lesson 2-1

Exit Ticket

Name

1. The volume of a figure can be found if the figure has how many dimensions?

A. 1 **B.** 2 [✓ **C.**] 3 **D.** 4

2. Which of these figures has volume? Choose all that apply.

A. **B.** [✓ **C.**] [✓ **D.**]

3. Which describes a situation in which volume is measured? Choose all that apply.

[✓ **A.**] the amount of water in a swimming pool

B. The amount of wall space covered by a poster

C. the distance walked from home to the library

[✓ **D.**] the amount of soup in a can

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 15

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Little Boxes

Work with pairs of students. Give each pair 30 unit cubes and small empty containers with various shapes. Have each pair try to fill the container with unit cubes in order to find the volume. Remind students that to be considered filled, the container must have no gaps or overlaps. Then discuss with the students which shapes could be filled with cubes and which could not.

GO ONLINE

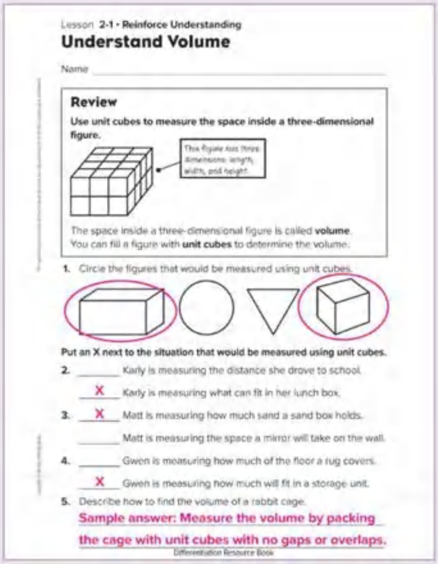
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Understand Volume

INDEPENDENT WORK

Differentiation Resource Book, p. 1



Lesson 2-1 • Reinforce Understanding

Understand Volume

Name ______________________

Review

Use unit cubes to measure the space inside a three-dimensional figure.

This figure has three dimensions: length, width, and height.

The space inside a three-dimensional figure is called **volume**. You can fill a figure with **unit cubes** to determine the volume.

1. Circle the figures that would be measured using unit cubes.

Put an X next to the situation that would be measured using unit cubes.

2. ______ Karly is measuring the distance she drove to school.

   __X__ Karly is measuring what can fit in her lunch box.

3. __X__ Matt is measuring how much sand a sand box holds.

   ______ Matt is measuring the space a mirror will take on the wall.

4. ______ Gwen is measuring how much of the floor a rug covers.

   __X__ Gwen is measuring how much will fit in a storage unit.

5. Describe how to find the volume of a rabbit cage.

Sample answer: Measure the volume by packing the cage with unit cubes with no gaps or overlaps.

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Volume Sort

Students explore volume.

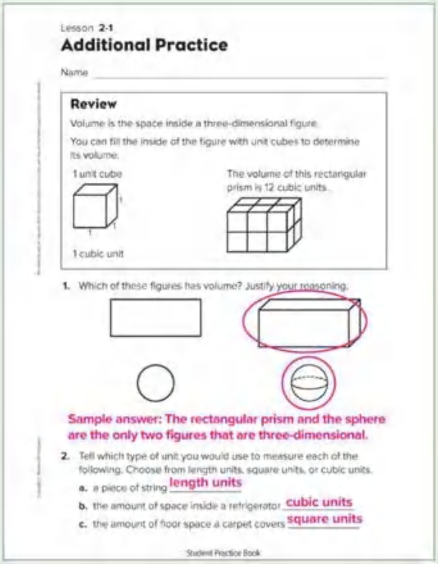
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 1–2



Lesson 2-1

Additional Practice

Name ______________________

Review

Volume is the space inside a three-dimensional figure.

You can fill the inside of the figure with unit cubes to determine its volume.

1 unit cube

1 cubic unit

The volume of this rectangular prism is 12 cubic units.

1. Which of these figures has volume? Justify your reasoning.

Sample answer: The rectangular prism and the sphere are the only two figures that are three-dimensional.

2. Tell which type of unit you would use to measure each of the following. Choose from length units, square units, or cubic units.
   a. a piece of string length units
   b. the amount of space inside a refrigerator cubic units
   c. the amount of floor space a carpet covers square units

Student Practice Book

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplying to find area.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 1–2

For each situation, tell whether you would measure using *length units*, *square units*, or *cubic units*. Explain your reasoning.

3. Franco is measuring the amount of wall space in his room so that he knows how much paint to buy.
   square units; Sample answer: Area is measured in square units.
4. Katrina wants to know how much water is inside her fish tank.
   cubic units; Sample answer: Volume is measured in cubic units.
5. Pete wants to know how far he walks from home to school.
   length units; Sample answer: Distance is measured in length units.

Use your understanding of area and volume to explain your answer.

6. Hannah wants to know how much air is inside her balloon. She thinks that she should calculate the area of the balloon. Henry suggests that she should find the volume of the balloon. Who is correct? Explain.
   Henry; Sample answer: The space inside the balloon is a measure of volume.

Math @Home Activity Identify measurement situations around your home, such as the length of a room, the amount of glass in a window, or how much space is inside a closet. Ask your child what type of units would be needed to measure in each situation.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

You Are a Computer Programmer

Students design a computer program to find the volume of a rectangular prism. *The content of this card has concepts covered later in Lesson 2-3*. You may want to assign this card to students ready to explore content covered later in this unit.

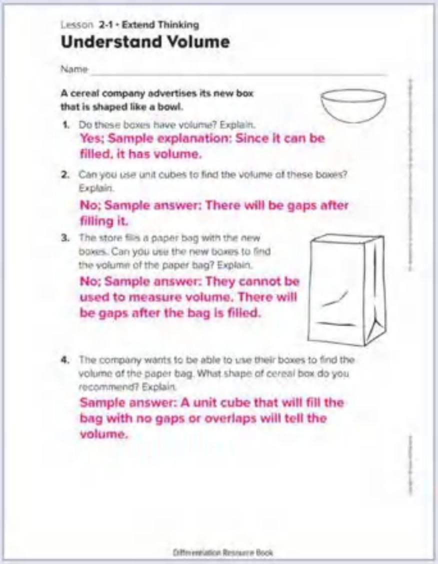
GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 2



Lesson **2-1 • Extend Thinking**

Understand Volume

Name ______________________

A cereal company advertises its new box that is shaped like a bowl.

1. Do these boxes have volume? Explain.
   Yes; Sample explanation: Since it can be filled, it has volume.
2. Can you use unit cubes to find the volume of these boxes? Explain.
   No; Sample answer: There will be gaps after filling it.
3. The store fills a paper bag with the new boxes. Can you use the new boxes to find the volume of the paper bag? Explain.
   No; Sample answer: They cannot be used to measure volume. There will be gaps after the bag is filled.
4. The company wants to be able to use their boxes to find the volume of the paper bag. What shape of cereal box do you recommend? Explain.
   Sample answer: A unit cube that will fill the bag with no gaps or overlaps will tell the volume.

Differentiation Resource Book

LESSON **2-2**

Use Unit Cubes to Determine Volume

Learning Targets

- I can determine volume by counting unit cubes that fill a solid with no gaps or overlaps.
- I can determine volume by multiplying the number of unit cubes in one layer by the number of layers that fill a solid with no gaps or overlaps.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.MD.C.3.a** A cube with side length 1 unit, called a “unit cube,” is said to have “one cubic unit” of volume, and can be used to measure volume.

◇ **5.MD.C.3.b** A solid figure which can be packed without gaps or overlaps using *n* unit cubes is said to have a volume of *n* cubic units.

◇ **5.MD.C.4** Measure volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units.

Math Practices and Processes

MPP Look for and make use of structure.

Vocabulary

Math Terms	Academic Terms
cubic unit	debate
unit cube	suggest
volume	

Materials

The materials may be for any part of the lesson.

- centimeter cubes
- *Nets* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students determine the volume of a rectangular prism by counting unit cubes. • Students determine the volume of a rectangular prism by multiplying the number of unit cubes in one layer by the number of layers.	• Students discuss how to determine the volume of any 3-dimensional solid by counting unit cubes while answering *Wh-* questions. • In order to support optimizing output, ELs will participate in MLR3: Critique, Correct, and Clarify.	• Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing thoughtful and constructive feedback.

Coherence

Previous	Now	Next
• Students described volume as an attribute of solid figures and understood concepts of volume measurement (Unit 2).	• Students measure volume by packing prisms with unit cubes then counting, using cubic cm, cubic in, cubic ft, and improvised units.	• Students use two formulas to determine the volume of a right rectangular prism with whole-number side lengths (Unit 2).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students understand that the volume of a right rectangular prism can be determined by counting the number of unit cubes that fill it completely with no gaps or overlaps.	• Students build proficiency in determining volume using multiplication.	• Students start to recognize the relationship between the dimensions of a rectangular prism and how many unit cubes it takes to pack it *Application is not a targeted element of rigor for this standard.*

Number Routine

Would You Rather? 5–7 min

Build Fluency Students build skills with multiplication and area as they compare measurements.

These prompts encourage students to talk about their reasoning:

- What information about the rugs did you use to find your answer?
- How could you use estimation to compare the areas of the rugs?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore objects that fill a solid container. They consider what objects may fill the given space with no gaps or overlaps.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip It may help students visualize the scenario by distributing containers shaped like rectangular prisms or plastic cups, and have them fill the cups with objects like counting cubes.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' thinking about packing a solid to determine volume and are based on possible comments and questions students may make during the share out.

- What ways could you suggest to count the boxes in the truck?
- Do the boxes pack the truck with no gaps or overlaps? Explain why or why not.

Math is... Mindset

- How can different ideas and viewpoints help you learn better?

SEL Social Awareness: Appreciate Diversity

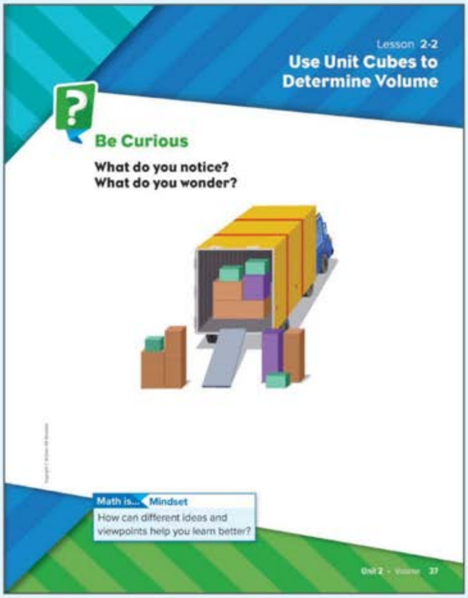
As students consider the Notice & Wonder routine, invite them to collaborate with peers and discuss different tools/strategies/representations/methods that they might use to determine the volume of the box. As students share their unique thought processes and ideas, emphasize the value of the differences as well as the similarities so students can understand the importance of diversity within a math context. Encourage students to listen to and build off the ideas of their peers.

Transition to Explore & Develop

ETP Establish Goals to Focus Learning

Ask questions that focus students' attention on the packing and counting objects to find volume and efficient ways to do that counting.

- Let's think about how to count unit cubes to find volume and efficient ways to do that counting.



Lesson 2-2
Use Unit Cubes to Determine Volume

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset
How can different ideas and viewpoints help you learn better?

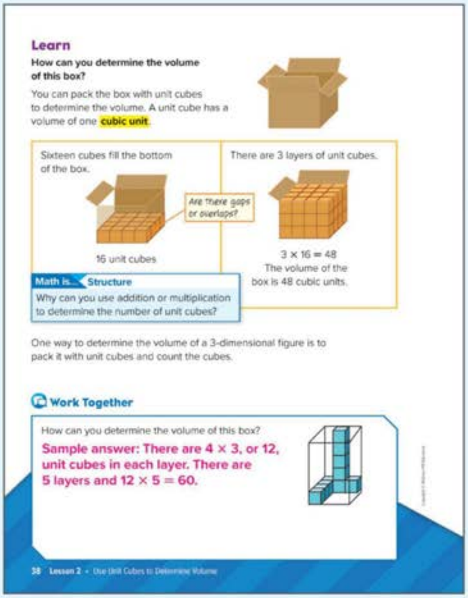
Unit 2 • Volume 37

Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

How can you determine the volume of this box?

You can pack the box with unit cubes to determine the volume. A unit cube has a volume of one **cubic unit**.

Sixteen cubes fill the bottom of the box.

16 unit cubes

There are 3 layers of unit cubes.

3 × 16 = 48

The volume of the box is 48 cubic units.

Math is... Structure

Why can you use addition or multiplication to determine the number of unit cubes?

One way to determine the volume of a 3-dimensional figure is to pack it with unit cubes and count the cubes.

Work Together

How can you determine the volume of this box?

Sample answer: There are 4 × 3, or 12, unit cubes in each layer. There are 5 layers and 12 × 5 = 60.

38 Lesson 2 • Use Unit Cubes to Determine Volume

❶ Pose the Problem

ETP Pose Purposeful Questions

- How does the picture help you understand this problem?
- Using what you know about volume, can you make a conjecture about how to find the volume of the box?
- How will the units and labels you will use correspond to the quantities in this problem?

❷ Develop the Math

Choose the option that best meets your instructional goal.

MLR Critique, Correct, and Clarify

Make a false claim for students to critique. Draw a cube with 3 × 2 unit cubes and 4 layers. Solve, but add instead of multiply the layers. Say *The volume of the box is 10. Yes or No?* Have the class discuss how to correct your mistake. Revisit this activity throughout the lesson.

❸ Bring it Together

ETP Elicit Evidence of Student Thinking

- How is a cubic unit like a square inch? How is it different?
- When can you count unit cubes to determine the volume of a solid figure?
- What strategies can you use to find quickly the number of unit cubes that pack a rectangular prism?

Key Takeaways

- A unit cube has a volume of 1 cubic unit.
- Volume of rectangular prisms can be determined by counting the number of unit cubes that fill the rectangular prism with no gaps or overlaps.
- Volume of rectangular prisms can be found by multiplying the number of unit cubes in one layer by the number of layers that fill the prism.

Work Together

Students determine the total number of unit cubes that fill a rectangular prism when given the number of cubes in the length, width, and height.

Common Misconception: Students may count just the number of cubes shown. Remind them that they are determining the volume of the box, so they need to imagine that the box is filled with the cubes.

LOM Language of Math

Some students may have noticed that packing unit cubes in layers like this would leave gaps if any of the dimensions of the box contained a fraction. For our purposes, *rectangular prism* means *rectangular prism with whole number dimensions*.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore volume of rectangular prisms by multiplying the number of unit cubes in each layer by the number of layers.

Materials: centimeter cubes, *Nets* Teaching Resource

Directions: Demonstrate creating a rectangular prism from nets. Have students pack the rectangular prism using centimeter cubes to determine its volume.

ETP Implement Tasks that Promote Reasoning and Problem Solving

- How might you pack a box with unit cubes? Where would you start?

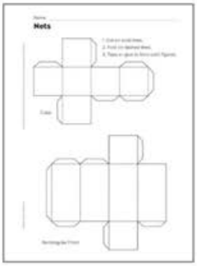
After students have completed the activity, ask

- What do you notice about how the cubes are arranged in the box?
- How can you describe the relationship between the number of layers, the number of cubes in each layer, and the volume of the box?

Math is... Structure

- What concepts have you learned before that were useful when determining the volume?

Students relate the concepts of multiplication as equal groups (or arrays) to the calculations used to determine volume.



Nets

Activity Debrief: Have students share their strategies for counting the number of centimeter cubes needed to fill the rectangular prism. Encourage students to use precise language, such a multiplication.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine the volume of this box?

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students explore ways to determine the volume of rectangular prisms.

ETP Facilitate Meaningful Discourse

- **Think About It:** What do you notice about the way the unit cubes are packed?
- If the unit cubes did not fill the box completely, could you determine the volume? Explain why or why not.

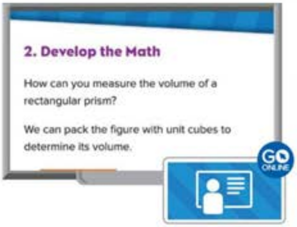
Have students propose strategies they have for counting the number of unit cubes that pack the box. Encourage them to debate the advantages of their strategies.

- Can you to make a layer a different way? How could you use it to find the volume of the box?

Math is... Structure

- Why can you use addition or multiplication to determine the number of unit cubes?

Students are understanding the properties in mathematics that connect repeated addition and multiplication.



2. Develop the Math

How can you measure the volume of a rectangular prism?

We can pack the figure with unit cubes to determine its volume.

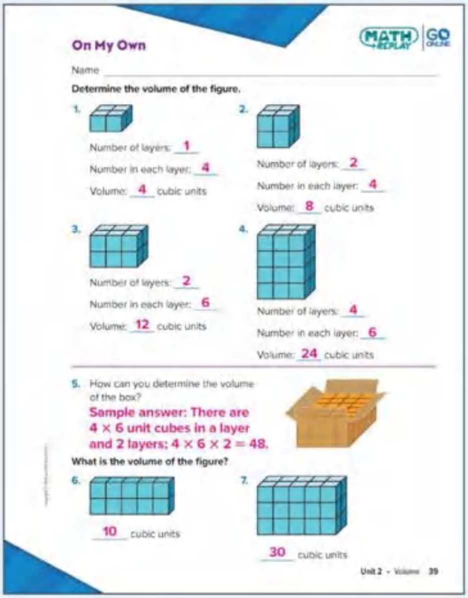
EL English Learner Scaffolds

Entering/Emerging Support students in understanding the terms *gaps*. Add some objects to a box, being sure not to fill it. Point to the spaces inside the box. Say *There are gaps*. Repeat the task again, asking, *Are there gaps?*

Developing/Expanding Support students in understanding the terms *gaps*. Add some objects to a box, being sure not to fill it. Point to the spaces inside the box. Say *There are gaps*. Ask students to repeat the task with similar objects provided to them. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to discuss how gaps affect the volume of an object. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, I disagree because gaps*...

Practice & Reflect 10 min



On My Own

Name

Determine the volume of the figure.

1. Number of layers: 1
Number in each layer: 4
Volume: 4 cubic units

2. Number of layers: 2
Number in each layer: 4
Volume: 8 cubic units

3. Number of layers: 2
Number in each layer: 6
Volume: 12 cubic units

4. Number of layers: 4
Number in each layer: 6
Volume: 24 cubic units

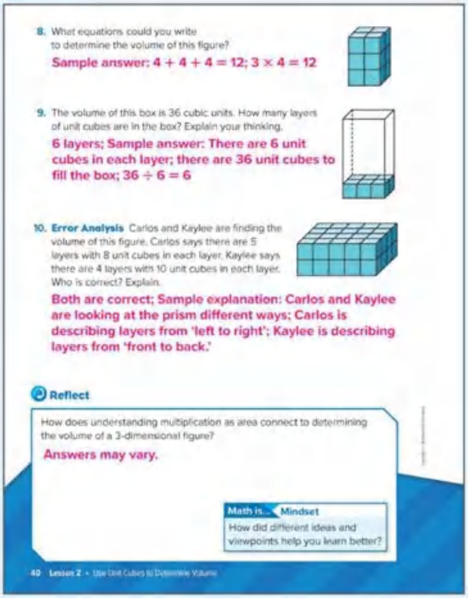
5. How can you determine the volume of the box?
Sample answer: There are 4 × 6 unit cubes in a layer and 2 layers; 4 × 6 × 2 = 48.

What is the volume of the figure?

6. 10 cubic units

7. 30 cubic units

Unit 2 • Volume 39



8. What equations could you write to determine the volume of this figure?
Sample answer: 4 + 4 + 4 = 12; 3 × 4 = 12

9. The volume of this box is 36 cubic units. How many layers of unit cubes are in the box? Explain your thinking.
6 layers; Sample answer: There are 6 unit cubes in each layer; there are 36 unit cubes to fill the box; 36 ÷ 6 = 6

10. **Error Analysis** Carlos and Kaylee are finding the volume of this figure. Carlos says there are 5 layers with 8 unit cubes in each layer. Kaylee says there are 4 layers with 10 unit cubes in each layer. Who is correct? Explain.
Both are correct; Sample explanation: Carlos and Kaylee are looking at the prism different ways; Carlos is describing layers from 'left to right'; Kaylee is describing layers from 'front to back.'

Reflect

How does understanding multiplication as area connect to determining the volume of a 3-dimensional figure?

Answers may vary.

Math is... Mindset
How did different ideas and viewpoints help you learn better?

40 Lesson 2 • Use Unit Cubes to Determine Volume

Practice

ETP Build Fluency from Understanding

Common Misconception: Exercise 10 A layer does not have to be horizontal or the *bottom*. A layer can be vertical. Students should choose the orientation of the layer based on what is easiest for them to use. If it is easier to find the number of cubes in a vertical layer, then they should use that.

Practice Item Analysis

Item	DOK	Rigor
1–4	1	Procedural Skill & Fluency
5–7	2	Procedural Skill & Fluency
8–10	3	Conceptual Understanding

Reflect

Students complete the Reflect Question.

- How does understanding multiplication as an array connect to determining the volume of a 3-dimensional figure?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How can different ideas and viewpoints help you learn better?

Students reflect on how they practiced social-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can determine volume by counting unit cubes that fill a solid with no gaps or overlaps.
- I can determine volume by multiplying the number of unit cubes in one layer by the number of layers that fill a solid with no gaps or overlaps.

GO ONLINE

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

MATH REPLAY

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Count unit cubes	5.MD.C.4
2	2	Count unit cubes	5.MD.C.4
3	2	Find volume	5.MD.C.4

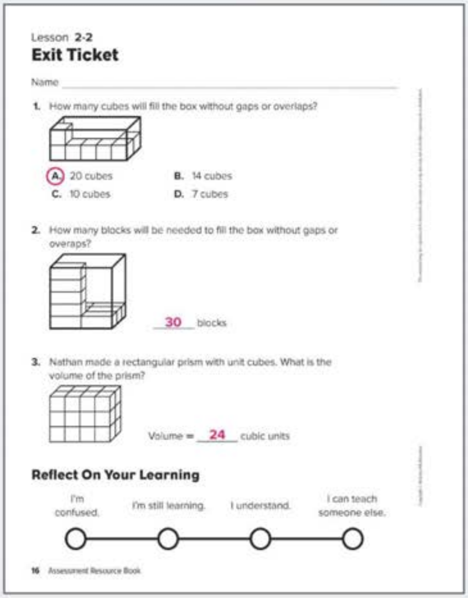
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 2-2

Exit Ticket

Name

1. How many cubes will fill the box without gaps or overlaps?

[✓ A. 20 cubes] B. 14 cubes
C. 10 cubes D. 7 cubes

2. How many blocks will be needed to fill the box without gaps or overaps?

30 blocks

3. Nathan made a rectangular prism with unit cubes. What is the volume of the prism?

Volume = 24 cubic units

Reflect On Your Learning

I'm confused. — I'm still learning. — I understand. — I can teach someone else.

○ ○ ○ ○

16 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Finding Volume

Work with students in groups of three. Give each student 30 unit cubes. Have each student create a rectangular solid using some or all of the cubes then find the volume of the figure. Have students switch figures with another student and find the volume of the figure. Then have students switch again so that each student finds the volume of all three figures. If necessary, remind students that they can count the number of cubes used to find the volume.

GO ONLINE

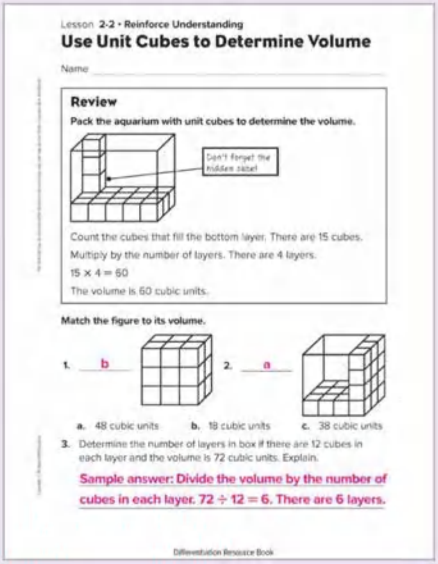
Take Another Look Lessons

Assign the interactive lessons to reinforce targeted skills.

- Volume Using Unit Cubes
- Volume Using Multiplication

INDEPENDENT WORK

Differentiation Resource Book, p. 3



Lesson **2-2 • Reinforce Understanding**

Use Unit Cubes to Determine Volume

Name ______

Review

Pack the aquarium with unit cubes to determine the volume.

Don't forget the hidden cube!

Count the cubes that fill the bottom layer. There are 15 cubes.

Multiply by the number of layers. There are 4 layers.

15 × 4 = 60

The volume is 60 cubic units.

Match the figure to its volume.

1. b
2. a

a. 48 cubic units b. 18 cubic units c. 38 cubic units

3. Determine the number of layers in box if there are 12 cubes in each layer and the volume is 72 cubic units. Explain.

Sample answer: Divide the volume by the number of cubes in each layer. 72 ÷ 12 = 6. There are 6 layers.

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Volume Sort

Students explore volume.

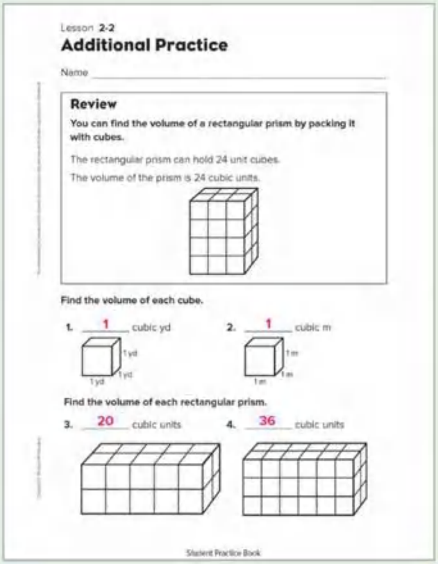
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 3–4



Lesson **2-2**

Additional Practice

Name ______

Review

You can find the volume of a rectangular prism by packing it with cubes.

The rectangular prism can hold 24 unit cubes.

The volume of the prism is 24 cubic units.

Find the volume of each cube.

1. 1 cubic yd
2. 1 cubic m

Find the volume of each rectangular prism.

3. 20 cubic units
4. 36 cubic units

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplying to find area.

Assign

Use It! Application Station

Harvesting Water Students plan and build a model of a rainwater harvesting reservoir. *The content of this card has concepts covered later in Lesson 2-4. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Assign

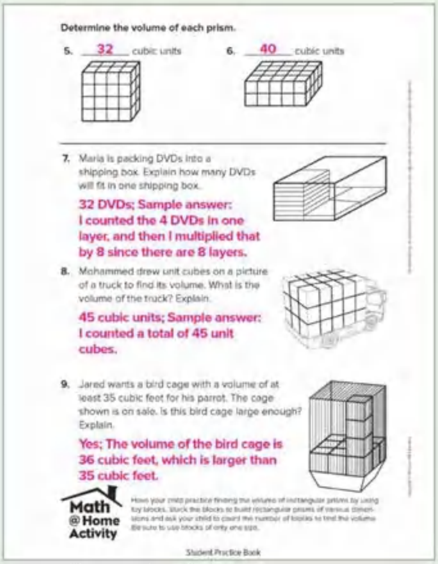
Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Assign

INDEPENDENT WORK

Student Practice Book, pp. 3–4



Determine the volume of each prism.

5. 32 cubic units

6. 40 cubic units

7. Maria is packing DVDs into a shipping box. Explain how many DVDs will fit in one shipping box.

32 DVDs; Sample answer: I counted the 4 DVDs in one layer, and then I multiplied that by 8 since there are 8 layers.

8. Mohammed drew unit cubes on a picture of a truck to find its volume. What is the volume of the truck? Explain.

45 cubic units; Sample answer: I counted a total of 45 unit cubes.

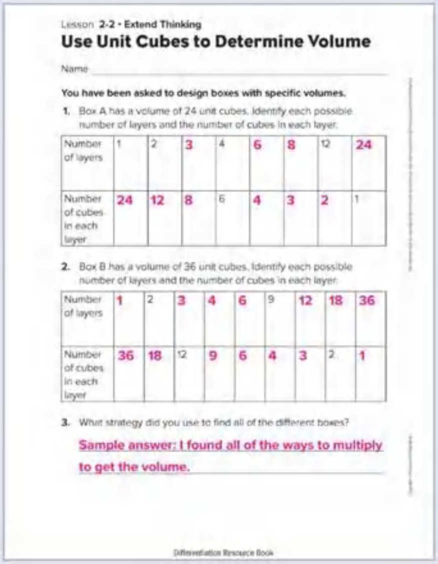
9. Jared wants a bird cage with a volume of at least 35 cubic feet for his parrot. The cage shown is on sale. Is this bird cage large enough? Explain.

Yes; The volume of the bird cage is 36 cubic feet, which is larger than 35 cubic feet.

Math @Home Activity

Student Practice Book

Differentiation Resource Book, p. 4



Lesson **2-2 • Extend Thinking**

Use Unit Cubes to Determine Volume

Name

You have been asked to design boxes with specific volumes.

1. Box A has a volume of 24 unit cubes. Identify each possible number of layers and the number of cubes in each layer.

Number of layers	1	2	3	4	6	8	12	24
Number of cubes in each layer	24	12	8	6	4	3	2	1

2. Box B has a volume of 36 unit cubes. Identify each possible number of layers and the number of cubes in each layer.

Number of layers	1	2	3	4	6	9	12	18	36
Number of cubes in each layer	36	18	12	9	6	4	3	2	1

3. What strategy did you use to find all of the different boxes?

Sample answer: I found all of the ways to multiply to get the volume.

Differentiation Resource Book

LESSON **2-3**

Use Formulas to Determine Volume

Learning Targets

- I can find the volume of rectangular prisms using formulas.
- I can explain how to find the volume of rectangular prisms using formulas.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.MD.C.5.a** Find the volume of a right rectangular prism with whole-number side lengths by packing it with unit cubes, and show that the volume is the same as would be found by multiplying the edge lengths, equivalently by multiplying the height by the area of the base. Represent threefold whole-number products as volumes, e.g., to represent the associative property of multiplication.

◇ **5.MD.C.5.b** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real-world and mathematical problems.

Mathematical Practices and Processes

MPP Model with mathematics.

Vocabulary

Math Terms	Academic Terms
base (of a solid)	assert
formula	evaluate

Materials

The materials may be for any part of the lesson.

- cubes

Focus

Content Objective	Language Objectives	SEL Objective
• Students determine the volume of rectangular prisms using formulas.	• Students explain how to determine the volume of rectangular prisms using formulas while answering *Wh-* and Yes/No questions and using the term *dimensions*. • In order to support cognitive meta-awareness and optimize output, ELs will participate in MLR1: Stronger and Clearer Each Time.	• Students practice strategies for persisting at a mathematical task, such as setting a small goal or setting timers for remaining focused.

Coherence

Previous	Now	Next
• Students measured volumes by counting unit cubes, using cubic cm, cubic in, cubic ft, and improvised units (Unit 2).	• Students use formulas to determine the volume of a right rectangular prism with whole-number side lengths.	• Students determine the volume of composite solid figures (Unit 2).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students use their understanding of volume to develop the formula used to calculate the volume of rectangular prisms.	• Students build proficiency in calculating the volume of rectangular prisms.	• Students apply the formulas for volume of a rectangular prism to solve real-world problems.

Number Routine
Can You Make the Number?

Build Fluency Students build number sense as they use combinations of numbers and mathematical operations to make the target number.

Remind students there is more than one solution to the problem. If they find one way, challenge them to continue to find other ways.

These prompts encourage students to talk about their reasoning:

- How many different equations did you write to make the target number?
- How many different mathematical symbols did you use?

Launch 5–7 min

Sense-Making Routine

Purpose Students notice that layers are one way of arranging objects, such as pizza boxes.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may wish to have students Turn and Talk before sharing out their ideas with the whole class.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' abilty to generalize the strategies they used in the previous lesson and are based on possible comments students may make during the share out.

- Are the boxes rectangular prisms? How could you find the volume of one of the boxes?
- What information would you need to determine the total volume of the stack of boxes?

Math is... Mindset

- What can you do to stay focused on your work?

SEL Self-Management: Control Impulses

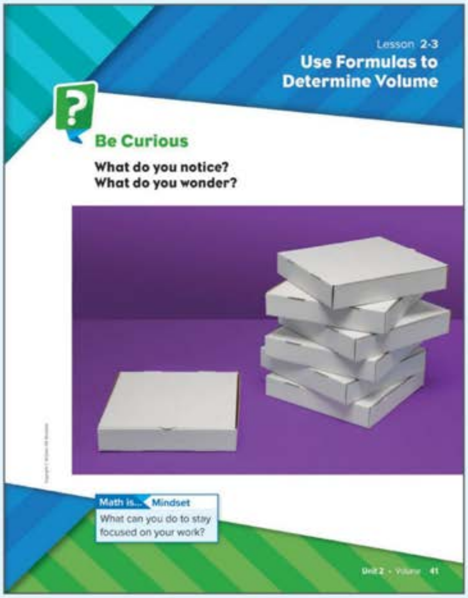
Provide opportunities for students to practice self-regulation. Have students discuss strategies to help maintain focus for the Notice & Wonder routine. As you transition from the Notice & Wonder routine, brainstorm strategies that can help students express emotionally and behaviorally appropriate responses in times of frustration or disappointment. As students work with using formulas to determine volume, invite them to practice deep-breathing techniques or take movement breaks when necessary.

Transition to Explore & Develop

ETP Establish Goals to Focus Learning

Ask questions that focus students' attention on the techniques they have used for counting, and how they might be used to create a formula for finding the volume of a rectangular prism.

- Let's think about how we can determine and use a formula and use it to find the volume of a rectangular prism.



Lesson 2-3
Use Formulas to Determine Volume

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset
What can you do to stay focused on your work?

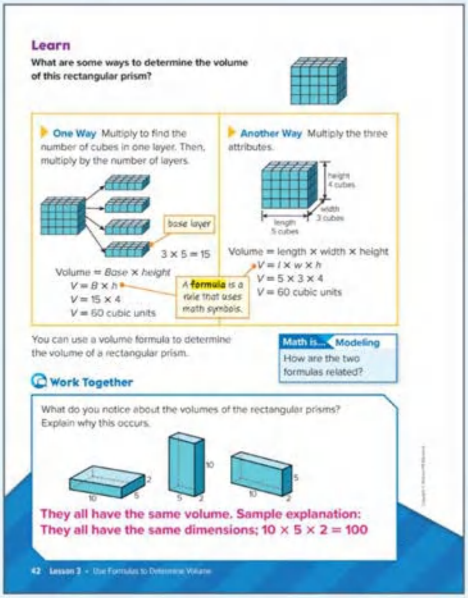
Unit 2 • Volume 41

Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

What are some ways to determine the volume of this rectangular prism?

One Way Multiply to find the number of cubes in one layer. Then, multiply by the number of layers.

$3 \times 5 = 15$

Volume = *Base* × *height*

$V = B \times h$

$V = 15 \times 4$

$V = 60$ cubic units

Another Way Multiply the three attributes.

Volume = length × width × height

$V = l \times w \times h$

$V = 5 \times 3 \times 4$

$V = 60$ cubic units

A **formula** is a rule that uses math symbols.

You can use a volume formula to determine the volume of a rectangular prism.

Math is... Modeling

How are the two formulas related?

Work Together

What do you notice about the volumes of the rectangular prisms? Explain why this occurs.

They all have the same volume. Sample explanation: They all have the same dimensions; $10 \times 5 \times 2 = 100$

42 Lesson 3 • Use Formulas to Determine Volume

❶ Pose the Problem

ETP Pose Purposeful Questions

- What problems like this have you done this before?
- What patterns did you see in the way you solved those problems?
- What words will you use to explain your thinking?
- How will the units and labels you will use correspond to the quantities in this problem?

❷ Develop the Math

Choose the option that best meets your instructional goal.

MLR Stronger and Clearer Each Time

Pair students and have them determine the volume of a figure. Have them individually write sentences explaining the steps they took to get the volume. Then have them share their writing with their partner and revise if necessary. Revisit throughout the lesson for reinforcement.

❸ Bring it Together

ETP Elicit Evidence of Student Thinking

- Explain how the $V = B \times h$ formula represents the volume of a rectangular prism.
- Explain how the $V = l \times w \times h$ formula determines the volume of a rectangular prism.

Math is... Modeling

- How are the two formulas related?

Students are looking at the structure in mathematics that relates the length times the width and the number of cubes in the base layer.

Key Takeaway

- Two formulas can be used to determine the volume of rectangular prisms: $V = l \times w \times h$ and $V = B \times h$.

Work Together

Students think about how using different bases for the same prism yields the same volume, and how that represents the Associate Property. Have students work on the problem in pairs before asking them to share their work.

Common Misconception: Students may feel they need to calculate the volume of each rectangular prism to compare their volumes. Suggest to them that the volumes can be compared without determining the volumes of any of the prisms.

LOM Language of Math

Base is a difficult term to define. Fortunately, for rectangular prisms, any face can serve as a base. This is not the case for prisms in general.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students derive the volume formulas by exploring patterns in the dimensions of rectangular prisms with the same volume.

Materials: 24 cubes per pair or small group

Directions: Have students explore different rectangular prisms that have a volume of 24 cubic units.

- What is the shortest rectangular prism you can create with a volume of 24 cubic units? Tallest?
- It is possible to create a height of each number between 1 and 24? If not, which heights are possible?

Support Productive Struggle

- How can you record your work?
- How did you determine that it is not possible to have a height of 5 units?

After students have determined all possible heights of rectangular prisms with a volume of 24 cubic units, ask them to determine all possible dimensions of the rectangular prisms.

- How did you begin to think about this problem?
- How could you prove that you have found all possible dimensions of the rectangular prisms?
- What strategy did you use to solve this problem?
- How does your strategy compare to a classmate's strategy?
- How does your thinking connect to previous mathematical concepts?

Activity Debrief: Facilitate a discussion to ensure all students understand that an efficient method of determining all possible rectangular prisms with a volume of 24 cubic units is to think about factors of 24. From this understanding, students can derive the volume formulas.

Have students revisit the Pose the Problem question and discuss answers.

- What are some ways to determine the volume of this figure?

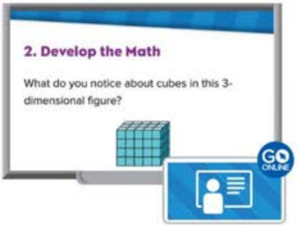
Guided Exploration

Students generalize the method for determining the volume of a rectangular prism discovered in the previous lesson to derive two formulas for calculating volume of rectangular prisms.

Use and Connect Mathematical Representations

- How are slices of bread like layers? How are they different?
- **Think About It:** When have you multiplied length by width before? What measurable attribute were you finding when you multiplied length by width?

Ensure students understand that *Base* in the formula represents the area of the base of the rectangular prism (as well as the number of cubes in a layer), by having students connect the number of cubes in a layer to the area of the base of that layer.



2. Develop the Math

What do you notice about cubes in this 3-dimensional figure?

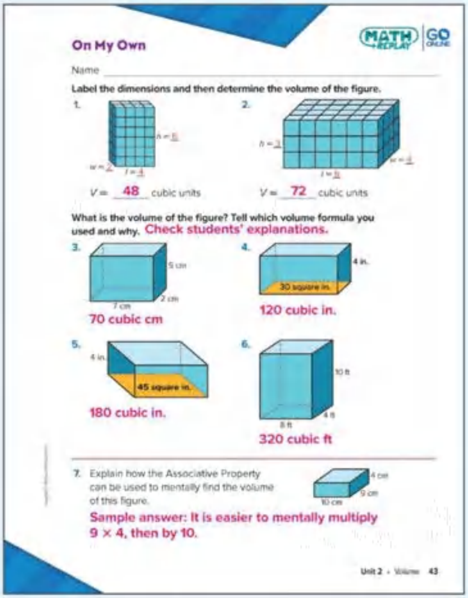
English Learner Scaffolds

Entering/Emerging Support students in understanding the term *dimensions*. Draw a line. Point and say *This has one dimension*. Next, draw a square. Point and say *This has two dimensions*. Finally, draw a cube, emphasizing its depth. Point and say *This has three dimensions*. Repeat the task with new drawings (such as a point, a triangle, and a cylinder) asking *How many dimensions does this have?*

Developing/Expanding Support students in understanding the term *dimensions*. Draw a line. Point and say *This has one dimension*. Next, draw a square. Point and say *This has two dimensions*. Finally, draw a cube, emphasizing its depth. Point and say *This has three dimensions*. After confirming comprehension of the term, ask students to draw and demonstrate *dimensions* as well. Provide examples and sentence frames for students who need more guidance.

Bridging/Reaching Ask students to explain why it's important to know the dimensions of an object before trying to find its volume. As students provide their explanations, listen for key words and phrases such as *height*, *length*, *width*, and *volume formula*, and provide validation or correction as needed.

Practice & Reflect 10 min



On My Own

Name ______________________

Label the dimensions and then determine the volume of the figure.

1.

$V =$ 48 cubic units

2.

$V =$ 72 cubic units

What is the volume of the figure? Tell which volume formula you used and why. Check students' explanations.

3.

70 cubic cm

4.

120 cubic in.

5.

180 cubic in.

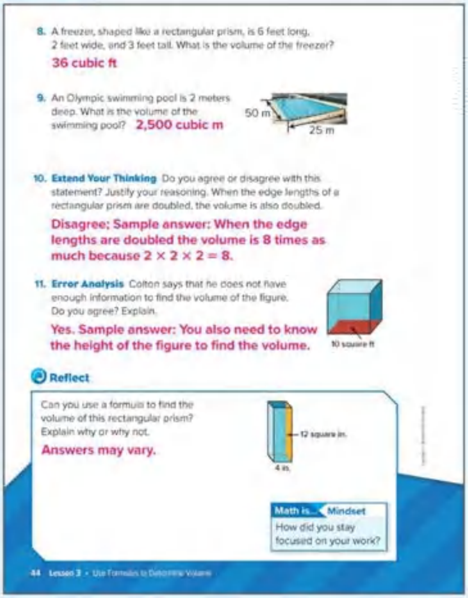
6.

320 cubic ft

7. Explain how the Associative Property can be used to mentally find the volume of this figure.

Sample answer: It is easier to mentally multiply 9 × 4, then by 10.

Unit 2 • Volume 43



8. A freezer, shaped like a rectangular prism, is 6 feet long, 2 feet wide, and 3 feet tall. What is the volume of the freezer?

36 cubic ft

9. An Olympic swimming pool is 2 meters deep. What is the volume of the swimming pool? 2,500 cubic m

10. **Extend Your Thinking** Do you agree or disagree with this statement? Justify your reasoning. When the edge lengths of a rectangular prism are doubled, the volume is also doubled.

Disagree; Sample answer: When the edge lengths are doubled the volume is 8 times as much because 2 × 2 × 2 = 8.

11. **Error Analysis** Colton says that he does not have enough information to find the volume of the figure. Do you agree? Explain.

Yes. Sample answer: You also need to know the height of the figure to find the volume.

Reflect

Can you use a formula to find the volume of this rectangular prism? Explain why or why not.

Answers may vary.

Math is... Mindset

How did you stay focused on your work?

44 Lesson 3 • Use Formulas to Determine Volume

Practice

Build Fluency from Understanding

Common Error: Exercises 4–5 Students may be confused that the area of the base is given and not the number of cubes in the base layer. Remind them that both are equal to the length times the width.

Practice Item Analysis

Item	DOK	Rigor
1–2	2	Procedural Skill & Fluency
3–6	3	Procedural Skill & Fluency
7	4	Conceptual Understanding
8–9	3	Application
10–11	4	Conceptual Understanding

Reflect

Students complete the Reflect Question.

- Does the base you use to find the volume of a rectangular prism have to be its bottom? Explain why or why not.

Ask students to share their reflections with their classmates.

Math is... Mindset

- What steps did you take to maintain focus?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can find the volume of rectangular prisms using formulas.
- I can explain how to find the volume of rectangular prisms using formulas.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Use volume formula	5.MD.C.5.b
2	2	Use volume formula	5.MD.C.5.b
3	2	Use volume formula	5.MD.C.5.b

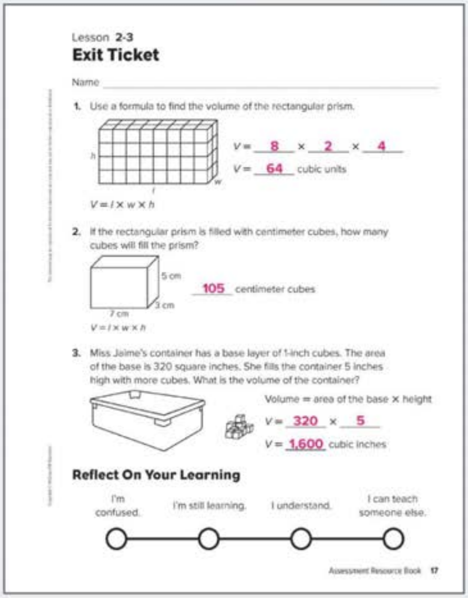
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 2-3

Exit Ticket

Name ____________________

1. Use a formula to find the volume of the rectangular prism.

$V = l \times w \times h$

$V =$ 8 × 2 × 4

$V =$ 64 cubic units

2. If the rectangular prism is filled with centimeter cubes, how many cubes will fill the prism?

$V = l \times w \times h$

105 centimeter cubes

3. Miss Jaime's container has a base layer of 1-inch cubes. The area of the base is 320 square inches. She fills the container 5 inches high with more cubes. What is the volume of the container?

Volume = area of the base × height

$V =$ 320 × 5

$V =$ 1,600 cubic inches

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 17

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Calculate Volume

Provide students with a piece of paper showing several rectangular prisms with the length, width, and height labeled in one column and a list of calculated volume in the other. Have students calculate the volumes of the prisms and match them with the values in the volume column. Each prism should be matched with a value. If students struggle, remind them that the Distributive and Associative properties may make it easier to multiply.

GO ONLINE

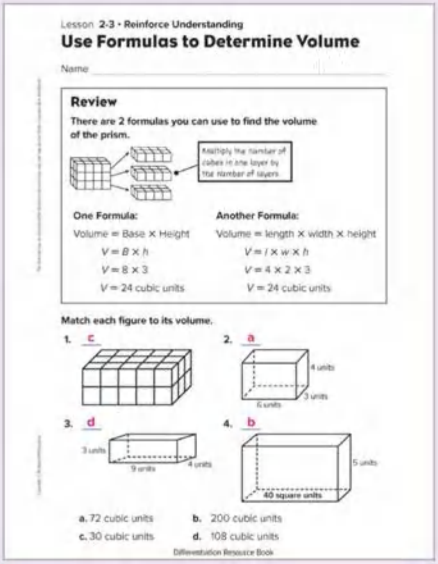
Take Another Look Lessons

Assign the interactive lesson to reinforce targeted skills.

- The $l \times w \times h$ Volume Formula
- The $B \times h$ Volume Formula

INDEPENDENT WORK

Differentiation Resource Book, p. 5



Lesson 2-3 • Reinforce Understanding

Use Formulas to Determine Volume

Name

Review

There are 2 formulas you can use to find the volume of the prism.

One Formula:

Volume = Base × Height

$V = B \times h$

$V = 8 \times 3$

$V = 24$ cubic units

Another Formula:

Volume = length × width × height

$V = l \times w \times h$

$V = 4 \times 2 \times 3$

$V = 24$ cubic units

Match each figure to its volume.

1. c
2. a
3. d
4. b

a. 72 cubic units b. 200 cubic units

c. 30 cubic units d. 108 cubic units

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Volume Showdown

Students practice using a formula to find the volume of rectangular prisms.

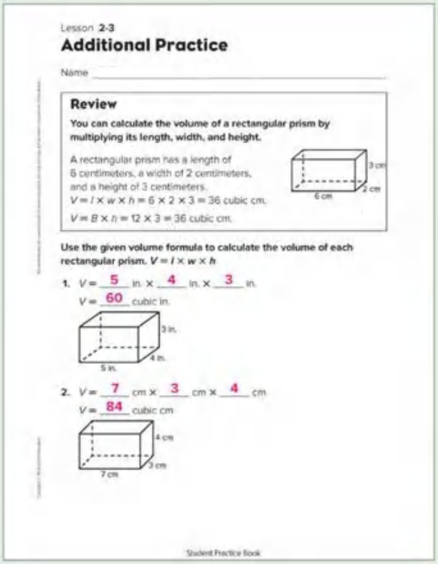
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 5–6



Lesson 2-3

Additional Practice

Name

Review

You can calculate the volume of a rectangular prism by multiplying its length, width, and height.

A rectangular prism has a length of 6 centimeters, a width of 2 centimeters, and a height of 3 centimeters.

$V = l \times w \times h = 6 \times 2 \times 3 = 36$ cubic cm.

$V = B \times h = 12 \times 3 = 36$ cubic cm.

Use the given volume formula to calculate the volume of each rectangular prism. $V = l \times w \times h$

1. $V =$ 5 in. × 4 in. × 3 in.
   $V =$ 60 cubic in.

2. $V =$ 7 cm × 3 cm × 4 cm
   $V =$ 84 cubic cm

Student Practice Book

Own It! Digital Station

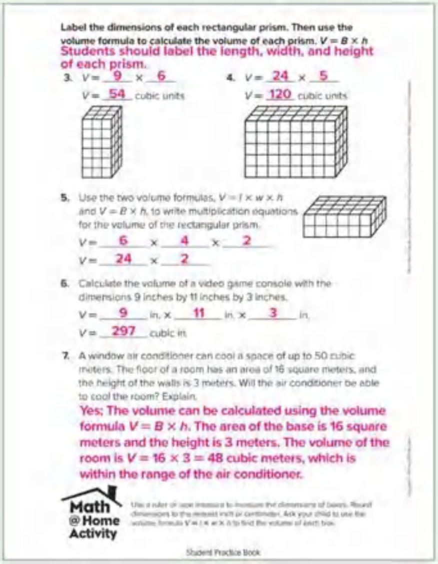
Build Fluency **Games**

Assign the digital game to develop fluency with multiplying to find area.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 5–6



Label the dimensions of each rectangular prism. Then use the volume formula to calculate the volume of each prism. $V = B \times h$

Students should label the length, width, and height of each prism.

3. $V =$ 9 × 6

$V =$ 54 cubic units

4. $V =$ 24 × 5

$V =$ 120 cubic units

5. Use the two volume formulas, $V = l \times w \times h$ and $V = B \times h$, to write multiplication equations for the volume of the rectangular prism.

$V =$ 6 × 4 × 2

$V =$ 24 × 2

6. Calculate the volume of a video game console with the dimensions 9 inches by 11 inches by 3 inches.

$V =$ 9 in. × 11 in. × 3 in.

$V =$ 297 cubic in.

7. A window air conditioner can cool a space of up to 50 cubic meters. The floor of a room has an area of 16 square meters, and the height of the walls is 3 meters. Will the air conditioner be able to cool the room? Explain.

Yes; The volume can be calculated using the volume formula $V = B \times h$. The area of the base is 16 square meters and the height is 3 meters. The volume of the room is $V = 16 \times 3 = 48$ cubic meters, which is within the range of the air conditioner.

Math @Home Activity

Student Practice Book

Extend Thinking

WORKSTATIONS

Use It! Application Station

You Are a Computer Programmer

Students design a computer program to find the volume of a rectangular prism.

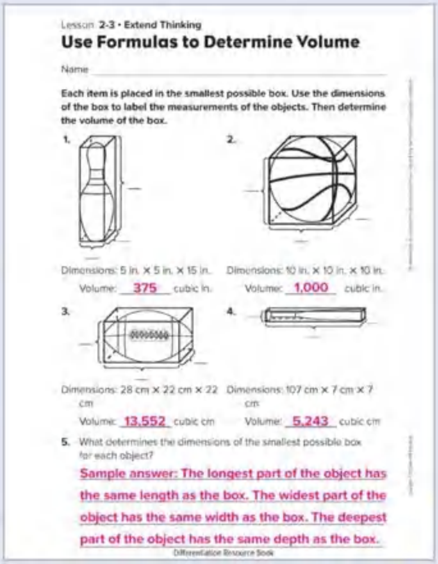
GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 6



Lesson 2-3 • Extend Thinking

Use Formulas to Determine Volume

Name

Each item is placed in the smallest possible box. Use the dimensions of the box to label the measurements of the objects. Then determine the volume of the box.

1. Dimensions: 5 in. × 5 in. × 15 in.

Volume: 375 cubic in.

2. Dimensions: 10 in. × 10 in. × 10 in.

Volume: 1,000 cubic in.

3. Dimensions: 28 cm × 22 cm × 22 cm

Volume: 13,552 cubic cm

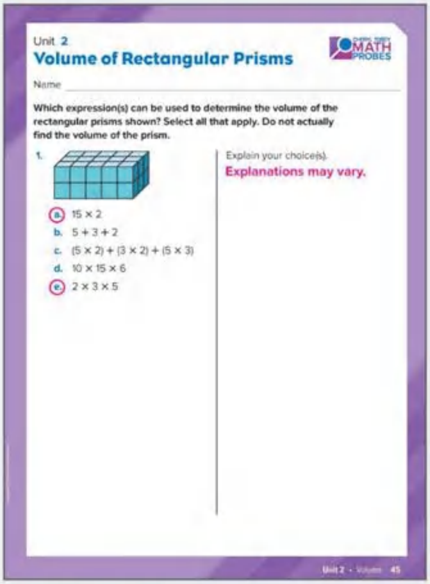
4. Dimensions: 107 cm × 7 cm × 7 cm

Volume: 5,243 cubic cm

5. What determines the dimensions of the smallest possible box for each object?

Sample answer: The longest part of the object has the same length as the box. The widest part of the object has the same width as the box. The deepest part of the object has the same depth as the box.

Differentiation Resource Book



Unit 2

Volume of Rectangular Prisms

Name

Which expression(s) can be used to determine the volume of the rectangular prisms shown? Select all that apply. Do not actually find the volume of the prism.

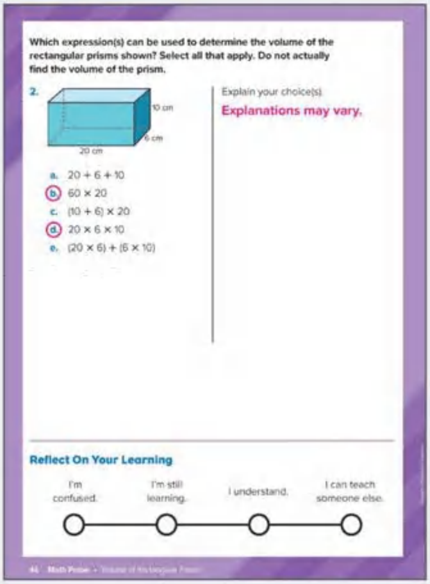
1.

[✓ a.] 15 × 2
b. 5 + 3 + 2
c. (5 × 2) + (3 × 2) + (5 × 3)
d. 10 × 15 × 6
[✓ e.] 2 × 3 × 5

Explain your choice(s).

Explanations may vary.

Unit 2 • Volume 45



Which expression(s) can be used to determine the volume of the rectangular prisms shown? Select all that apply. Do not actually find the volume of the prism.

2.

a. 20 + 6 + 10
[✓ b.] 60 × 20
c. (10 + 6) × 20
[✓ d.] 20 × 6 × 10
e. (20 × 6) + (6 × 10)

Explain your choice(s).

Explanations may vary.

Reflect On Your Learning

○ I'm confused.
○ I'm still learning.
○ I understand.
○ I can teach someone else.

46 Math Probe • Volume of Rectangular Prisms

Analyze The Probe

Formative Assessment

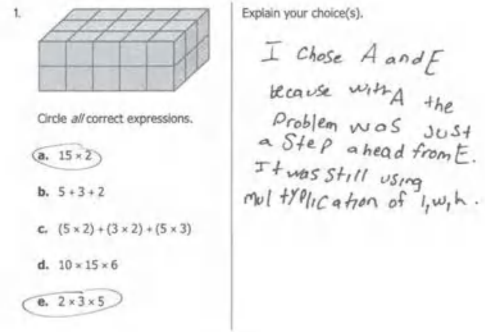
Targeted Concept The volume of a rectangular prism may be found by multiplying the three dimensions. It may also be found by multiplying the area of the base by the height.

Targeted Misconceptions Some students lack understanding of volume and the relationship between area and volume. They may use addition to determine volume, confuse volume with surface area, or recognize the formula, $V = l \times w \times h$, as the only way to calculate the volume of a rectangular prism.

Authentic Student Work

Below are examples of correct student work and explanations.

Sample A



1.

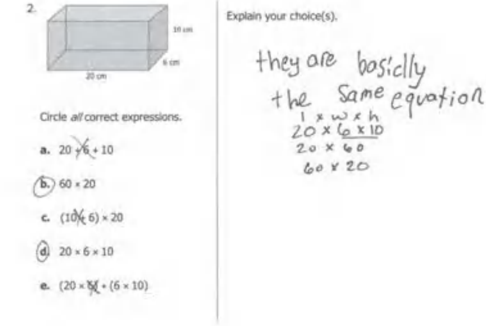
Circle *all* correct expressions.

[✓ a.] 15 × 2
b. 5 + 3 + 2
c. (5 × 2) + (3 × 2) + (5 × 3)
d. 10 × 15 × 6
[✓ e.] 2 × 3 × 5

Explain your choice(s).

I Chose A and E
because with A the
Problem was just
a Step ahead from E.
It was still using
multyplication of l,w,h.

Sample B



2.

Circle *all* correct expressions.

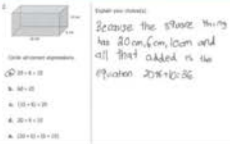
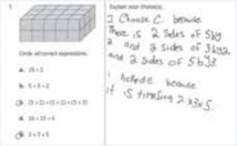
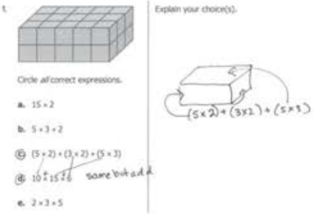
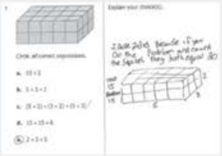
a. 20 + 6 + 10
[✓ b.] 60 × 20
c. (10 + 6) × 20
[✓ d.] 20 × 6 × 10
e. (20 × 6) + (6 × 10)

Explain your choice(s).

they are basiclly
the Same equation
l × w × h
20 × 6 × 10
20 × 60
60 × 20

Collect and Assess Student Work

Collect and review student response to determine possible misconceptions. See examples in If-Then chart.

IF incorrect...	THEN the student likely...	Sample Misconceptions
1. b, c 2. a	adds the length of the three dimensions (height, length and width) rather than multiplying, or adds the area of the faces.	 Because the square thing has 20 cm, 6 cm, 10 cm and all that added is the equation 20+6+10=36
2. e	finds the sum of the areas of the labeled faces.	 I Choose C because There is 2 Sides of 5 by 2 and 2 Sides of 3 by 2 and 2 Sides of 5 by 3 I chose e because it is timesing 2 x 3 x 5.
1. d 2. c	misapplies the formula, $V = l \times w \times h$, by multiplying the areas of three faces (rather than multiplying the lengths of the three dimensions); OR finds the sum of two dimensions and multiplies that sum by the third dimension.	 Circle all correct expressions. a. 15 × 2 b. 5 × 3 × 2 [✓ c.] (5 × 2) + (3 × 2) + (5 × 3) [✓ d.] 10 + 15 + 6 same but add e. 2 × 3 × 5 Explain your choice(s). (5×2)+(3×2)+(5×3)
1. Chooses e, but not also a 2. Chooses d, but not also b	only recognizes the expression that matches the familiar $V = l \times w \times h$ formula for the volume of a rectangular prism.	 I pick 2×3×5 because if you count on the bottom and count the squares they both equal 30

Many of the above difficulties result in a combination of correct and incorrect responses.
For correct responses, be sure to check for sound reasoning.

Take Action

Choose from the following resources or suggestions:

- Revisit the activities on understanding and finding volume in Lessons 2-1, 2-2, and 2-3.
- Use concrete materials to construct rectangular prisms to build understanding of the meaning of volume and to develop a variety of approaches to find volume. These approaches should include counting units and determining the area of a layer, extrapolating to multiple layers that comprise the prism.
- Explore the relationship between area and volume and how knowledge of the area of a base of a prism can be used to find the volume.
- Build understanding that the volume of a rectangular prism can be represented with more than one expression—and that those expressions are equivalent.

Revisit the Probe after additional instruction. Have students review their initial answers to the probe. Use these questions for discussion:

- Are there any answers you would like to change? Which ones?
- Explain why you might want to change them.
- Are there any questions that you still have about any of the items on this probe?

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

LESSON **2-4**

Determine the Volume of Composite Figures

Learning Targets

- I can find the volume of composite figures.
- I can explain how to find the volume of composite figures.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.MD.C.5.c** Recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms by adding the volumes of the non-overlapping parts, applying this technique to solve real world problems.

Mathematical Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Model with mathematics.

Vocabulary

Math Terms	Academic Terms
composite solid figure	complex
formula	speculate

Materials

The materials may be for any part of the lesson.

- *Nets* Teaching Resource
- ruler
- unit cubes

Focus

Content Objective	Language Objectives	SEL Objective
• Students determine the volume of composite solid figures.	• Students discuss how to determine the volume of composite solid figures while answering *Wh-* questions. • In order to support optimizing output, ELs will participate in MLR5: Co-Craft Questions and Problems.	• Students engage in active listening and work collaboratively with a partner to complete mathematical tasks.

Coherence

Previous	Now	Next
• Students found and used two formulas to determine the volume of a right rectangular prism with whole-number side lengths (Unit 2).	• Students recognize volume as additive. Find volumes of solid figures composed of two non-overlapping right rectangular prisms.	• Students apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems (Unit 2).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of volume by decomposing composite figures to calculate volume. They recognize that volume is additive and to calculate the volume of the composite figure, the volumes of each part must be added.	• Students build proficiency with calculating volumes of rectangular prisms by using the volume formulas.	• Students build proficiency with calculating volumes of rectangular prisms by using the volume formulas.

GO ONLINE

Number Routine
Can You Make the Number?

Build Fluency Students build their number sense as they use combinations of numbers and mathematical operations to make the target number.

Remind students there is more than one solution to the problem. If they find one way, challenge them to continue to find other ways.

These prompts encourage students to talk about their reasoning:

- What two numbers do you want to start with?
- What operation(s) could you perform to create an answer close to 21?
- What other number(s) from the list and which operation(s) could you use to get the number closer to 21?

Launch 5–7 min

Sense-Making Routine

Purpose Students discuss and share their thoughts about composite figures composed of rectangular prisms.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip You may want to have students work in pairs as they look for similarities and differences. This can help build a collaborative classroom culture. It also allows for greater participation among students as they share their thinking with their partners.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' awareness of composite figures composed of rectangular prisms and are based on possible comments and questions students may make during the share out.

- How do you think the figure on the right was made?
- What do you think is the volume of the figure on the right?

Math is... Mindset

- What can you do today to help build a relationship with a classmate?

SEL Relationship Skill: Build Relationships

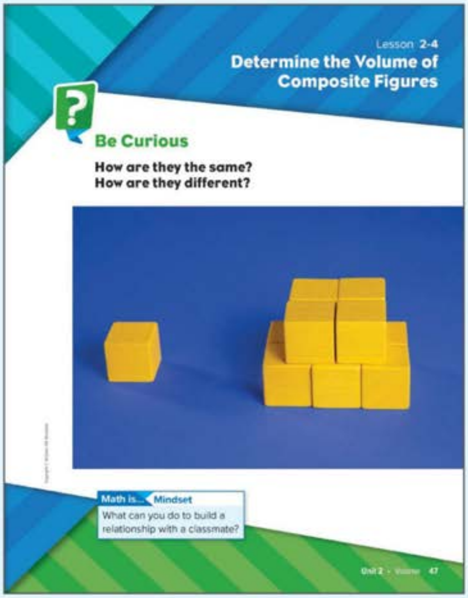
Invite students to partner with a new or less familiar peer to complete the activity. Encourage students to actively and respectfully listen to one another as they explore and collaborate to identify similarities and differences.

Transition to Explore & Develop

ETP Establish Goals to Focus Learning

Ask questions that focus students' attention on the additive nature of volume and how it could be used to determine the volume of a composite figure.

- Let's think about how we can use parts of a figure to determine the volume of the figure.



Lesson 2-4

Determine the Volume of Composite Figures

Be Curious

How are they the same?
How are they different?

Math is... Mindset

What can you do to build a relationship with a classmate?

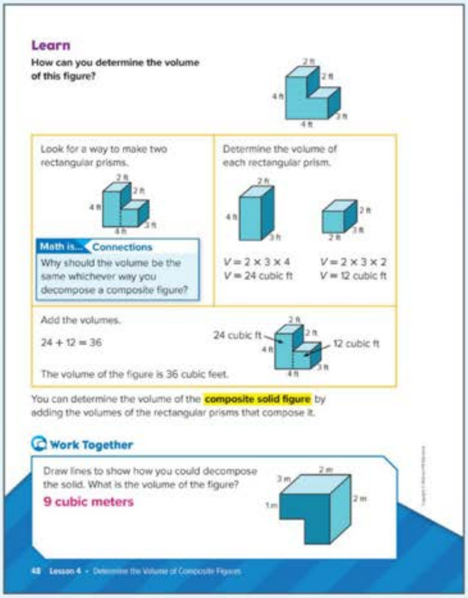
Unit 2 • Volume 47

Be Curious

How are they the same?
How are they different?

Explore & Develop

20 min



Learn

How can you determine the volume of this figure?

Look for a way to make two rectangular prisms.

Math is... Connections

Why should the volume be the same whichever way you decompose a composite figure?

Determine the volume of each rectangular prism.

$V = 2 \times 3 \times 4$
$V = 24$ cubic ft

$V = 2 \times 3 \times 2$
$V = 12$ cubic ft

Add the volumes.

$24 + 12 = 36$

The volume of the figure is 36 cubic feet.

You can determine the volume of the **composite solid figure** by adding the volumes of the rectangular prisms that compose it.

Work Together

Draw lines to show how you could decompose the solid. What is the volume of the figure?

9 cubic meters

48 Lesson 4 • Determine the Volume of Composite Figures

❶ Pose the Problem

ETP Pose Purposeful Questions

- How are the quantities in this problem related?
- How does the picture help you make sense of those quantities?
- What words will you use to explain your thinking?
- How will the units and labels you will use correspond to the quantities in this problem?

❷ Develop the Math

Choose the option that best meets your instructional goal.

MLR Co-Craft Questions and Problems

Pair students and have them co-create a problem similar to the one on the Learn page. Have them work together to solve their problem and then trade their problem with another pair. After each pair solves the other pair's problems, have them form a group of four to check solutions and correct any mistakes that may have been made. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How is the process for determining the volume of a composite solid figure similar to the process of finding the area of a composite 2-dimensional figure? How is it different? How is it more complex?

Key Takeaway

- The process for determining the volume of a composite solid figure is similar to the process of finding the area of a composite 2-dimensional figure.

Work Together

Students think about decomposing a composite figure into rectangular prisms to find the volume of the composite figure. Have students work on the problem in pairs before asking them to share their work.

Common Error: Students may struggle because all sides are not labeled. Point out that all the edges and faces in this figure are parallel or perpendicular. Because of that, for example, they can extrapolate the unknown edge lengths.

LOM Language of Math

Composite solid figures are not limited to figures composed of rectangular prisms. In Grade 1, students spent time composing solid figures of cubes, right rectangular prisms, right circular cones, right circular cylinders, etc.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore the concept of finding the volume of composite solid figures.

Materials: Nets Teaching Resource, ruler

Directions: Have students construct a composite solid figure that matches the figure in the Pose the Problem. Students can measure the prisms to find the dimensions of the figure.

Support Productive Struggle

- What do you notice about this figure?
- How could you decompose this figure?
- What rectangular prisms do you see?
- How is finding the volume of a composite figure similar to finding the area of a composite figure?

Math is... Connections

- Why should the volume be the same whichever way you decompose a composite figure?

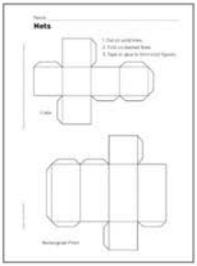
Students are thinking abstractly about the volume of a figure being independent of the way it is decomposed

Activity Debrief: Have students share how they decomposed the composite solid figure and found the volume of each rectangular prism. Encourage students to explain why it was necessary to add the volumes of each rectangular prism to determine the volume of the composite solid figure.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine the volume of this figure?

A PDF of the Teaching Resource is available in the Digital Teacher Center.



Nets

Guided Exploration

Students extend their understanding of decomposing 2-dimensional composite figures to find area to decomposing composite solid figures to find volume.

Use and Connect Mathematical Representations

- How does this figure look familiar?
- How can the labels in the drawing of the figure help you solve the problem?
- **Think About It:** Why are some of the dimensions filled in and some are not?

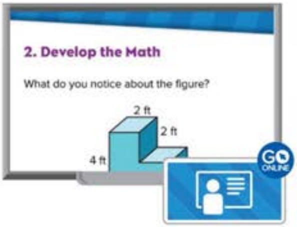
Have students determine the missing lengths. Ensure that students understand the length of the composite figure is 4 feet.

Have students determine the volume using a different decomposition. Show that decomposing the composite figure horizontally results in the same volume. Students may also notice that the composite solid figure can be decomposed into three rectangular prisms.

Math is... Connections

- Why should the volume be the same whichever way you decompose a composite figure?

Students are thinking abstractly about the volume of a figure being independent of the way it is decomposed.



2. Develop the Math

What do you notice about the figure?

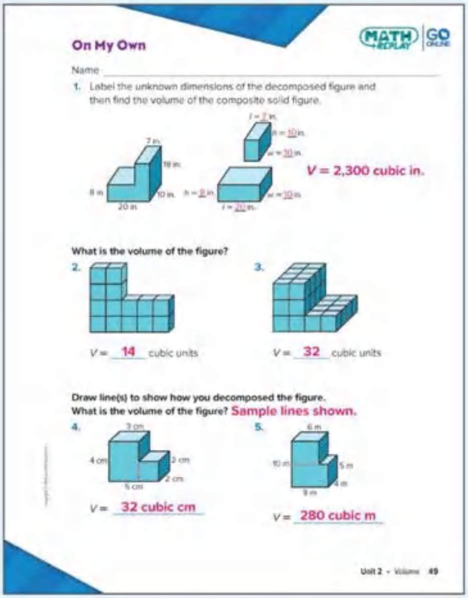
English Learner Scaffolds

Entering/Emerging Support comprehension of the phrase *that compose it*. With students, look together at the sentence below the table on the Learn page. Make sure students understand that *it* refers to the composite solid figure. Have students move a finger from "it" back to "composite solid figure." Then explain that *that compose it* gives us more information about the prisms. It means that there are rectangular prisms in the composite solid figure. Be sure to accompany your explanation with comprehension supports such as pointing to visuals on the page.

Developing/Expanding Support comprehension of the phrase *that compose it*. With students, look together at the sentence below the table on the Learn page. Ask students what *it* refers to (the composite solid figure). Then ask what *that compose it* gives us more information about (the prisms). Explain to students that this means that there are rectangular prisms in the composite solid figure. Work with students to break down the meaning into more manageable chunks of information: *This is a composite solid figure. In it are two rectangular prisms.*

Bridging/Reaching Work with students to break down the meaning and purpose of the phrase *that compose it*. With students, look together at the sentence below the table on the Learn page. Have students discuss what they think this means. *The composite solid figure has two rectangular prisms in it. You can add the volumes... to,,,* Ensure that students understand that *that compose it* tells us more about the prisms and that *it* refers to the composite solid figure.

Practice & Reflect 10 min



On My Own

Name

1. Label the unknown dimensions of the decomposed figure and then find the volume of the composite solid figure.

V = 2,300 cubic in.

What is the volume of the figure?

2. V = 14 cubic units

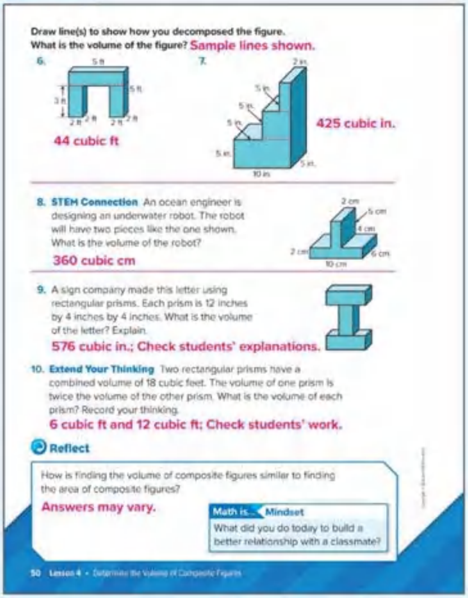
3. V = 32 cubic units

Draw line(s) to show how you decomposed the figure.
What is the volume of the figure? Sample lines shown.

4. V = 32 cubic cm

5. V = 280 cubic m

Unit 2 • Volume 49



Draw line(s) to show how you decomposed the figure.
What is the volume of the figure? Sample lines shown.

6. 44 cubic ft

7. 425 cubic in.

8. **STEM Connection** An ocean engineer is designing an underwater robot. The robot will have two pieces like the one shown. What is the volume of the robot?
360 cubic cm

9. A sign company made this letter using rectangular prisms. Each prism is 12 inches by 4 inches by 4 inches. What is the volume of the letter? Explain.
576 cubic in.; Check students' explanations.

10. **Extend Your Thinking** Two rectangular prisms have a combined volume of 18 cubic feet. The volume of one prism is twice the volume of the other prism. What is the volume of each prism? Record your thinking.
6 cubic ft and 12 cubic ft; Check students' work.

Reflect

How is finding the volume of composite figures similar to finding the area of composite figures?

Answers may vary.

Math is... Mindset

What did you do today to build a better relationship with a classmate?

50 Lesson 4 • Determine the Volume of Composite Figures

Practice

Build Fluency from Understanding

Common Error: Exercises 4–5 Students may not include units. Remind them that including correct units in an answer is as important as doing correct calculations.

Practice Item Analysis

Item	DOK	Rigor
1	2	Conceptual Understanding
2–7	3	Procedural Skill & Fluency
8	3	Application
9–10	4	Conceptual Understanding

Reflect

Students complete the Reflect Question.

- How is finding the volume of composite figures similar to finding the area of composite figures?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What did you do to help build a relationship with a classmate?

Students reflect on how they developed stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can find the volume of composite figures.
- I can explain how to find the volume of composite figures.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Find volume of composite figures	5.MD.C.5.c
2	2	Find volume of composite figures	5.MD.C.5.c
3	2	Find volume of composite figures	5.MD.C.5.c

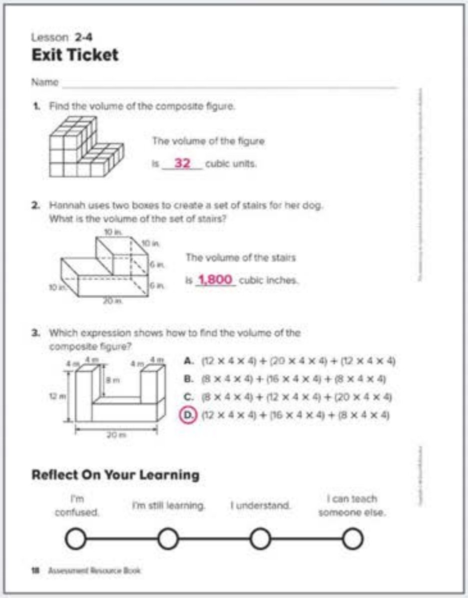
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 2-4

Exit Ticket

Name ____________________

1. Find the volume of the composite figure.

The volume of the figure is 32 cubic units.

2. Hannah uses two boxes to create a set of stairs for her dog. What is the volume of the set of stairs?

The volume of the stairs is 1,800 cubic inches.

3. Which expression shows how to find the volume of the composite figure?

A. (12 × 4 × 4) + (20 × 4 × 4) + (12 × 4 × 4)
B. (8 × 4 × 4) + (16 × 4 × 4) + (8 × 4 × 4)
C. (8 × 4 × 4) + (12 × 4 × 4) + (20 × 4 × 4)
[✓ D.] (12 × 4 × 4) + (16 × 4 × 4) + (8 × 4 × 4)

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

18 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Find the Dimensions

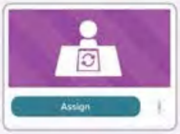
Work with students in pairs. Give each student 24 unit cubes. Have each student use some or all of the cubes to create a composite figure, sketch the figure, and label the dimensions. Then have students switch sketches with their partners and use the labeled sketches to find the volume of each figure. Encourage students to determine how the figures could be divided into two rectangular prisms and what the dimensions of each prism would be. Students can check each other's work by identifying the number of unit cubes used.

GO ONLINE

Take Another Look Lesson

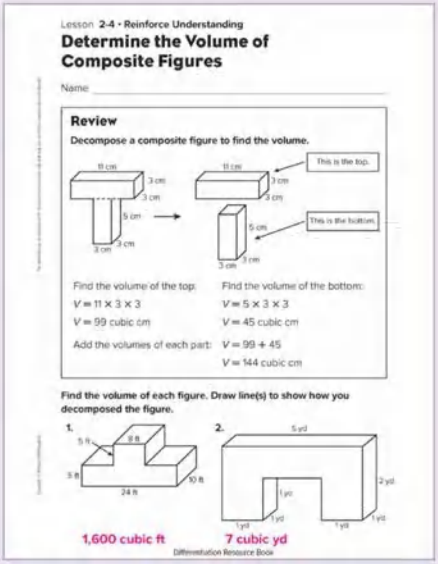
Assign the interactive lesson to reinforce targeted skills.

- Recognize Volume as Additive



INDEPENDENT WORK

Differentiation Resource Book, p. 7



Lesson 2-4 • Reinforce Understanding

Determine the Volume of Composite Figures

Name

Review

Decompose a composite figure to find the volume.

Find the volume of the top:

$V = 11 \times 3 \times 3$

$V = 99$ cubic cm

Find the volume of the bottom:

$V = 5 \times 3 \times 3$

$V = 45$ cubic cm

Add the volumes of each part: $V = 99 + 45$

$V = 144$ cubic cm

Find the volume of each figure. Draw line(s) to show how you decomposed the figure.

1\.

1,600 cubic ft

2\.

7 cubic yd

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Additive Volume Task Cards

Student practice finding the volume of composite figures.

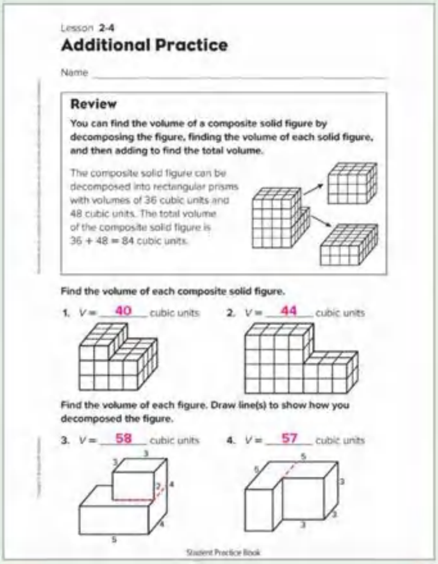
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 7–8



Lesson 2-4

Additional Practice

Name

Review

You can find the volume of a composite solid figure by decomposing the figure, finding the volume of each solid figure, and then adding to find the total volume.

The composite solid figure can be decomposed into rectangular prisms with volumes of 36 cubic units and 48 cubic units. The total volume of the composite solid figure is $36 + 48 = 84$ cubic units.

Find the volume of each composite solid figure.

1\. $V =$ 40 cubic units

2\. $V =$ 44 cubic units

Find the volume of each figure. Draw line(s) to show how you decomposed the figure.

3\. $V =$ 58 cubic units

4\. $V =$ 57 cubic units

Student Practice Book

Own It! Digital Station

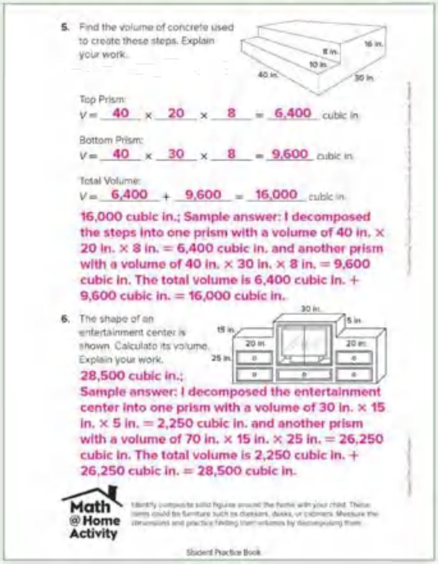
Build Fluency **Games**

Assign the digital game to develop fluency with multiplying to find area.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 7–8



5. Find the volume of concrete used to create these steps. Explain your work.

Top Prism:
V = 40 × 20 × 8 = 6,400 cubic in.

Bottom Prism:
V = 40 × 30 × 8 = 9,600 cubic in.

Total Volume:
V = 6,400 + 9,600 = 16,000 cubic in.

16,000 cubic in.; Sample answer: I decomposed the steps into one prism with a volume of 40 in. × 20 in. × 8 in. = 6,400 cubic in. and another prism with a volume of 40 in. × 30 in. × 8 in. = 9,600 cubic in. The total volume is 6,400 cubic in. + 9,600 cubic in. = 16,000 cubic in.

6. The shape of an entertainment center is shown. Calculate its volume. Explain your work.

28,500 cubic in.;
Sample answer: I decomposed the entertainment center into one prism with a volume of 30 in. × 15 in. × 5 in. = 2,250 cubic in. and another prism with a volume of 70 in. × 15 in. × 25 in. = 26,250 cubic in. The total volume is 2,250 cubic in. + 26,250 cubic in. = 28,500 cubic in.

Math @ Home Activity

Student Practice Book

WORKSTATIONS

GO ONLINE

INDEPENDENT WORK

E Extend Thinking

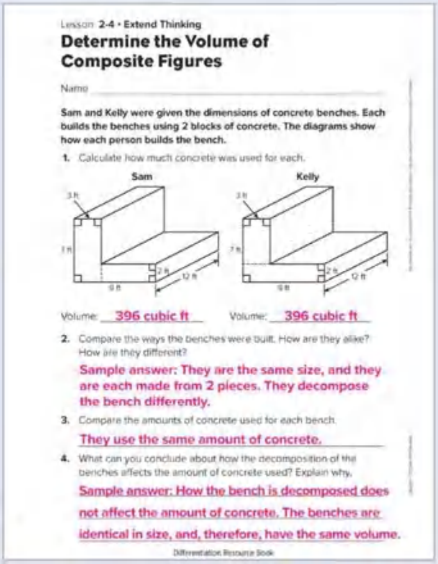
Use It! Application Station

Harvesting Water Students plan and build a model of a rainwater harvesting reservoir.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Differentiation Resource Book, p. 8



Lesson 2-4 • Extend Thinking

Determine the Volume of Composite Figures

Name

Sam and Kelly were given the dimensions of concrete benches. Each builds the benches using 2 blocks of concrete. The diagrams show how each person builds the bench.

1. Calculate how much concrete was used for each.

Sam — Volume: 396 cubic ft

Kelly — Volume: 396 cubic ft

2. Compare the ways the benches were built. How are they alike? How are they different?

Sample answer: They are the same size, and they are each made from 2 pieces. They decompose the bench differently.

3. Compare the amounts of concrete used for each bench.

They use the same amount of concrete.

4. What can you conclude about how the decomposition of the benches affects the amount of concrete used? Explain why.

Sample answer: How the bench is decomposed does not affect the amount of concrete. The benches are identical in size, and, therefore, have the same volume.

Differentiation Resource Book

LESSON **2-5**

Solve Problems Involving Volume

Learning Targets

- I can solve problems involving volume.
- I can describe how to solve problems involving volume.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.MD.C.5.b** Apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole- number edge lengths in the context of solving real world and mathematical problems.

Mathematical Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Reason abstractly and quantitatively.

Vocabulary

Math Terms	Academic Terms
equation	relevant
formula	valid
unknown	
variable	

Materials

The materials may be for any part of the lesson.

- *Problem-Solving Tool* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students apply the volume formulas to solve real-world problems involving rectangular prisms.	• Students talk about applying the volume formula to solve real-world problems using the adjective *given*. • In order to support cultivating conversation, ELs will participate in MLR8: Discussion Supports.	• Students determine the strategies and analyses necessary to make informed decisions when engaging in mathematical practices.

Coherence

Previous	Now	Next
• Students applied the area and perimeter formulas for rectangles in real world and mathematical problems (Grade 4). • Students recognized volume as additive. Found volumes of solid figures composed of two non-overlapping right rectangular prisms (Unit 2).	• Students apply the formulas $V = l \times w \times h$ and $V = b \times h$ for rectangular prisms to find volumes of right rectangular prisms with whole-number edge lengths in the context of solving real world and mathematical problems.	• Students recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left (Unit 3). • Students find the volume of a right rectangular prism with fractional edge lengths (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students continue to build on their understanding of volume. They relate volume to multiplication and addition and solve real-world problems involving volume. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students build proficiency with calculating volume of prisms, and determining missing dimensions given the volume, by using the volume formulas.	• Students apply their understanding of volume to solve real-world problems involving volume of rectangular prisms.

Number Routine
Where Does It Go?

Build Fluency Students build estimation skills and spatial reasoning as they determine a number's position on a number line relative to two other numbers.

These prompts encourage students to talk about their reasoning:

- With what number would you label the center of each number line?
- Where does 532 fall with respect to the center of each number line?
- How can you be sure that 532 can be plotted on each line?

Launch 5–7 min

Sense-Making Routine

Purpose Students share and discuss volume of real-world objects, and that objects may have the same volume but different dimensions.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip You may wish to have students Think-Pair-Share before inviting volunteers to share what they notice about the different containers.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' awareness of volume of real-world objects, and that objects may have the same volume but different dimensions and are based on possible comments and questions students may make during the share out.

- How can two rectangular prisms with the different dimensions have the same volume?
- If you know the product of three factors and you know two of the factors, how can you determine the factor you do not know?

Math is... Mindset

- How can creative thinking help you solve a problem?

SEL Responsible Decision-Making: Solve Problems

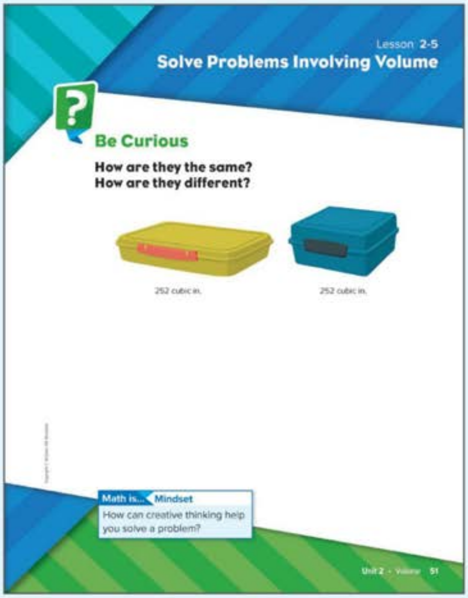
Help students develop responsible decision-making skills by providing them opportunities to practice problem solving. As students begin the Notice & Wonder routine, encourage them to first identify the problem, then think critically about what they will do to solve the problem. As students work through the Notice & Wonder routine, have them think about alternative ways to find objects that have the same volume but different dimensions. Encourage students to use a different strategy to check their answer or identify multiple possible answers/solutions. As you come together to collaboratively discuss the Notice & Wonder routine, you can invite students to share their problem-solving processes.

Transition to Explore & Develop

ETP Establish Goals to Focus Learning

Ask questions that focus students' attention on using the volume formulas to solve real-world problems.

- Let's think about using the volume formulas we know to help us solve real-world problems.



Lesson 2-5

Solve Problems Involving Volume

Be Curious

How are they the same?
How are they different?

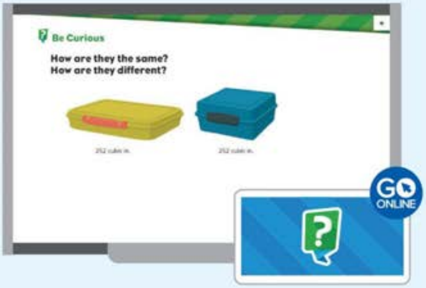
252 cubic in.

252 cubic in.

Math is... Mindset

How can creative thinking help you solve a problem?

Unit 2 • Volume 51



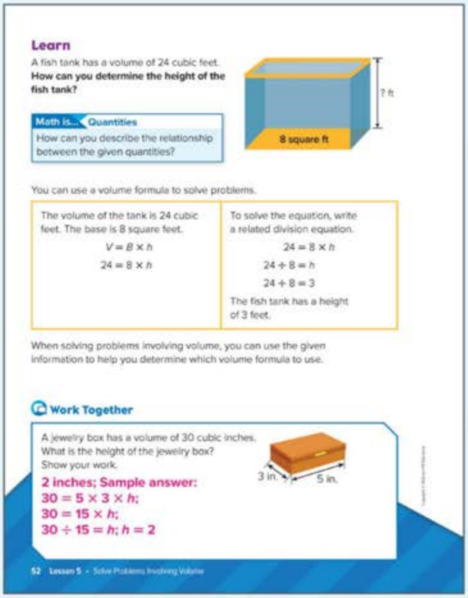
Be Curious

How are they the same?
How are they different?

252 cubic in.

252 cubic in.

Explore & Develop 20 min



Learn

A fish tank has a volume of 24 cubic feet. **How can you determine the height of the fish tank?**

Math is... Quantities
How can you describe the relationship between the given quantities?

You can use a volume formula to solve problems.

The volume of the tank is 24 cubic feet. The base is 8 square feet. $V = B \times h$ $24 = 8 \times h$	To solve the equation, write a related division equation. $24 = 8 \times h$ $24 \div 8 = h$ $24 \div 8 = 3$ The fish tank has a height of 3 feet.

When solving problems involving volume, you can use the given information to help you determine which volume formula to use.

Work Together

A jewelry box has a volume of 30 cubic inches. What is the height of the jewelry box? Show your work.

2 inches; Sample answer:
$30 = 5 \times 3 \times h$;
$30 = 15 \times h$;
$30 \div 15 = h$; $h = 2$

52 Lesson 5 • Solve Problems Involving Volume

❶ Pose the Problem

ETP Pose Purposeful Questions

- What quantities in this problem are relevant? Why?
- How could a drawing help you make sense of those quantities?
- How could a formula or tool help you solve this problem?

❷ Develop the Math

Choose the option that best meets your instructional goal.

MLR Discussion Supports

As students engage in discussing the answers to the questions, restate statements they make as a question to seek clarification. Encourage students to challenge each other's ideas when warranted, as well as to elaborate on their ideas and give examples.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How can you check that an unknown dimension you found is valid?
- If you know the height and volume of a rectangular prism, explain how you could find the area of its base.
- Describe how the length, width, height, and volume of a rectangular prism are related.

Key Takeaway

- The volume formulas for rectangular prisms can be used to solve real-world problems.

Work Together

Students think about using volume formulas to determine the missing dimension in a real-world problem. Have students work on the problem in pairs before asking them to share their work.

Common Error: Students may use the wrong unit in their answer, e.g., 2 cubic inches. Remind them that they are trying to determine the height, which is the length of one of the edges of the box, and that length is measured in units, like inches.

LOM Language of Math

Students may be familiar with *context* from their literacy classes. That term is used in mathematics also. Students use the *context* of a real-world problem to write an equation that relates the quantities in the problem and to check if their answer makes sense.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students apply the volume formula to solve real-world problems.

Materials: *Problem-Solving Tool* Teaching Resource

Directions: Distribute copies of the *Problem-Solving Tool* Teaching Resource to each student or pairs. Have students solve the Pose the Problem.

Math is... Quantities

- How can you describe the relationship between the given quantities?

Students are making sense of quantities and their relationships.

ETP Implement Tasks that Promote Reasoning and Problem Solving

- What formula did you use to solve the problem?
- What is another formula you could have used?
- Why might you use one formula and not another?

Activity Debrief: After students solve the problem, have students discuss answers and check students' understanding.

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students apply the volume formula to solve real-world problems.

Math is... Quantities

- How can you describe the relationship between the given quantities?

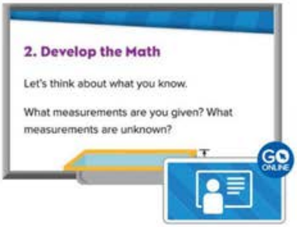
Students are making sense of quantities and their relationships.

ETP Facilitate Meaningful Discourse

- **Think About It:** Why doesn't the formula $V = l \times w \times h$ help solve this problem?
- Does the related division equation $24 \div h = 8$ help you solve the problem? Why or why not?

Have students work in pairs or small groups to discuss strategies to solve unknown factor problems. Invite volunteers to share their strategies. Encourage students to compare the strategy they used to their classmates' strategies.

- Explain why the answer is 3 feet and not 3 cubic feet.



2. Develop the Math

Let's think about what you know.

What measurements are you given? What measurements are unknown?

EL English Learner Scaffolds

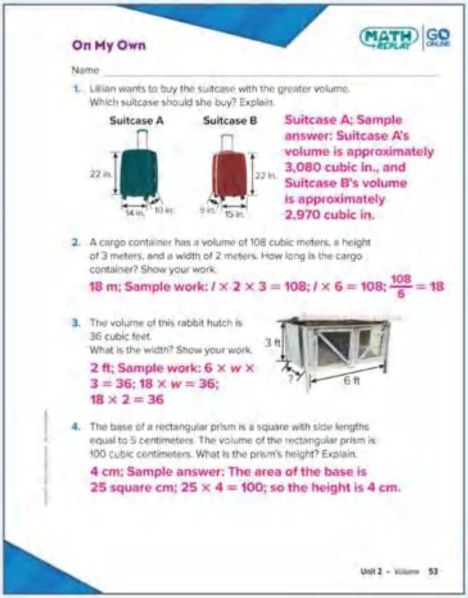
Entering/Emerging Support students in understanding the meaning of the word *given* as it pertains to the lesson. Point to *24 cubic feet* in the problem on the Learn page. Say *The volume of the fish task is given*. Next, point to the fish tank and ask *What other quantity is given?* (*8 square ft*).

Developing/Expanding Support students in understanding the meaning of the word *given* as it pertains to the lesson. Point to *24 cubic feet* in the problem on the Learn page. Say *The volume of the fish task is given*. Then, without pointing at or gesturing towards the fish tank, ask students to tell you what other quantity is given.

Bridging/Reaching Encourage students to explain how given quantities can help them to find the volume, height, or base of an object. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, I disagree because...* or *No, given quantities....*

Practice & Reflect

10 min



On My Own

Name

1. Lillian wants to buy the suitcase with the greater volume. Which suitcase should she buy? Explain.

Suitcase A; Sample answer: Suitcase A's volume is approximately 3,080 cubic in., and Suitcase B's volume is approximately 2,970 cubic in.

2. A cargo container has a volume of 108 cubic meters, a height of 3 meters, and a width of 2 meters. How long is the cargo container? Show your work.

18 m; Sample work: $l \times 2 \times 3 = 108$; $l \times 6 = 108$; $\frac{108}{6} = 18$

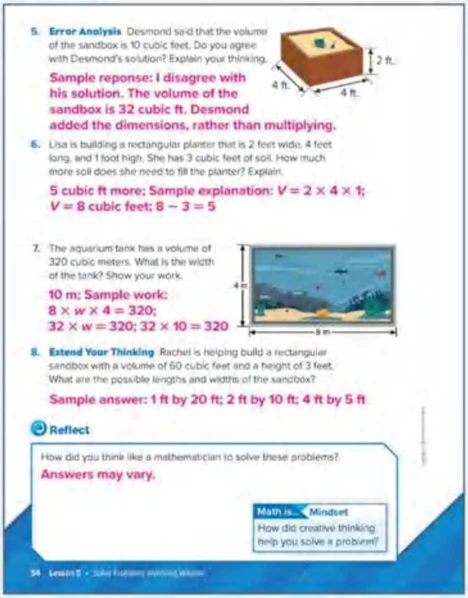
3. The volume of this rabbit hutch is 36 cubic feet. What is the width? Show your work.

2 ft; Sample work: $6 \times w \times 3 = 36$; $18 \times w = 36$; $18 \times 2 = 36$

4. The base of a rectangular prism is a square with side lengths equal to 5 centimeters. The volume of the rectangular prism is 100 cubic centimeters. What is the prism's height? Explain.

4 cm; Sample answer: The area of the base is 25 square cm; $25 \times 4 = 100$; so the height is 4 cm.

Unit 2 • Volume 53



5. **Error Analysis** Desmond said that the volume of the sandbox is 10 cubic feet. Do you agree with Desmond's solution? Explain your thinking.

Sample reponse: I disagree with his solution. The volume of the sandbox is 32 cubic ft. Desmond added the dimensions, rather than multiplying.

6. Lisa is building a rectangular planter that is 2 feet wide, 4 feet long, and 1 foot high. She has 3 cubic feet of soil. How much more soil does she need to fill the planter? Explain.

5 cubic ft more; Sample explanation: $V = 2 \times 4 \times 1$; $V = 8$ cubic feet; $8 - 3 = 5$

7. The aquarium tank has a volume of 320 cubic meters. What is the width of the tank? Show your work.

10 m; Sample work: $8 \times w \times 4 = 320$; $32 \times w = 320$; $32 \times 10 = 320$

8. **Extend Your Thinking** Rachel is helping build a rectangular sandbox with a volume of 60 cubic feet and a height of 3 feet. What are the possible lengths and widths of the sandbox?

Sample answer: 1 ft by 20 ft; 2 ft by 10 ft; 4 ft by 5 ft

Reflect

How did you think like a mathematician to solve these problems?

Answers may vary.

Math is... Mindset

How did creative thinking help you solve a problem?

54 Lesson 5

Practice

Build Fluency from Understanding

Common Error: Exercise 6 Students may try to find an unknown dimension for this problem. Point out to them that not all real-world problems involving volume are those types of problems. This is a two-step problem. Suggest that students do it in chunks by finding the volume first.

Practice Item Analysis

Item	DOK	Rigor
1	2	Conceptual Understanding
2–3	2	Procedural Skill & Fluency
4–6	4	Procedural Skill & Fluency
7	3	Application
8	4	Conceptual Understanding

Reflect

Students complete the Reflect Question.

- How did you think like a mathematician to solve these problems?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did creative thinking help you solve a problem?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can solve problems involving volume.
- I can describe how to solve problems involving volume.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	3	Solve problems involving volume	5.MD.C.5
2	3	Solve problems involving volume	5.MD.C.5
3	3	Solve problems involving volume	5.MD.C.5

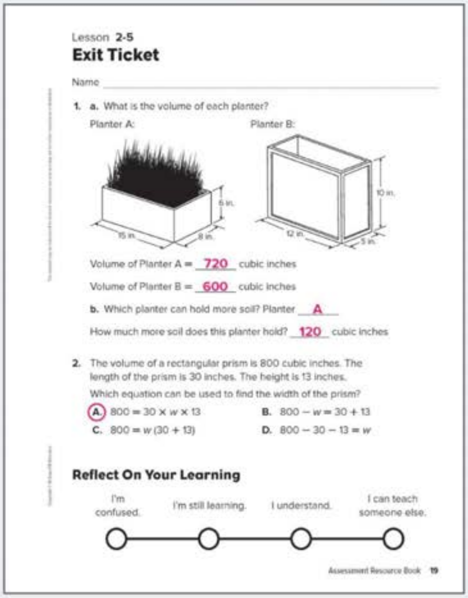
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 2-5

Exit Ticket

Name ______________________

1. a. What is the volume of each planter?

Planter A: Planter B:

Volume of Planter A = 720 cubic inches

Volume of Planter B = 600 cubic inches

b. Which planter can hold more soil? Planter A

How much more soil does this planter hold? 120 cubic inches

2. The volume of a rectangular prism is 800 cubic inches. The length of the prism is 30 inches. The height is 13 inches.

Which equation can be used to find the width of the prism?

[✓ A.] $800 = 30 \times w \times 13$
B. $800 - w = 30 + 13$
C. $800 = w\,(30 + 13)$
D. $800 - 30 - 13 = w$

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

Assessment Resource Book 19

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

Reinforce Understanding

SMALL GROUP

Ready to Fly

Ask student pairs to design suitcases in the shape of rectangular prisms with dimensions no greater than 9 inches × 14 inches × 22 inches (the maximum size of a carry-on bag on many airlines). Have students draw and label the dimensions and calculate the volume. Then have them share 2 of the 3 dimensions and the volume with their partner, who finds the missing measurement. As needed, help students write and solve an equation to describe the volume.

GO ONLINE

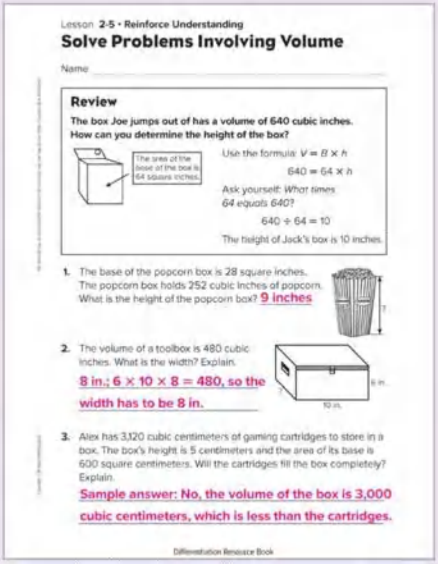
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Solve Volume Problems

INDEPENDENT WORK

Differentiated Resource Book, p. 9



Lesson 2-5 • Reinforce Understanding

Solve Problems Involving Volume

Name

Review

The box Joe jumps out of has a volume of 640 cubic inches. How can you determine the height of the box?

The area of the base of the box is 64 square inches.

Use the formula: $V = B \times h$

$640 = 64 \times h$

Ask yourself: What times 64 equals 640?

$640 \div 64 = 10$

The height of Jack's box is 10 inches.

1. The base of the popcorn box is 28 square inches. The popcorn box holds 252 cubic inches of popcorn. What is the height of the popcorn box? 9 inches

2. The volume of a toolbox is 480 cubic inches. What is the width? Explain.
8 in.; $6 \times 10 \times 8 = 480$, so the width has to be 8 in.

3. Alex has 3,120 cubic centimeters of gaming cartridges to store in a box. The box's height is 5 centimeters and the area of its base is 600 square centimeters. Will the cartridges fill the box completely? Explain.
Sample answer: No, the volume of the box is 3,000 cubic centimeters, which is less than the cartridges.

Differentiation Resource Book

Build Proficiency

WORKSTATIONS

Practice It! Game Station

Volume Situation Concentration

Students solve word problems involving volume.

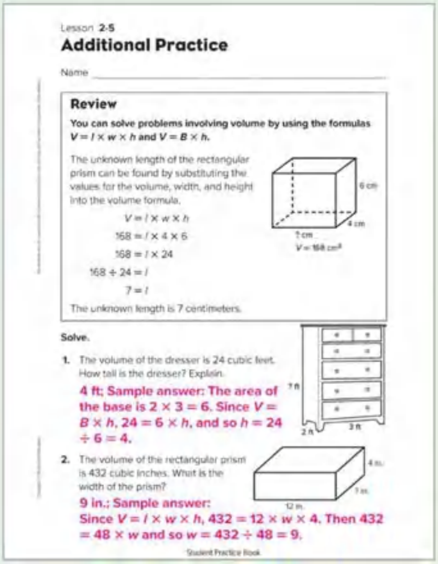
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 9–10



Lesson 2-5

Additional Practice

Name

Review

You can solve problems involving volume by using the formulas $V = l \times w \times h$ and $V = B \times h$.

The unknown length of the rectangular prism can be found by substituting the values for the volume, width, and height into the volume formula.

$V = l \times w \times h$

$168 = l \times 4 \times 6$

$168 = l \times 24$

$168 \div 24 = l$

$7 = l$

The unknown length is 7 centimeters.

6 cm
4 cm
? cm
$V = 168\text{ cm}^3$

Solve.

1. The volume of the dresser is 24 cubic feet. How tall is the dresser? Explain.
4 ft; Sample answer: The area of the base is $2 \times 3 = 6$. Since $V = B \times h$, $24 = 6 \times h$, and so $h = 24 \div 6 = 4$.

2. The volume of the rectangular prism is 432 cubic inches. What is the width of the prism?
9 in.; Sample answer: Since $V = l \times w \times h$, $432 = 12 \times w \times 4$. Then $432 = 48 \times w$ and so $w = 432 \div 48 = 9$.

Student Practice Book

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplying to find area.

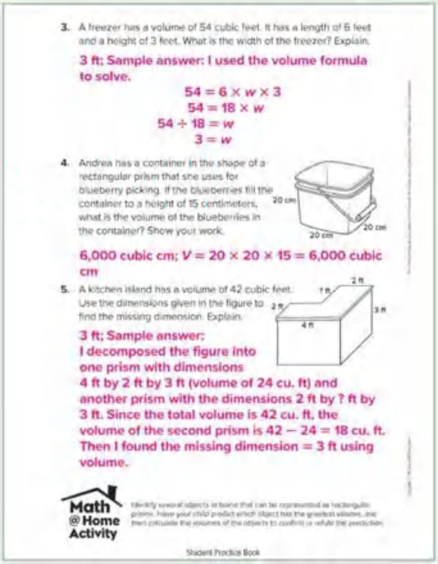
GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

INDEPENDENT WORK

Student Practice Book, pp. 9–10



3. A freezer has a volume of 54 cubic feet. It has a length of 6 feet and a height of 3 feet. What is the width of the freezer? Explain.

3 ft; Sample answer: I used the volume formula to solve.

$$54 = 6 \times w \times 3$$
$$54 = 18 \times w$$
$$54 \div 18 = w$$
$$3 = w$$

4. Andrea has a container in the shape of a rectangular prism that she uses for blueberry picking. If the blueberries fill the container to a height of 15 centimeters, what is the volume of the blueberries in the container? Show your work.

6,000 cubic cm; $V = 20 \times 20 \times 15 = 6,000$ cubic cm

5. A kitchen island has a volume of 42 cubic feet. Use the dimensions given in the figure to find the missing dimension. Explain.

3 ft; Sample answer: I decomposed the figure into one prism with dimensions 4 ft by 2 ft by 3 ft (volume of 24 cu. ft) and another prism with the dimensions 2 ft by ? ft by 3 ft. Since the total volume is 42 cu. ft, the volume of the second prism is 42 − 24 = 18 cu. ft. Then I found the missing dimension = 3 ft using volume.

Math @Home Activity

Student Practice Book

E Extend Thinking

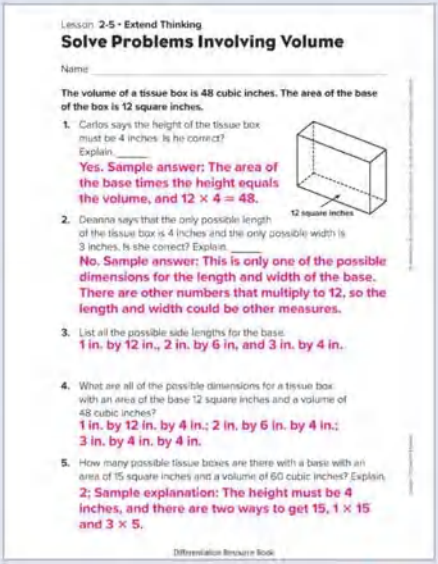
Use It! Application Station

Developing and Using Models Students create a scale model of a kitchen cabinet.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Differentiated Resource Book, p. 10



Lesson 2-5 • Extend Thinking

Solve Problems Involving Volume

Name ____________

The volume of a tissue box is 48 cubic inches. The area of the base of the box is 12 square inches.

1. Carlos says the height of the tissue box must be 4 inches. Is he correct? Explain. ______

Yes. Sample answer: The area of the base times the height equals the volume, and 12 × 4 = 48.

2. Deanna says that the only possible length of the tissue box is 4 inches and the only possible width is 3 inches. Is she correct? Explain. ______

No. Sample answer: This is only one of the possible dimensions for the length and width of the base. There are other numbers that multiply to 12, so the length and width could be other measures.

3. List all the possible side lengths for the base.

1 in. by 12 in., 2 in. by 6 in, and 3 in. by 4 in.

4. What are all of the possible dimensions for a tissue box with an area of the base 12 square inches and a volume of 48 cubic inches?

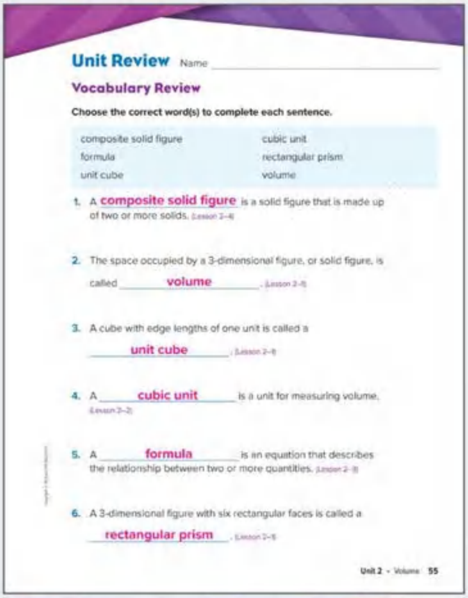
1 in. by 12 in. by 4 in.; 2 in. by 6 in. by 4 in.; 3 in. by 4 in. by 4 in.

5. How many possible tissue boxes are there with a base with an area of 15 square inches and a volume of 60 cubic inches? Explain.

2; Sample explanation: The height must be 4 inches, and there are two ways to get 15, 1 × 15 and 3 × 5.

Differentiation Resource Book

Unit Review



Unit Review

Name ______________________

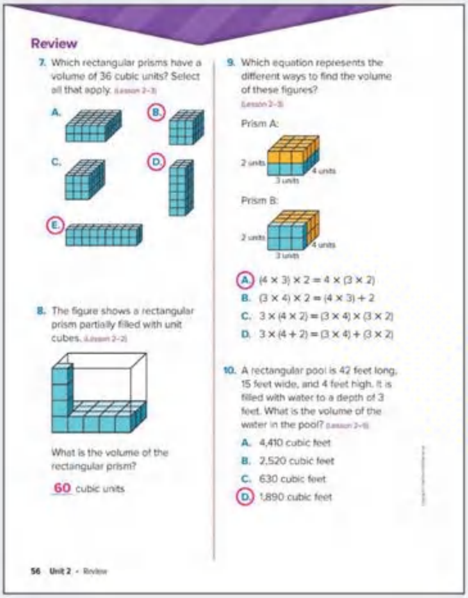
Vocabulary Review

Choose the correct word(s) to complete each sentence.

composite solid figure	cubic unit
formula	rectangular prism
unit cube	volume

1. A **composite solid figure** is a solid figure that is made up of two or more solids. (Lesson 2-4)
2. The space occupied by a 3-dimensional figure, or solid figure, is called **volume**. (Lesson 2-1)
3. A cube with edge lengths of one unit is called a **unit cube**. (Lesson 2-1)
4. A **cubic unit** is a unit for measuring volume. (Lesson 2-2)
5. A **formula** is an equation that describes the relationship between two or more quantities. (Lesson 2-3)
6. A 3-dimensional figure with six rectangular faces is called a **rectangular prism**. (Lesson 2-1)

Unit 2 • Volume 55



Review

7. Which rectangular prisms have a volume of 36 cubic units? Select all that apply. (Lesson 2-3)

A. [✓ B.] C. [✓ D.] [✓ E.]

8. The figure shows a rectangular prism partially filled with unit cubes. (Lesson 2-2)

What is the volume of the rectangular prism?

60 cubic units

9. Which equation represents the different ways to find the volume of these figures? (Lesson 2-3)

Prism A:

Prism B:

[✓ A.] $(4 \times 3) \times 2 = 4 \times (3 \times 2)$

B. $(3 \times 4) \times 2 = (4 \times 3) + 2$

C. $3 \times (4 \times 2) = (3 \times 4) \times (3 \times 2)$

D. $3 \times (4 + 2) = (3 \times 4) + (3 \times 2)$

10. A rectangular pool is 42 feet long, 15 feet wide, and 4 feet high. It is filled with water to a depth of 3 feet. What is the volume of the water in the pool? (Lesson 2-5)

A. 4,410 cubic feet

B. 2,520 cubic feet

C. 630 cubic feet

[✓ D.] 1,890 cubic feet

56 Unit 2 • Review

Students can complete the **Unit Review** to prepare for the **Unit Assessment.** Students may complete the Review in their Interactive eBook in the Digital Student Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	2-4
2	2-1
3	2-1
4	2-2
5	2-3
6	2-1

Review

Item Analysis

Item	DOK	Lesson	Standard
7	2	2-3	5.MD.C.4
8	2	2-2	5.MD.C.4
9	3	2-3	5.MD.C.5.a
10	2	2-5	5.MD.C.5.b

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

Item Analysis (continued)

Item	DOK	Lesson	Standard
11	3	2-3	5.MD.C.5.a
12	2	2-4	5.MD.C.5.c
13	2	2-4	5.MD.C.5.c
14	3	2-4	5.MD.C.5.c

Performance Task

Standards: 5.MD.C.4, 5.MD.C.5.c

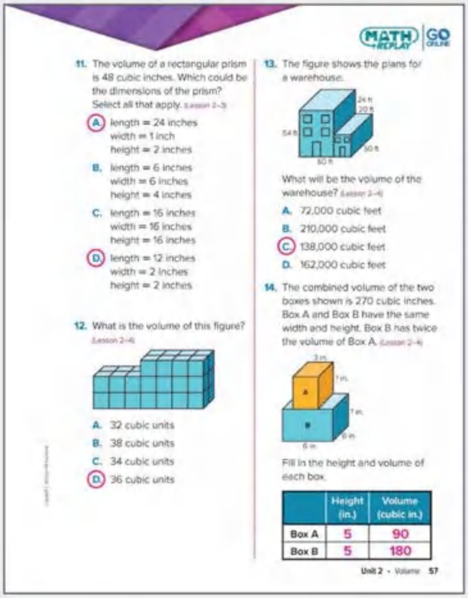
Rubric (4 points)

Part A – 2 points	
2 POINTS	Student's work reflects a proficiency with determining the volume of a figure by counting unit cubes.
1 POINT	Student's work reflects developing proficiency with determining the volume of a figure by counting unit cubes.
0 POINTS	Student's work reflects a poor understanding of determining the volume of a figure by counting unit cubes.

Part B – 2 points	
2 POINTS	Student's work reflects a proficiency with solving problems involving volume.
1 POINT	Student's work reflects developing proficiency with solving problems involving volume.
0 POINTS	Student's work reflects a poor understanding of solving problems involving volume.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.



11. The volume of a rectangular prism is 48 cubic inches. Which could be the dimensions of the prism? Select all that apply. Lesson 2-3

[✓ A.] length = 24 inches
width = 1 inch
height = 2 inches

B. length = 6 inches
width = 6 inches
height = 4 inches

C. length = 16 inches
width = 16 inches
height = 16 inches

[✓ D.] length = 12 inches
width = 2 inches
height = 2 inches

12. What is the volume of this figure? Lesson 2-4

A. 32 cubic units
B. 38 cubic units
C. 34 cubic units
[✓ D.] 36 cubic units

13. The figure shows the plans for a warehouse.

What will be the volume of the warehouse? Lesson 2-4

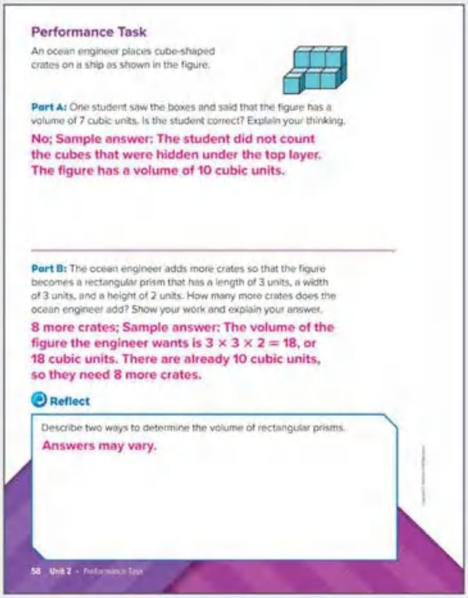
A. 72,000 cubic feet
B. 210,000 cubic feet
[✓ C.] 138,000 cubic feet
D. 162,000 cubic feet

14. The combined volume of the two boxes shown is 270 cubic inches. Box A and Box B have the same width and height. Box B has twice the volume of Box A. Lesson 2-4

Fill in the height and volume of each box.

	Height (in.)	Volume (cubic in.)
Box A	5	90
Box B	5	180

Unit 2 • Volume 57



Performance Task

An ocean engineer places cube-shaped crates on a ship as shown in the figure.

Part A: One student saw the boxes and said that the figure has a volume of 7 cubic units. Is the student correct? Explain your thinking.

No; Sample answer: The student did not count the cubes that were hidden under the top layer. The figure has a volume of 10 cubic units.

Part B: The ocean engineer adds more crates so that the figure becomes a rectangular prism that has a length of 3 units, a width of 3 units, and a height of 2 units. How many more crates does the ocean engineer add? Show your work and explain your answer.

8 more crates; Sample answer: The volume of the figure the engineer wants is $3 \times 3 \times 2 = 18$, or 18 cubic units. There are already 10 cubic units, so they need 8 more crates.

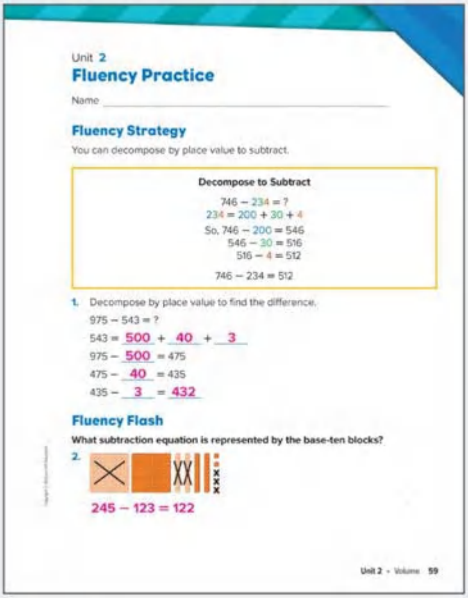
Reflect

Describe two ways to determine the volume of rectangular prisms.

Answers may vary.

58 Unit 2 • Performance Task

Fluency Practice



Unit 2

Fluency Practice

Name ______________________________

Fluency Strategy

You can decompose by place value to subtract.

Decompose to Subtract

746 − 234 = ?
234 = 200 + 30 + 4
So, 746 − 200 = 546
546 − 30 = 516
516 − 4 = 512

746 − 234 = 512

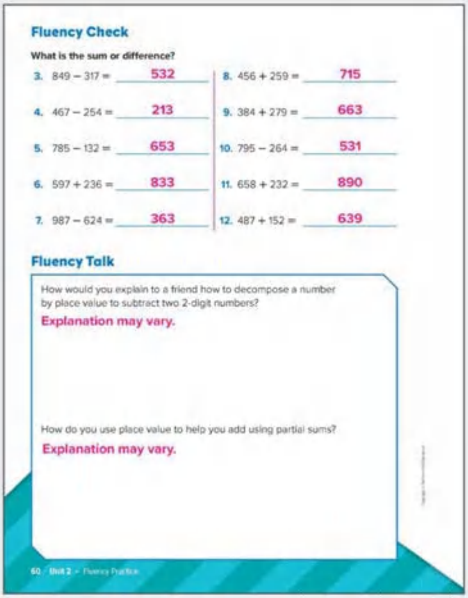
1. Decompose by place value to find the difference.
975 − 543 = ?
543 = 500 + 40 + 3
975 − 500 = 475
475 − 40 = 435
435 − 3 = 432

Fluency Flash

What subtraction equation is represented by the base-ten blocks?

2. 245 − 123 = 122

Unit 2 • Volume 59



Fluency Check

What is the sum or difference?

3. 849 − 317 = 532
4. 467 − 254 = 213
5. 785 − 132 = 653
6. 597 + 236 = 833
7. 987 − 624 = 363
8. 456 + 259 = 715
9. 384 + 279 = 663
10. 795 − 264 = 531
11. 658 + 232 = 890
12. 487 + 152 = 639

Fluency Talk

How would you explain to a friend how to decompose a number by place value to subtract two 2-digit numbers?

Explanation may vary.

How do you use place value to help you add using partial sums?

Explanation may vary.

60 Unit 2 • Fluency Practice

Fluency practice helps students develop procedural fluency, that is, the "ability to apply procedures accurately, efficiently, and flexibly." Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students review decomposing by place value to build fluency with subtracting.

Fluency Progression

Unit	Skill	Standard
1	Use Partial Sums to Add	4.NBT.B.4
2	**Decompose by Place Value to Subtract**	**4.NBT.B.4**
3	Use an Algorithm to Add	4.NBT.B.4
4	Use an Algorithm to Subtract	4.NBT.B.4
5	Choose a Strategy to Add	4.NBT.B.4
6	Choose a Strategy to Subtract	4.NBT.B.4
7	Multiply by Multiples of 10	5.NBT.B.5
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4

- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Field Trip to the Science Center

Students draw on their understanding of volume. Use the rubric shown to evaluate students' work.

Standards: 5.MD.C.3, 5.MD.C.3.a, 5.MD.C.4, 5.MD.C.5, 5.MD.C.5.c

Rubric (10 points)

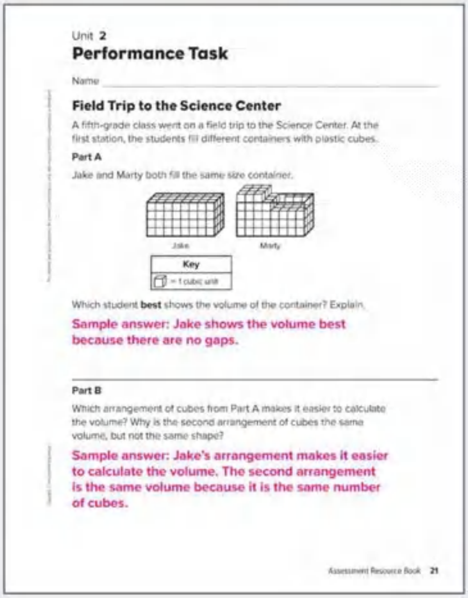
Part A (DOK 1) – 2 points	
2 POINTS	Student's work identifies which person best shows the volume. The student's explanation is reasonable.
1 POINT	Student either identifies the correct person or has a reasonable explanation.
0 POINTS	Student does not identify the correct person. The student's explanation is not reasonable.

Part B (DOK 3) – 2 points	
2 POINTS	Student's work identifies best arrangement for calculating volume. The student's explanation is reasonable.
1 POINT	Student either identifies best arrangement for calculating volume or has a reasonable explanation.
0 POINTS	Student does not identify the best arrangement for calculating volume. The student's explanation is not reasonable.

Part C (DOK 2) – 2 points	
2 POINTS	Student's explanation is reasonable. Student's work shows proficiency in finding the volume of a composite figure.
1 POINT	Student's explanation is reasonable. Student's work reflects developing proficiency in finding the volume of a composite figure and an inaccurate solution is due to computational errors, rather than conceptual weaknesses.
0 POINTS	Student's work shows weak proficiency in finding volume of composite figures. The student's solution is incorrect.

Part D (DOK 2) – 2 points	
2 POINTS	Student's work shows proficiency in calculating volume of a figure. The student's explanation is reasonable.
1 POINT	Student's explanation is reasonable. Student's work reflects developing proficiency in finding the volume of a figure and an inaccurate solution is due to computational errors, rather than conceptual weaknesses.
0 POINTS	Student's work shows weak proficiency with volume. The student's solution is incorrect.

Part E (DOK 3) – 2 points	
2 POINTS	Student's work shows proficiency in calculating volume of a figure. The student's explanation is reasonable.
1 POINT	Student's explanation is reasonable. Student's work reflects developing proficiency in finding the volume of a figure. The student's solution is inaccurate due to computational errors, rather than conceptual weakness.
0 POINTS	Student's work shows weak proficiency in calculating volume of a figure. The student's explanation is inaccurate.



Unit 2

Performance Task

Name ______

Field Trip to the Science Center

A fifth-grade class went on a field trip to the Science Center. At the first station, the students fill different containers with plastic cubes.

Part A

Jake and Marty both fill the same size container.

Which student **best** shows the volume of the container? Explain.

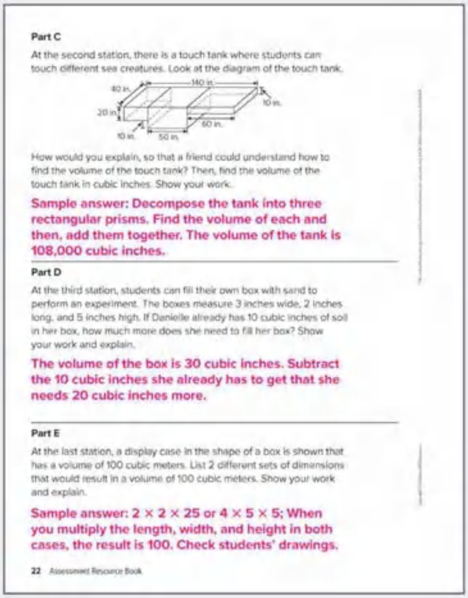
Sample answer: Jake shows the volume best because there are no gaps.

Part B

Which arrangement of cubes from Part A makes it easier to calculate the volume? Why is the second arrangement of cubes the same volume, but not the same shape?

Sample answer: Jake's arrangement makes it easier to calculate the volume. The second arrangement is the same volume because it is the same number of cubes.

Assessment Resource Book 21



Part C

At the second station, there is a touch tank where students can touch different sea creatures. Look at the diagram of the touch tank.

How would you explain, so that a friend could understand how to find the volume of the touch tank? Then, find the volume of the touch tank in cubic inches. Show your work.

Sample answer: Decompose the tank into three rectangular prisms. Find the volume of each and then, add them together. The volume of the tank is 108,000 cubic inches.

Part D

At the third station, students can fill their own box with sand to perform an experiment. The boxes measure 3 inches wide, 2 inches long, and 5 inches high. If Danielle already has 10 cubic inches of soil in her box, how much more does she need to fill her box? Show your work and explain.

The volume of the box is 30 cubic inches. Subtract the 10 cubic inches she already has to get that she needs 20 cubic inches more.

Part E

At the last station, a display case in the shape of a box is shown that has a volume of 100 cubic meters. List 2 different sets of dimensions that would result in a volume of 100 cubic meters. Show your work and explain.

Sample answer: 2 × 2 × 25 or 4 × 5 × 5; When you multiply the length, width, and height in both cases, the result is 100. Check students' drawings.

22 Assessment Resource Book

Unit Assessment

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

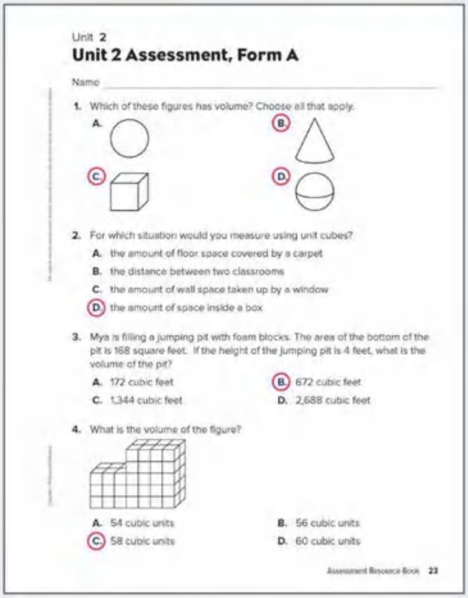
Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	1	1	Understand Volume	5.MD.C.3
2	2	1	Understand Volume	5.MD.C.3
3	1	3	The $B \times h$ Volume Formula	5.MD.C.5.b
4	1	4	Recognize Volume as Additive	5.MD.C.5.c
5	2	2	Volume Using Unit Cubes	5.MD.C.4
6	2	2	Volume Using Multiplication	5.MD.C.4
7	2	3	The $l \times w \times h$ Volume Formula	5.MD.C.5.b
8	1	3	The $l \times w \times h$ Volume Formula	5.MD.C.5.b
9	2	4	Recognize Volume as Additive	5.MD.C.5.c
10	2	3	The $B \times h$ Volume Formula	5.MD.C.5.b
11	3	5	Solve Volume Problems	5.MD.C.5.c
12	3	3	Solve Volume Problems	5.MD.C.5

GO ONLINE

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.



Unit 2

Unit 2 Assessment, Form A

Name ____________________

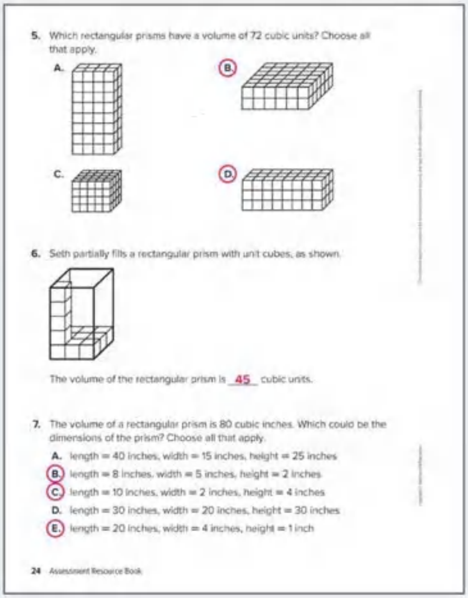
1. Which of these figures has volume? Choose all that apply.
   A. [✓ B.] [✓ C.] [✓ D.]

2. For which situation would you measure using unit cubes?
   A. the amount of floor space covered by a carpet
   B. the distance between two classrooms
   C. the amount of wall space taken up by a window
   [✓ D.] the amount of space inside a box

3. Mya is filling a jumping pit with foam blocks. The area of the bottom of the pit is 168 square feet. If the height of the jumping pit is 4 feet, what is the volume of the pit?
   A. 172 cubic feet
   [✓ B.] 672 cubic feet
   C. 1,344 cubic feet
   D. 2,688 cubic feet

4. What is the volume of the figure?
   A. 54 cubic units
   B. 56 cubic units
   [✓ C.] 58 cubic units
   D. 60 cubic units

Assessment Resource Book 23



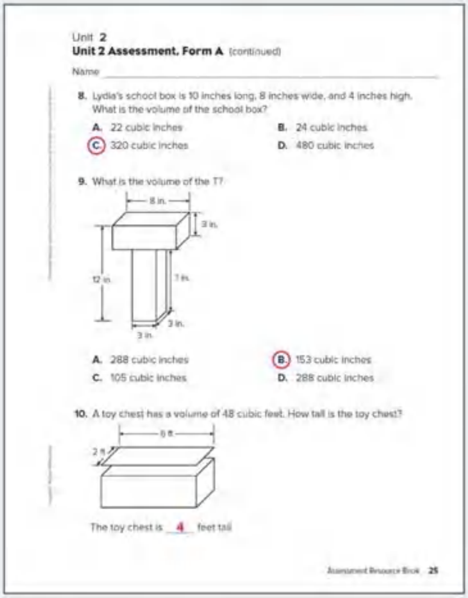
5. Which rectangular prisms have a volume of 72 cubic units? Choose all that apply.
   A. [✓ B.] C. [✓ D.]

6. Seth partially fills a rectangular prism with unit cubes, as shown.

   The volume of the rectangular prism is 45 cubic units.

7. The volume of a rectangular prism is 80 cubic inches. Which could be the dimensions of the prism? Choose all that apply.
   A. length = 40 inches, width = 15 inches, height = 25 inches
   [✓ B.] length = 8 inches, width = 5 inches, height = 2 inches
   [✓ C.] length = 10 inches, width = 2 inches, height = 4 inches
   D. length = 30 inches, width = 20 inches, height = 30 inches
   [✓ E.] length = 20 inches, width = 4 inches, height = 1 inch

24 Assessment Resource Book



Unit 2

Unit 2 Assessment, Form A (continued)

Name ____________________

8. Lydia's school box is 10 inches long, 8 inches wide, and 4 inches high. What is the volume of the school box?

A. 22 cubic inches
B. 24 cubic inches
[✓ C.] 320 cubic inches
D. 480 cubic inches

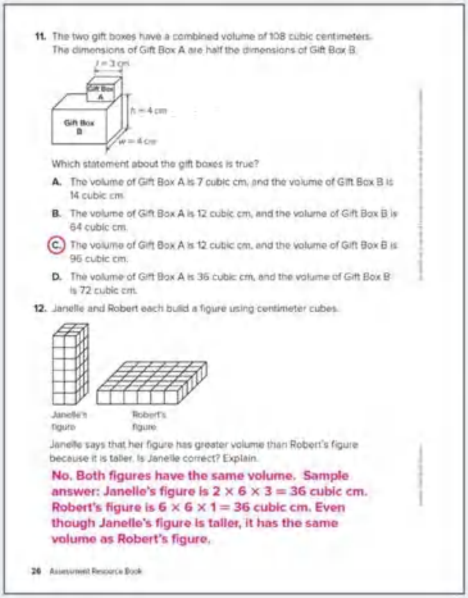
9. What is the volume of the T?

A. 288 cubic inches
[✓ B.] 153 cubic inches
C. 105 cubic inches
D. 288 cubic inches

10. A toy chest has a volume of 48 cubic feet. How tall is the toy chest?

The toy chest is 4 feet tall.

Assessment Resource Book 25



11. The two gift boxes have a combined volume of 108 cubic centimeters. The dimensions of Gift Box A are half the dimensions of Gift Box B.

Which statement about the gift boxes is true?

A. The volume of Gift Box A is 7 cubic cm, and the volume of Gift Box B is 14 cubic cm.
B. The volume of Gift Box A is 12 cubic cm, and the volume of Gift Box B is 64 cubic cm.
[✓ C.] The volume of Gift Box A is 12 cubic cm, and the volume of Gift Box B is 96 cubic cm.
D. The volume of Gift Box A is 36 cubic cm, and the volume of Gift Box B is 72 cubic cm.

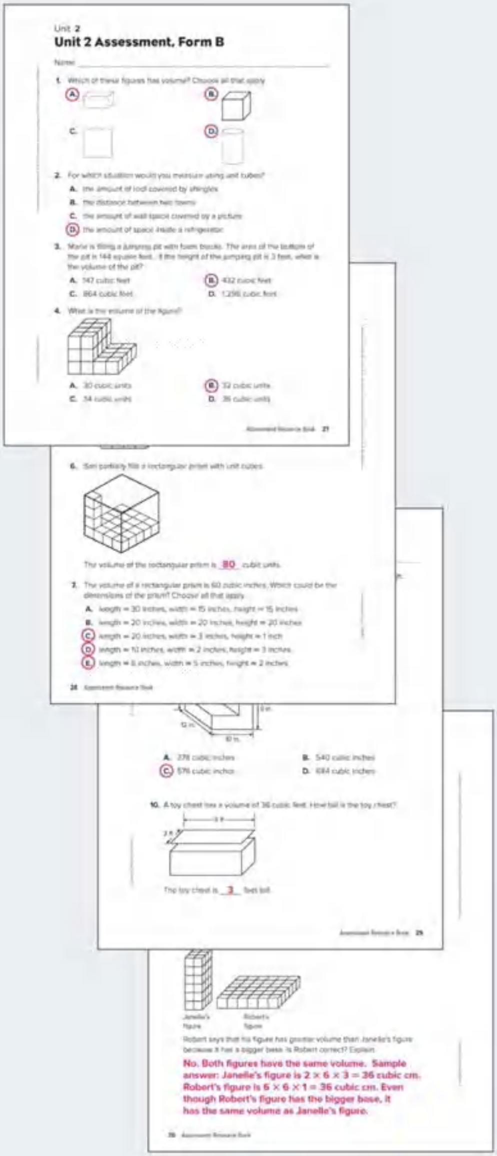
12. Janelle and Robert each build a figure using centimeter cubes.

Janelle says that her figure has greater volume than Robert's figure because it is taller. Is Janelle correct? Explain.

No. Both figures have the same volume. Sample answer: Janelle's figure is 2 × 6 × 3 = 36 cubic cm. Robert's figure is 6 × 6 × 1 = 36 cubic cm. Even though Janelle's figure is taller, it has the same volume as Robert's figure.

26 Assessment Resource Book

Form B



Unit 2

Unit 2 Assessment, Form B

Name ____________________

1. Which of these figures has volume? Choose all that apply.

[✓ A.]
[✓ B.]
C.
[✓ D.]

2. For which situation would you measure using unit cubes?

A. the amount of roof covered by shingles
B. the distance between two towns
C. the amount of wall space covered by a picture
[✓ D.] the amount of space inside a refrigerator

3. [illegible]

A. 147 cubic feet
[✓ B.] 432 cubic feet
C. 864 cubic feet
D. 1,296 cubic feet

4. What is the volume of the figure?

A. 30 cubic units
[✓ B.] 32 cubic units
C. 34 cubic units
D. 36 cubic units

Assessment Resource Book 27

6. [illegible] partially fills a rectangular prism with unit cubes.

The volume of the rectangular prism is 80 cubic units.

7. The volume of a rectangular prism is 60 cubic inches. Which could be the dimensions of the prism? Choose all that apply.

A. length = 30 inches, width = 15 inches, height = 15 inches
B. length = 20 inches, width = 20 inches, height = 20 inches
[✓ C.] length = 20 inches, width = 3 inches, height = 1 inch
[✓ D.] length = 10 inches, width = 2 inches, height = 3 inches
[✓ E.] length = 6 inches, width = 5 inches, height = 2 inches

28 Assessment Resource Book

A. 278 cubic inches
B. 540 cubic inches
[✓ C.] 576 cubic inches
D. 684 cubic inches

10. A toy chest has a volume of 36 cubic feet. How tall is the toy chest?

The toy chest is 3 feet tall.

Assessment Resource Book 29

Robert says that his figure has greater volume than Janelle's figure because it has a bigger base. Is Robert correct? Explain.

No. Both figures have the same volume. Sample answer: Janelle's figure is 2 × 6 × 3 = 36 cubic cm. Robert's figure is 6 × 6 × 1 = 36 cubic cm. Even though Robert's figure has the bigger base, it has the same volume as Janelle's figure.

30 Assessment Resource Book

UNIT 3 PLANNER

Place Value and Number Relationships

PACING: 12 days

LESSON		MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! Number Lines Estimate decimal locations on open number lines.				
3-1	Generalize Place Value	Students relate the value of a digit in a multi-digit whole number in one place value position to that of the same digit in the place to its right. Students relate the value of a digit in a multi-digit whole number in one place value position to that of the same digit in the place to its left.	Students explain how the value of a digit compares to that of the same digit in a different place-value position while answering *Wh-* and yes/no questions and using the academic term *relationship*.	Students identify personal traits that make them good students, peers, and math learners.
3-2	Extend Place Value to Decimals	Students relate the value of a digit in a decimal in one place value position to that of the same digit in the place to its right. Students relate the value of a digit in a decimal in one place value position to that of the same digit in the place to its left.	Students discuss how the value of a digit in a decimal compares to that of the same digit in a different decimal place-value position, using the terms *hundredths* and *tenths*.	Students discuss and practice strategies for managing stressful situations.
3-3	Read and Write Decimals	Students read and write decimals to the thousandths place in standard form, expanded form, and word form.	Students explain how to read and write decimals to the thousandths place while making sure to include *and*.	Students actively listen without interruption as peers describe how they approached a complex mathematical task.
3-4	Compare Decimals	Students compare two decimals to the thousandths place using place value and record the comparison using appropriate symbols.	Students explain how to use place value and number lines to compare two decimals, using the terms *greater than*, *less than*, and *equal to*.	Students engage in respectful discourse with peers about various perspectives for approaching a mathematical challenge.
Math Probe Comparing Decimals Compare two decimals by reasoning about the digits and their values based on place-value positions.				
3-5	Use Place Value to Round Decimals	Students round decimals to any place value position. Students identify situations that call for rounding decimals and determine the place to which to round.	Students identify place values to the nearest whole and tenths place using *about*.	Students demonstrate thoughtful reflection through identifying the causes of challenges and successes while completing a mathematical task.
Unit Review **Fluency Practice**				
Unit Assessment **Performance Task**				

FOCUS QUESTION:
How can I extend my knowledge of place value to decimals?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	Academic Terms			
3-1	digit place value place-value chart	cite relationship	• *Place-Value Chart to Millions* Teaching Resource • *10 × 10 Grids* Teaching Resource	Conceptual Understanding	5.NBT.A.1
3-2	decimal decimal point tenth hundredth thousandth	contradiction infer	• blank number cubes • number cubes	Conceptual Understanding	5.NBT.A.1
3-3	expanded form standard form word form	expand quality	• *Decimal Forms* Teaching Resources • number cubes	Conceptual Understanding Procedural Skill & Fluency	5.NBT.A.3.a
3-4	greater than (>) less than (<)	address negate	• number cube	Conceptual Understanding	5.NBT.A.3.b
3-5	estimate round	prove variation	• *Number Cards 0–10* Teaching Resource • number cubes	Conceptual Understanding Procedural Skill & Fluency	5.NBT.A.4

Unit Overview

Focus

Decimal Concepts

Our number system is called a base-10 place-value system because it takes 10 of one unit to equal 1 unit in the place-value position to the left of the given unit.

Students in Grade 5 have several years of experience with whole-number place value and fraction concepts, and in Grade 4 they began to investigate decimals in tenths and hundredths. They learn that it takes 10 hundredths to equal 1 tenth, and it takes 10 tenths to equal 1.

As students learn more about decimals, they need every opportunity to tie current learning to established understanding. Lesson 3-1 of this unit reviews whole-number place value. Students are asked questions such as: “What pattern do you see as you move from one place to another?” “How does the value of the 3 in the thousands place compare to the value of the 3 in the hundreds place?”

Students learn that the value of a digit in a decimal, as its value in a whole number, depends upon its place in the number. So, the value of a digit is 10 times what it would be in the place to its right, and its value is $\frac{1}{10}$ what it would be to its left.

As students progress through the unit, you may want to provide them with place-value charts and digits cards to give them frequent opportunities to experience concrete correspondences among place values.

Coherence

What Students Have Learned

- **Whole Number Place Value** Students recognized that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. (Grade 4)
- **Volume** Students understood volume. (Grade 5, Unit 2)

What Students Are Learning

- **Decimal Place Value** Students understand decimal place value.
- **Reading and Writing Decimals** Students read and write decimals in number, word, and expanded form.
- **Comparing Decimals** Students compare decimals using the same strategies used for whole numbers.
- **Rounding Decimals** Students round decimals using the same strategies used for whole numbers.

What Students Will Learn

- **Add and Subtract Decimals** Students will add and subtract decimals. (Grade 5, Unit 4)
- **Add, Subtract, Multiply, and Divide Multi-Digit Decimals** Students will fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (Grade 6)

Rigor

Conceptual Understanding

Students develop understanding of

- understanding decimal place value;
- using place value understanding to read and write decimals to the thousandths place;
- using number sense to extend place value concepts to rounding decimals;
- using rounding strategies to understand and use to solve problems.

Procedural Skill and Fluency

Students build proficiency with

- comparing and rounding decimals.

Application

Students apply their knowledge of

- understanding decimals to solve problems with real-world contexts;
- comparing and rounding decimals to solve problems with real-world contexts;

Application is not a targeted element of rigor for the standards in this unit.

Effective Teaching Practices

Pose Purposeful Questions

Purposeful questioning facilitates effective assessment of what students know, helps advance their reasoning skills, and reinforces current learning while building bridges to future learning.

The power of purposeful questions can be as simple as the difference between asking “What answer did you get?” and “How did you find the solution?” The answer to the first question is a single number, which is either right or wrong. The answer to the second question describes a process of reasoning and action. The first is an end in itself, while the second reinforces strategies that have been used, with application to future problems and solutions.

Use the *Explore & Develop* questions to assess students’ understanding and encourage discussion.

As the lessons progress, focus on process-oriented questioning. Look for questions that will lead to connections between known concepts and new concepts, and among different aspects of current learning, such as multiple representations of decimals.

Questions focused on reasoning and process can be adapted to meet the needs of all students. Provide conceptual scaffolding as needed by breaking questions into parts. Provide verbal scaffolding by providing sentence frames for English learners.

Math Practices and Processes

Look For and Make Use of Structure

We use a base-ten number system, in which we can move from one place-value position to the next by multiplying or dividing by 10.

As students learn about decimals, they are applying and deepening their understanding of how place value works. They should already be comfortable with multiplying whole numbers by 10, 100, and 1,000. Helping them recall and practice that structure will help them gain facility with the parallel relationships among decimals.

To encourage proficiency, encourage students to find and describe structure in their own words, using their own reasoning, as much as possible.

Some suggestions include:

- Students work in pairs or groups in which each student chooses a different way to represent a decimal or series of decimals.
- Students discuss the similarities and differences between place value to the left of the decimal point and place values to the right of the decimal point.
- Students describe the structure of powers of 10, using general words and providing a specific number series as an example.
- Students write a verbal description of each place in a number with at least three places on each side of the decimal point.

Social and Emotional Learning

What Skills Will We Develop?

- **Self-Awareness: Self-Confidence** (Lesson 3-1): Self-confident students are more willing to take risks, allowing them to learn from mistakes.
- **Self-Management: Manage Stress** (Lesson 3-2): Students who can regulate their stress are resilient and better prepared for academic success.
- **Relationship Skills: Communication** (Lesson 3-3): Students who can communicate effectively are more likely to build strong relationships and contribute to a positive classroom culture.
- **Social Awareness: Develop Perspective** (Lesson 3-4): Developing perspective can help students understand different ways of thinking.
- **Responsible Decision-Making: Reflection** (Lesson 3-5): When students reflect, they can make connections between effort and achievement.

Language of Math

Vocabulary

Students will be using these key terms in this unit:

- **Decimal** (Lesson 4-2): Students were introduced to decimals in Grade 4. Draw a connection between the root *dec-* (*ten*) and our base-ten number system. Students may be familiar with the word *decade*, which uses the same root.
- **Thousandths*** (Lesson 4-2): *Tenths* and *hundredths* were introduced in Grade 4; *thousandths* is a new term. Students may need reinforcement with the *-ths* ending to distinguish the terms from tens, hundreds, and thousands.

*This is a new term.

Math Language Development

A Focus on Decimal Vocabulary

Mathematical understanding and language usage may require different skills, but they can work together in students' learning of math concepts.

When learners can describe what they are learning, or teach someone else what they have learned themselves, the concepts are reinforced. Also, in describing an operation or conclusion, learners might discover a mistake in their own reasoning that they now have an opportunity to correct.

Using precise terminology—the correct word or phrase for each concept—also reinforces learning. For example, when students are referring to the decimal point, make sure they say, "decimal point" rather than simply, "decimal."

Consistently model usage of the vocabulary from each lesson, and provide consistent opportunities for students to use each word in discussion and answers to questions.

Help English learners develop fluency with math vocabulary by providing sentence frames and prompts. Frames and prompts should focus on the target vocabulary or concept, while limiting the need for the learner to articulate the less specific parts of a sentence.

Throughout this unit, make sure that students know how to refer to tenths, hundredths, and thousandths, and how to read decimals. You may want to point out that the decimal place values are *not* "symmetric" with respect to the decimal point. Rather, they are "symmetric" with respect to the *ones* place. So, 713.524 is read, "seven hundred thirteen and five hundred twenty-four *thousandths*." Some students incorrectly read it as, "seven hundred thirteen and five hundred twenty-four *hundredths* (because "hundreds contain three digits"—and there are three digits to the right of the decimal point). The decimal point is read "and" to separate the whole number portion from the decimal portion.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to place value and number relationships. Because many of the words (*related, compare, estimate, about*) and phrases (*one/another way, the same as, greater/less than*) used in this unit are likely unfamiliar or unknown to ELs, students are supported in understanding and using these words so that instruction is more accessible to them.

Lesson 3-1 – *one way, another way*
Lesson 3-2 – *related*
Lesson 3-3 – *the same as*
Lesson 3-4 – *greater than, less than, compare*
Lesson 3-5 – *estimate, about*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

Where Does It Go?

Purpose: Build estimating skills using benchmarks.

Overview: Students place a target number on number lines with different endpoints and justify their placement. In some instances, as a challenge, the target number may not actually belong on one of the number lines.

Decompose It!

Purpose: Build flexibility with numbers.

Overview: Students generate multiple (at least 3) ways to decompose given numbers and share their thinking for each decomposition. The teacher records decompositions and then facilitates a discussion of patterns in the decompositions.

Find the Pattern, Make a Pattern

Purpose: Build efficiency with recognizing and building patterns.

Overview: Students determine the rule(s) for a given pattern, then use the rule(s) to create a new pattern. The teacher records students' new patterns and facilitates a discussion to validate the pattern and its rules.

Sense-Making Routines

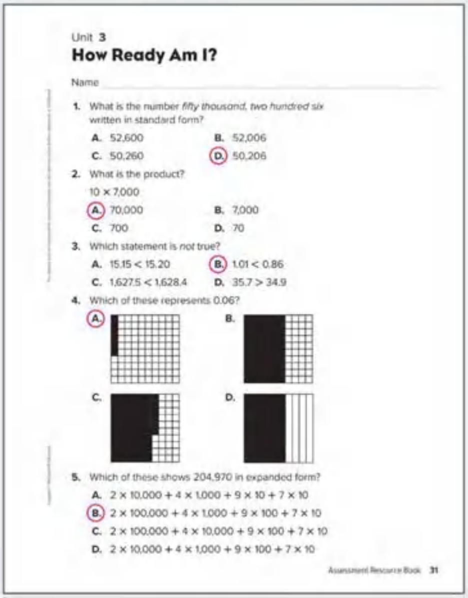
- **Which Doesn't Belong?** (Lesson 3-1) For this Which Doesn't Belong? routine, students compare and contrast whole numbers. The purpose of this Which Doesn't Belong? is to get students to extend their understanding of whole-number place value and understand the realtionships among place values to the right and left.
- **Notice & Wonder: What do you notice? What do you wonder?** (Lessons 3-2, 3-3) In Lesson 3-2, students discuss partially-filled decimal grids. The purpose of this Notice & Wonder extend students' understanding of whole-number place value to decimals.
- **Notice & Wonder: How are they the same? How are they different?** (Lesson 3-4) Students compare and contrast the weights of backpacks. The purpose of this Notice & Wonder is to get students thinking about comparing decimals and how what they already know about whole-number place value that can help them compare decimals.
- **Notice & Wonder: What do you notice? What do you wonder?** (Lesson 3-5) Students share thoughts on the estimated cost of popcorn. The purpose of this Notice & Wonder is to get students thinking about rounding decimals and how what they already know about whole-number place value that can help them round decimals.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. These routines can also be used as formative assessment opportunities as students develop proficiency in English and mathematical language. They can be used in ways that support real-time-, peer-, and self-assessment. For more information on the Math Language Routines, see the Appendix.

- **Lesson 3–1** Students participate in MLR3: Critique, Correct, and Clarify.
- **Lesson 3–2** Students participate in MLR2: Collect and Display.
- **Lesson 3–3** Students participate in MLR1: Stronger and Clearer Each Time.
- **Lesson 3–4** Students participate in MLR8: Discussion Supports.
- **Lesson 3–5** Students participate in MLR5: Co-Craft Questions and Problems.

Readiness Diagnostic



Unit 3

How Ready Am I?

Name

1. What is the number *fifty thousand, two hundred six* written in standard form?

   A. 52,600 B. 52,006

   C. 50,260 [✓ D.] 50,206

2. What is the product?

   10 × 7,000

   [✓ A.] 70,000 B. 7,000

   C. 700 D. 70

3. Which statement is *not* true?

   A. 15.15 < 15.20 [✓ B.] 1.01 < 0.86

   C. 1,627.5 < 1,628.4 D. 35.7 > 34.9

4. Which of these represents 0.06?

   [✓ A.] B.

   C. D.

5. Which of these shows 204,970 in expanded form?

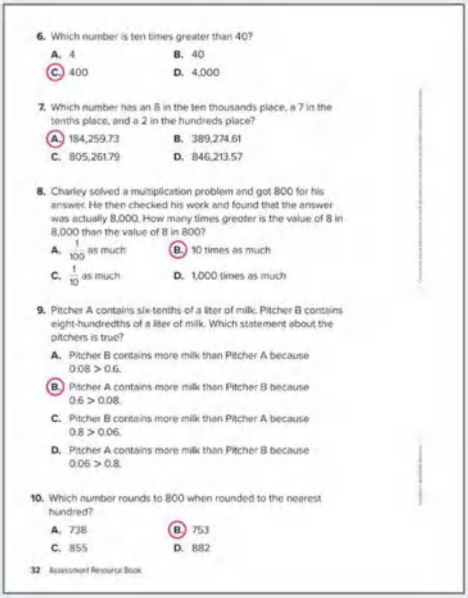
   A. 2 × 10,000 + 4 × 1,000 + 9 × 10 + 7 × 10

   [✓ B.] 2 × 100,000 + 4 × 1,000 + 9 × 100 + 7 × 10

   C. 2 × 100,000 + 4 × 10,000 + 9 × 100 + 7 × 10

   D. 2 × 10,000 + 4 × 1,000 + 9 × 100 + 7 × 10

Assessment Resource Book 31



6. Which number is ten times greater than 40?

   A. 4 B. 40

   [✓ C.] 400 D. 4,000

7. Which number has an 8 in the ten thousands place, a 7 in the tenths place, and a 2 in the hundreds place?

   [✓ A.] 184,259.73 B. 389,274.61

   C. 805,261.79 D. 846,213.57

8. Charley solved a multiplication problem and got 800 for his answer. He then checked his work and found that the answer was actually 8,000. How many times greater is the value of 8 in 8,000 than the value of 8 in 800?

   A. $\frac{1}{100}$ as much [✓ B.] 10 times as much

   C. $\frac{1}{10}$ as much D. 1,000 times as much

9. Pitcher A contains six-tenths of a liter of milk. Pitcher B contains eight-hundredths of a liter of milk. Which statement about the pitchers is true?

   A. Pitcher B contains more milk than Pitcher A because 0.08 > 0.6.

   [✓ B.] Pitcher A contains more milk than Pitcher B because 0.6 > 0.08.

   C. Pitcher B contains more milk than Pitcher A because 0.8 > 0.06.

   D. Pitcher A contains more milk than Pitcher B because 0.06 > 0.8.

10. Which number rounds to 800 when rounded to the nearest hundred?

   A. 738 [✓ B.] 753

   C. 855 D. 882

32 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

Targeted Intervention

Use Guided Support Intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	1	Write multi-digit numbers in standard form	Standard & Word Form through 999,999	4.NBT.A.2
2	1	Multiply by factor of 10	Ten Times as Great	4.NBT.A.1
3	2	Compare decimals to hundredths	Compare Fractions & Decimals in 100ths	4.NF.C.7
4	1	Represent decimals on a decimal grid	Decimal Fractions in 100ths	4.NF.C.6
5	1	Write multi-digit numbers in expanded form	Expanded Form through 999,999	4.NBT.A.2
6	2	Number sense	Ten Times as Great	4.NBT.A.1
7	2	Place value	Compare & Order Numbers through 999,999	4.NBT.A.2
8	2	Place value	Ten Times as Great	4.NBT.A.1
9	2	Compare decimals to hundredths	Compare Fractions & Decimals in 100ths	4.NF.C.7
10	2	Round multi-digit numbers	Round to Any Place	4.NBT.A.3

GO ONLINE

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.

Unit Opener

Focus Question

Introduce the Focus Question, *How can I extend my knowledge of place value to understand decimals?*

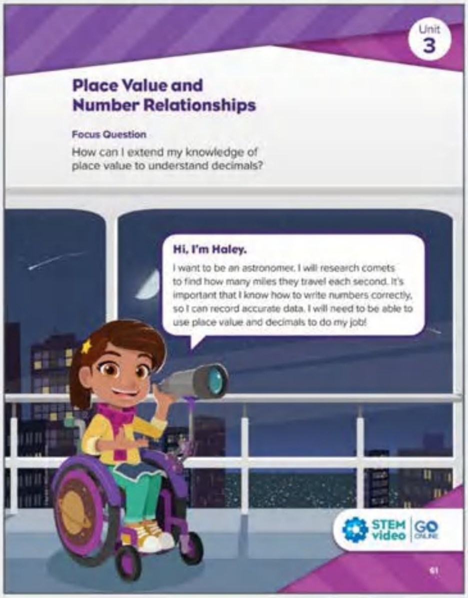
Ask students to think about what they know about decimals.

- *What do you already know about decimals?*
- *What can decimals be used for?*
- *What do you already know about place value?*
- *What do think you will be doing in the unit?*

Remind students that at the end of the unit, they will reflect back on what they learned.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.



Unit 3

Place Value and Number Relationships

Focus Question

How can I extend my knowledge of place value to understand decimals?

Hi, I'm Haley.

I want to be an astronomer. I will research comets to find how many miles they travel each second. It's important that I know how to write numbers correctly, so I can record accurate data. I will need to be able to use place value and decimals to do my job!

STEM video GO ONLINE

61

STEM in Action

Videos

Students can watch the two STEM videos.

STEM Career: Astronomer Haley talks about the work of astronomers.

Haley Researches Comets Haley explains the place value positions of decimals.

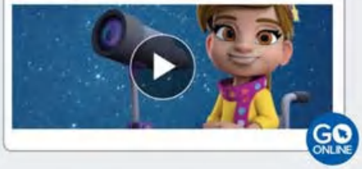
STEM Project Card

Students can complete the STEM project during their workstation time.

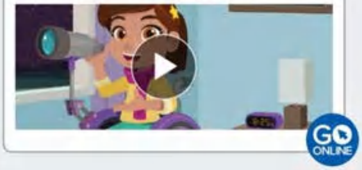
STEM Adventure

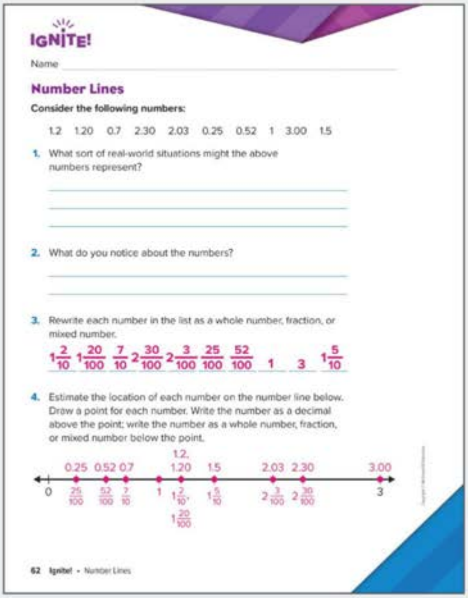
Students can complete the STEM adventure during their workstation time.

STEM Career: Astronomer



Haley Researches Comets





IGNITE!

Name

Number Lines

Consider the following numbers:

1.2 1.20 0.7 2.30 2.03 0.25 0.52 1 3.00 1.5

1. What sort of real-world situations might the above numbers represent?

2. What do you notice about the numbers?

3. Rewrite each number in the list as a whole number, fraction, or mixed number.

$1\frac{2}{10}$ $1\frac{20}{100}$ $\frac{7}{10}$ $2\frac{30}{100}$ $2\frac{3}{100}$ $\frac{25}{100}$ $\frac{52}{100}$ 1 3 $1\frac{5}{10}$

4. Estimate the location of each number on the number line below. Draw a point for each number. Write the number as a decimal above the point; write the number as a whole number, fraction, or mixed number below the point.

62 Ignite! • Number Lines

Ignite!

Number Lines

Students develop number sense by estimating decimal locations on an open number line.

1. Have students work in pairs to discuss and record their ideas for Exercises 1–2. Then have students share ideas with the class.
   - What sort of real-world situations might the numbers represent?
   - What do you notice about the numbers?
2. Have students complete Exercise 3, writing each number as a whole number, fraction, or mixed number. You may want to mention that fractions with a denominator of 10 or 100 are called *decimal fractions*.
3. In Exercise 4, have students work in pairs to find an estimated location on the number line for each number.
   - What tick marks would be useful to add to the number line before plotting the points.
4. After students graph the points, have them tour the class to view the other students' work. Ask them note similarities and differences among the number lines.
5. Have students share what they observed with the class. Discuss any misconceptions.
6. Ask students to read the numbers from smallest to greatest. Encourage them to read the numbers correctly. For example, students should read 1.2 as *one and two tenths* (rather than, say, as *one point two*).
   - Explain why is 1.2 equal to 1.20.
   - How would you determine which two numbers are closest together (excluding the two numbers that are equal)?

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with using decimal numbers.	
		• **Value of a Digit Sort**	3-1
		• **Place Value with Decimals Sort**	3-2
		• **Reading and Writing Decimals Concentration**	3-3
		• **Decimal Showdown**	3-4
		• **Rounding Decimals Four in a Row**	3-5
Digital Station	Digital Game	**Factory Sort** Students practice adding and subtracting within 1,000,000.	3-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**How Far?** Students research stars and create a model or drawing showing the stars and their distances from Earth.	3-5
	Connection Card	**On Your Mark, Get Set, Go!** Students create a list of times in a swimming meet and compare the times to the results of Olympic swimming events.	3-4
	Real World Card	**State Sales Tax** Student investigate and compare state sales tax rates.	3-5

Additional Resources

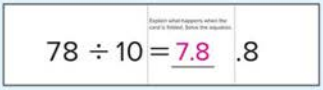
Use the resources below to provide additional support for this unit.

Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the key terms on the front side of the card.

Foldables

Use the unit foldable with Lessons 3-2 and 3-3.



Spiral Review

Students can complete the Spiral Review Practice at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
3-1	4.NF.C
3-2	4.OA.A
3-3	4.NBT.A
3-4	4.NBT.B
3-5	4.NF.A

LESSON **3-1**

Generalize Place Value

Learning Targets

- I can recognize that the value of a digit represents ten times as much as it represents in a place to its right.
- I can recognize that the value of a digit represents one-tenth as much as the place to its left.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Look for and make use of structure.

Vocabulary

Math Terms	**Academic Terms**
digit	cite
place value	relationship
place-value chart	

Materials

The materials may be for any part of the lesson.

- *Place-Value Charts to Millions* Teaching Resource
- *10 × 10 Grids* Teaching Resource
- index cards

Focus

Content Objectives	**Language Objectives**	**SEL Objective**
• Students relate the value of a digit in a multi-digit whole number in one place value position to that of the same digit in the place to its right. • Students relate the value of a digit in a multi-digit whole number in one place value position to that of the same digit in the place to its left.	• Students explain how the value of a digit compares to that of the same digit in a different place-value position while answering *Wh-* and yes/no questions and using the academic term *relationship*. • In order to support cultivating conversation, ELs will participate in MLR3: Critique, Correct, and Clarify.	• Students identify personal traits that make them good students, peers, and math learners.

Coherence

Previous	**Now**	**Next**
• Students recognized that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right. (Grade 4)	• Students recognize that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.	• Students recognize that in a decimal number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left. (Unit 3)

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build on place-value concepts by comparing the value of a digit in one place-value position with the value of the same digit in another place-value position when the digits are adjacent or several places away.	• Students will gain some early experience developing proficiency. *Procedural skill and fluency is not a targeted element of rigor for this standard.*	• Several problems are presented in a real-world context, and the applications for understanding place value will be further explored later in the unit. *Application is not a targeted element of rigor for this standard.*

Number Routine
Where Does it Go?

5–7 min

Build Fluency Students determine the location of a decimal on two number lines with different marked endpoints.

Remind students that this is an estimation activity, and exact locations are not needed.

These prompts encourage students to talk about their reasoning:

- *What do you notice about the two marked endpoints?*
- *Will the point you mark on the top number line appear right above the point you mark on the bottom number line? Explain.*
- *What point on the second number line might you mark before you estimate where 0.3 should go?*
- *How do you know your answers are reasonable?*

Launch 5–7 min

Sense-Making Routine

Purpose Students compare and contrast numbers, thinking about the value each digit in a whole number represents.

Which Doesn't Belong

- Which doesn't belong?

Teaching Tip Place-value charts may guide students towards comparing and contrasting these numbers by place value.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' thinking about the value each digit in a whole number represents and are based on possible comments and questions students may make during the share out.

- Which numbers have a 7 in the tens place? Explain what the digit 7 represents in those numbers.
- For the number that does not have a 7 in the tens place, explain what each digit 7 represents in that number.

Math is... Mindset

- How can you give positive feedback to your classmates today?

SEL Self-Awareness: Self-Confidence

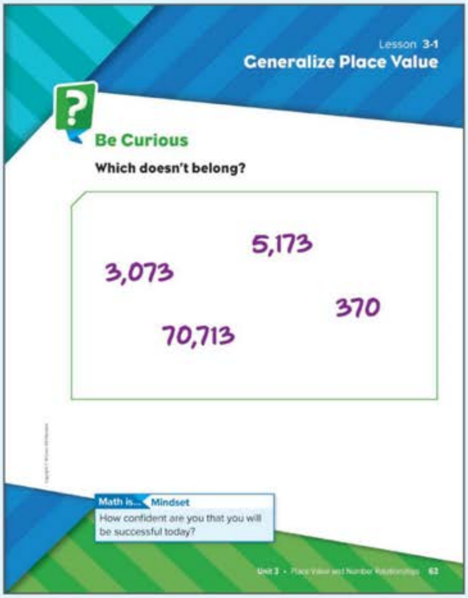
Throughout the Which Doesn't Belong? routine, provide opportunities for students to feel confident in themselves. Model and encourage giving positive feedback for sharing ideas, good effort, or creative thinking. Make sure students understand that being good students can also include being helpful peers and active members of the classroom community. Remind students that some tasks are more challenging than others, and they can demonstrate self-confidence by speaking up and asking for help if they need it. Throughout their work with eneralizing place value, continue to find other opportunities to allow students to give positive feedback to their classmates.

Transition to Explore & Develop

Ask questions that focus students' attention on the value of each digit in a whole number.

ETP Establish Goals to Focus Learning

- Let's think about what each digit in a number represents and compare them.



Lesson 3-1
Generalize Place Value

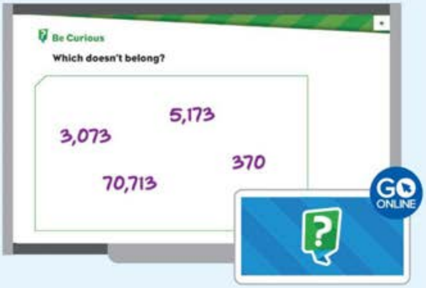
Be Curious

Which doesn't belong?

5,173
3,073
370
70,713

Math is... Mindset
How confident are you that you will be successful today?

Unit 3 • Place Value and Number Relationships 63



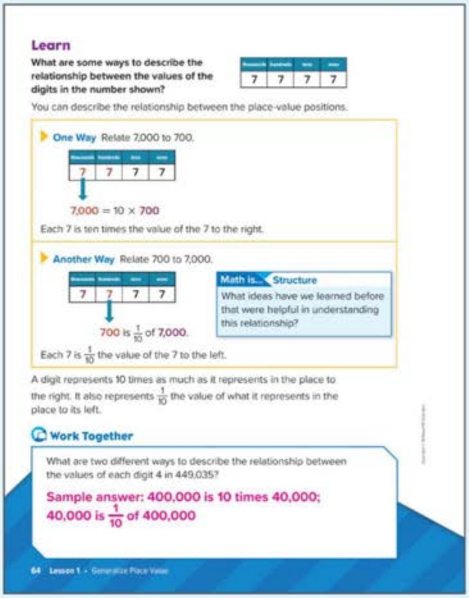
Be Curious

Which doesn't belong?

5,173
3,073
370
70,713

Explore & Develop

20 min



Learn

What are some ways to describe the relationship between the values of the digits in the number shown?

[illegible]	[illegible]	[illegible]	[illegible]
7	7	7	7

You can describe the relationship between the place-value positions.

One Way Relate 7,000 to 700.

[illegible]	[illegible]	[illegible]	[illegible]
7	7	7	7

$7{,}000 = 10 \times 700$

Each 7 is ten times the value of the 7 to the right.

Another Way Relate 700 to 7,000.

[illegible]	[illegible]	[illegible]	[illegible]
7	7	7	7

700 is $\frac{1}{10}$ of 7,000.

Each 7 is $\frac{1}{10}$ the value of the 7 to the left.

Math is... Structure

What ideas have we learned before that were helpful in understanding this relationship?

A digit represents 10 times as much as it represents in the place to the right. It also represents $\frac{1}{10}$ the value of what it represents in the place to its left.

Work Together

What are two different ways to describe the relationship between the values of each digit 4 in 449,035?

Sample answer: 400,000 is 10 times 40,000; 40,000 is $\frac{1}{10}$ of 400,000

64 Lesson 1 • Generalize Place Value

❶ Pose the Problem

ETP **Pose Purposeful Questions**

- How does the place-value chart help you understand the problem?
- What patterns that you have seen before can help you solve this problem?
- Explain why the value of each digit is not 7.

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR **Critique, Correct, and Clarify**

Make a false claim for students to critique. Write 5,555 on the board. Say the 5 in the thousands place is$\frac{1}{10}$ the value of the 5 in the hundreds place. Ask, *Is this statement correct or incorrect? How do you know?* Have the class discuss how to correct your mistake.

❸ Bring It Together

ETP **Elicit Evidence of Student Thinking**

- How would you explain the relationships among the digits in a multi-digit whole number?

Key Takeaway

- A digit in one place in a multi-digit whole number represents 10 times as much as it represents in the place to the right and $\frac{1}{10}$ of what it represents in the place to its left.

Work Together

Students describe the relationships between the hundred thousands and ten thousands places. Make sure that students can describe the relationship in both directions. Students can work on the problem in pairs before sharing their work.

Common Misconception Students may think that the 9 should represent $\frac{1}{10}$ as much as the 4 in the ten thousands place. Make sure they understand that the relationships discussed in this lesson are for the same digit. So, for example, a digit in one place represents 10 times as much as that *same digit* would represent in the place to the right.

LOM **Language of Math**

A digit and the value it represents are different things. 6 is never $\frac{1}{10}$ or ten times 6. The *value a 6 represents* in one place is 10 times or $\frac{1}{10}$ of the value a 6 represents in a place to its ight or left in that number.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore the relationship between place-value positions.

Materials: *10 × 10 Grids* Teaching Resource

Directions: Before comparing the values of each digit 7 in the Pose the Problem, have students take a closer look at the value of each place-value position. Provide multiple copies of *10 × 10 Grids* Teaching Resource to each pair or small group. Have students model 1,000, 100, 10, and 1.

Support Productive Struggle

- Did you notice a pattern when determining how to use the 10 × 10 grids to model the numbers?
- How did you determine how many 10 × 10 grids are needed to make 1,000? Is there an operation you can use to explain this relationship?
- How did you determine how to partition the 10 × 10 grid to show 10? How can you explain this relationship using a fraction?

Math is... Structure

- What ideas have you learned before that were helpful in understanding this relationship?

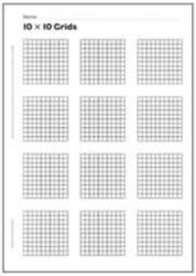
Students are looking for and using the patterns they have already discovered in the structure of the base-ten system.

Activity Debrief: Have pairs or small groups share their strategies for determining how to model each number. Encourage students to use mathematically precise language, such as *10 times* or *one-tenth* when describing their strategies.

Have students revisit the Pose the Problem question and discuss answers.

- What are some ways to describe the relationship between the values of the digits in the number shown?

The PDF of the Teaching Resource is available in the Digital Teacher Center.



10 × 10 Grids

Guided Exploration

Students extend their understanding of whole-number place value to the relationships place values represent to the right and to the left.

Use and Connect Mathematical Representations

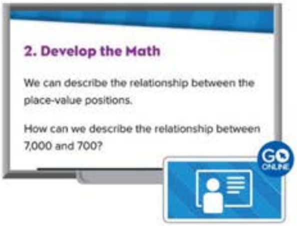
- How does a place-value chart help you understand the problem?
- Are you partitioning the thousand into equal parts? How does that help you describe the relationship as a fraction?
- **Think About It:** How can you show that 1 is $\frac{1}{10}$ of 10?
- How could another model, like expanded form, help you understand the problem?

Have students state as many relationships in 7,777 as they can.

Math is... Structure

- What ideas have you learned before that were helpful in understanding this relationship?

Students are looking for and using the patterns they have already discovered in the structure of the base-ten system.



2. Develop the Math

We can describe the relationship between the place-value positions.

How can we describe the relationship between 7,000 and 700?

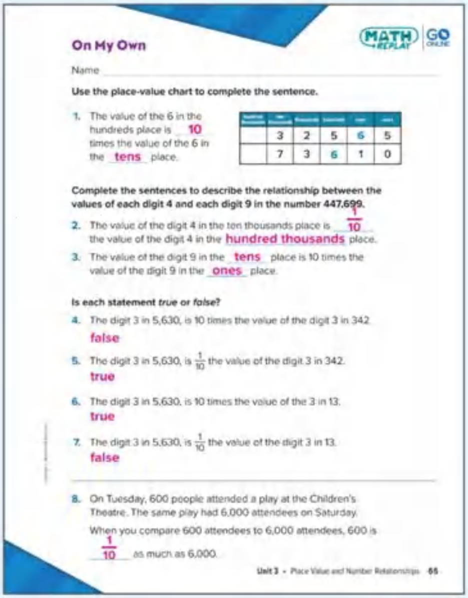
English Learner Scaffolds

Entering/Emerging Support students in understanding the meaning of the word *way.* Using manipulatives, show students one way of doing a familiar task, such as grouping. Say, *This is one way.* Then, using the manipulatives again, show students another way of doing that task. Say, *This is another way.* Then, to confirm comprehension, show students one way of doing a new task. Say, *This is one way. Show me another way.*

Developing/Expanding Support students in understanding the meaning of the word *way.* Using manipulatives, show students one way of doing a familiar task. Say, *This is one way.* Then, using the manipulatives again, show students another way of doing that task. Say, *This is another way.* Then, to confirm comprehension, ask students to show you two ways to do a task of their choice, prompting them to use *one way* and *another way* in their descriptions.

Bridging/Reaching Ask students to explain the different strategies they can use to understand the problem. Support students with relevant language as needed, such as one way and another way.

Practice & Reflect 10 min



On My Own

Name

Use the place-value chart to complete the sentence.

1. The value of the 6 in the hundreds place is 10 times the value of the 6 in the tens place.

	3	2	5	6	5
	7	3	6	1	0

Complete the sentences to describe the relationship between the values of each digit 4 and each digit 9 in the number 447,699.

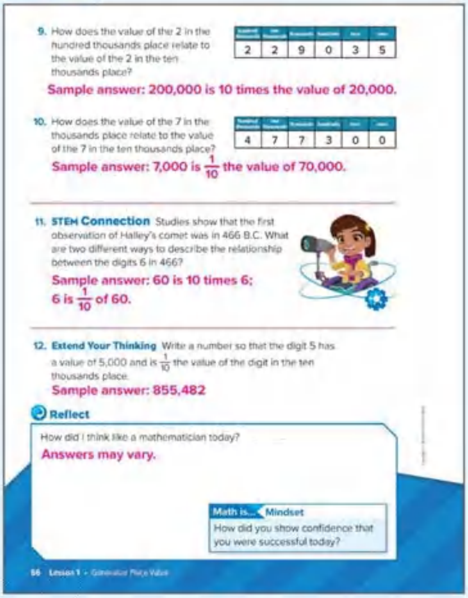
2. The value of the digit 4 in the ten thousands place is $\frac{1}{10}$ the value of the digit 4 in the hundred thousands place.
3. The value of the digit 9 in the tens place is 10 times the value of the digit 9 in the ones place.

Is each statement *true* or *false*?

4. The digit 3 in 5,630, is 10 times the value of the digit 3 in 342
false
5. The digit 3 in 5,630, is $\frac{1}{10}$ the value of the digit 3 in 342.
true
6. The digit 3 in 5,630, is 10 times the value of the 3 in 13.
true
7. The digit 3 in 5,630, is $\frac{1}{10}$ the value of the digit 3 in 13.
false

8. On Tuesday, 600 people attended a play at the Children's Theatre. The same play had 6,000 attendees on Saturday.
When you compare 600 attendees to 6,000 attendees, 600 is $\frac{1}{10}$ as much as 6,000.

Unit 3 • Place Value and Number Relationships 65



9. How does the value of the 2 in the hundred thousands place relate to the value of the 2 in the ten thousands place?

2	2	9	0	3	5

Sample answer: 200,000 is 10 times the value of 20,000.

10. How does the value of the 7 in the thousands place relate to the value of the 7 in the ten thousands place?

4	7	7	3	0	0

Sample answer: 7,000 is $\frac{1}{10}$ the value of 70,000.

11. **STEM Connection** Studies show that the first observation of Halley's comet was in 466 B.C. What are two different ways to describe the relationship between the digits 6 in 466?
Sample answer: 60 is 10 times 6;
6 is $\frac{1}{10}$ of 60.

12. **Extend Your Thinking** Write a number so that the digit 5 has a value of 5,000 and is $\frac{1}{10}$ the value of the digit in the ten thousands place.
Sample answer: 855,482

Reflect

How did I think like a mathematician today?

Answers may vary.

Math is... Mindset

How did you show confidence that you were successful today?

66 Lesson 1 • Generalize Place Value

Practice

Build Fluency from Understanding

Common Error: Exercise 8 Students may look only at the first digit in each number, which is a 6, and not see the $\frac{1}{10}$ relationship. Remind them that they need to look at the value of the digit 6.

Item Analysis

Item	DOK	Rigor
1–3	2	Procedural Skill & Fluency
4–7	3	Conceptual Understanding
8	3	Application
9–10	3	Conceptual Understanding
11	3	Application
12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did I think like a mathematician today?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you give positive feedback to your classmates today?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can recognize that the value of a digit represents ten times as much as it represents in a place to its right.
- I can recognize that the value of a digit represents one-tenth as much as the place to its left.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Compare the value of digits	5.NBT.A.1
2	2	Compare the value of digits	5.NBT.A.1
3	2	Compare the value of digits	5.NBT.A.1

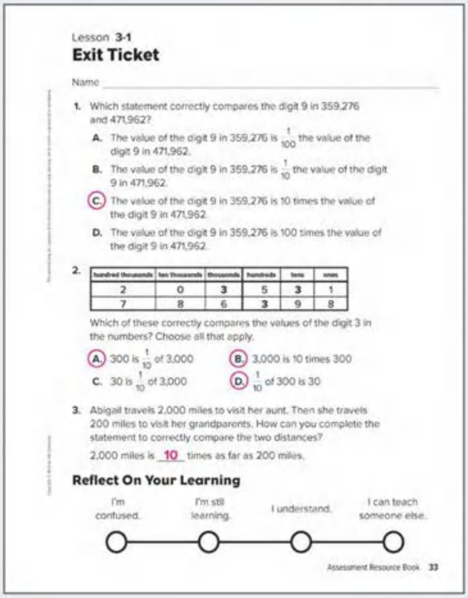
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 3-1

Exit Ticket

Name ____________________

1. Which statement correctly compares the digit 9 in 359,276 and 471,962?
   - A. The value of the digit 9 in 359,276 is $\frac{1}{100}$ the value of the digit 9 in 471,962.
   - B. The value of the digit 9 in 359,276 is $\frac{1}{10}$ the value of the digit 9 in 471,962.
   - [✓ C.] The value of the digit 9 in 359,276 is 10 times the value of the digit 9 in 471,962.
   - D. The value of the digit 9 in 359,276 is 100 times the value of the digit 9 in 471,962.

2.

hundred thousands	ten thousands	thousands	hundreds	tens	ones
2	0	3	5	3	1
7	8	6	3	9	8

Which of these correctly compares the values of the digit 3 in the numbers? Choose all that apply.

[✓ A.] 300 is $\frac{1}{10}$ of 3,000
[✓ B.] 3,000 is 10 times 300
C. 30 is $\frac{1}{10}$ of 3,000
[✓ D.] $\frac{1}{10}$ of 300 is 30

3. Abigail travels 2,000 miles to visit her aunt. Then she travels 200 miles to visit her grandparents. How can you complete the statement to correctly compare the two distances?

2,000 miles is __10__ times as far as 200 miles.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 33

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

That's the Way!

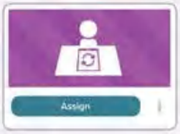
Distribute two index cards marked "× 10" and "× $\frac{1}{10}$" to each student. Display a large number that includes a blank space for one of the digits. Draw an arrow below a digit that is adjacent to the blank space. Ask students to raise the card that shows the multiplication that they would have to be performed to "move" that digit to the blank space. Have students explain their thinking. Repeat with other numbers and arrows. If students have difficulty, ask them to multiply 20 by 10 and describe the result, and then divide by 20 by 10 and describe the result.

GO ONLINE

Take Another Look Lessons

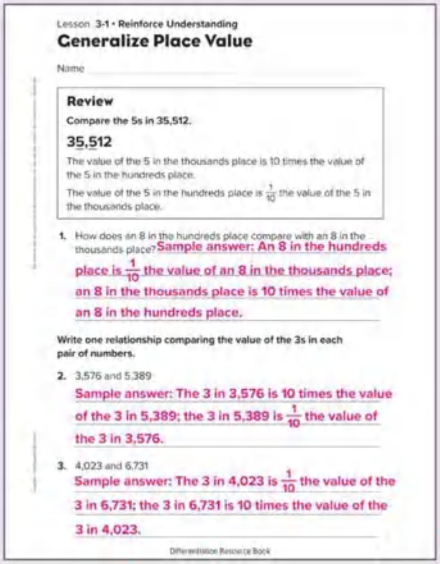
Assign the interactive lessons to reinforce targeted skills.

- One-Tenth as Much
- Digits to the Left and Right



INDEPENDENT WORK

Differentiation Resource Book, p. 11



Lesson 3-1 • Reinforce Understanding

Generalize Place Value

Name

Review

Compare the 5s in 35,512.

35,512

The value of the 5 in the thousands place is 10 times the value of the 5 in the hundreds place.

The value of the 5 in the hundreds place is $\frac{1}{10}$ the value of the 5 in the thousands place.

1. How does an 8 in the hundreds place compare with an 8 in the thousands place? Sample answer: An 8 in the hundreds place is $\frac{1}{10}$ the value of an 8 in the thousands place; an 8 in the thousands place is 10 times the value of an 8 in the hundreds place.

Write one relationship comparing the value of the 3s in each pair of numbers.

2. 3,576 and 5,389
Sample answer: The 3 in 3,576 is 10 times the value of the 3 in 5,389; the 3 in 5,389 is $\frac{1}{10}$ the value of the 3 in 3,576.

3. 4,023 and 6,731
Sample answer: The 3 in 4,023 is $\frac{1}{10}$ the value of the 3 in 6,731; the 3 in 6,731 is 10 times the value of the 3 in 4,023.

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Value of a Digit Sort

Students practice comparing the values of digits in adjacent places within whole numbers.

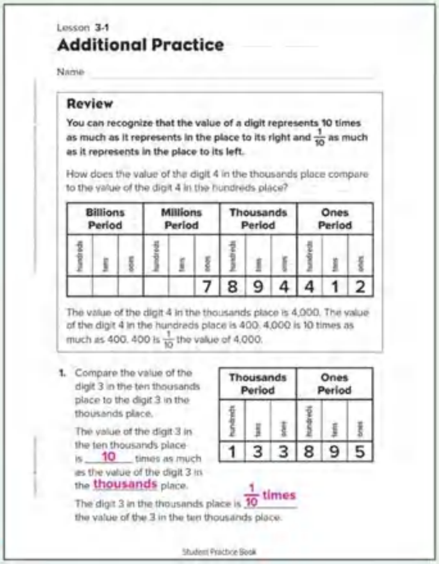
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 11–12



Lesson 3-1

Additional Practice

Name

Review

You can recognize that the value of a digit represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ as much as it represents in the place to its left.

How does the value of the digit 4 in the thousands place compare to the value of the digit 4 in the hundreds place?

Billions Period			Millions Period			Thousands Period			Ones Period		
hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones	hundreds	tens	ones
					7	8	9	4	4	1	2

The value of the digit 4 in the thousands place is 4,000. The value of the digit 4 in the hundreds place is 400. 4,000 is 10 times as much as 400. 400 is $\frac{1}{10}$ the value of 4,000.

1. Compare the value of the digit 3 in the ten thousands place to the digit 3 in the thousands place.

Thousands Period			Ones Period		
hundreds	tens	ones	hundreds	tens	ones
1	3	3	8	9	5

The value of the digit 3 in the ten thousands place is 10 times as much as the value of the digit 3 in the thousands place.

The digit 3 in the thousands place is $\frac{1}{10}$ times the value of the 3 in the ten thousands place.

Student Practice Book

Own It! Digital Station

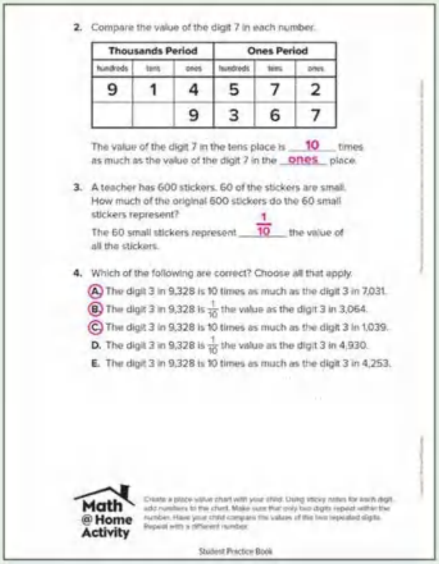
Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting within 1,000,000.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 11–12



2. Compare the value of the digit 7 in each number.

Thousands Period			Ones Period		
hundreds	tens	ones	hundreds	tens	ones
9	1	4	5	7	2
		9	3	6	7

The value of the digit 7 in the tens place is 10 times as much as the value of the digit 7 in the ones place.

3. A teacher has 600 stickers. 60 of the stickers are small. How much of the original 600 stickers do the 60 small stickers represent?

The 60 small stickers represent $\frac{1}{10}$ the value of all the stickers.

4. Which of the following are correct? Choose all that apply.

Ⓐ The digit 3 in 9,328 is 10 times as much as the digit 3 in 7,031.
Ⓑ The digit 3 in 9,328 is $\frac{1}{10}$ the value as the digit 3 in 3,064.
Ⓒ The digit 3 in 9,328 is 10 times as much as the digit 3 in 1,039.
D. The digit 3 in 9,328 is $\frac{1}{10}$ the value as the digit 3 in 4,930.
E. The digit 3 in 9,328 is 10 times as much as the digit 3 in 4,253.

Math @ Home Activity Create a place-value chart with your child. Using sticky notes for each digit, add numbers to the chart. Make sure that only two digits repeat within the number. Have your child compare the values of the two repeated digits. Repeat with a different number.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

On Your Mark, Get Set, Go! Students create a list of times in a swimming meet and compare the times to the results of Olympic swimming events. *The content of this card has concepts covered later in Lesson 3-4. You may want to assign this card to students ready to explore content covered later in this unit.*

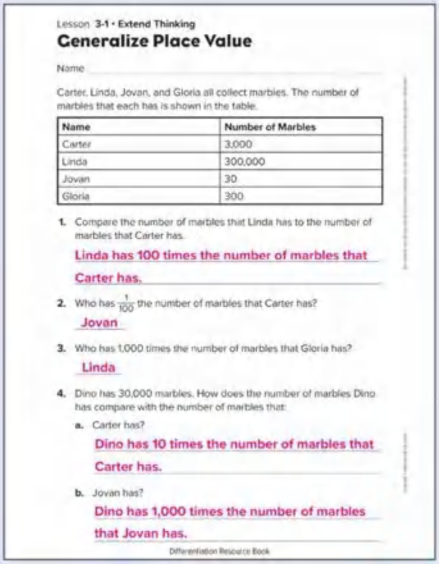
GO ONLINE

STEM Activity

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 12



Lesson **3-1 • Extend Thinking**

Generalize Place Value

Name

Carter, Linda, Jovan, and Gloria all collect marbles. The number of marbles that each has is shown in the table.

Name	Number of Marbles
Carter	3,000
Linda	300,000
Jovan	30
Gloria	300

1. Compare the number of marbles that Linda has to the number of marbles that Carter has.

Linda has 100 times the number of marbles that Carter has.

2. Who has $\frac{1}{100}$ the number of marbles that Carter has?

Jovan

3. Who has 1,000 times the number of marbles that Gloria has?

Linda

4. Dino has 30,000 marbles. How does the number of marbles Dino has compare with the number of marbles that:

a. Carter has?

Dino has 10 times the number of marbles that Carter has.

b. Jovan has?

Dino has 1,000 times the number of marbles that Jovan has.

Differentiation Resource Book

LESSON **3-2**

Extend Place Value to Decimals

Learning Targets

- I can extend the place value relationship to decimal numbers.
- I can explain the relationship of place values in decimal numbers.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.1** Recognize that in a multi-digit number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.

Math Practices and Processes

MPP Model with mathematics.

MPP Look for and make use of structure.

Vocabulary

Math Terms	**Academic Terms**
decimal	contradiction
decimal point	infer
tenth	
hundredth	
thousandth	

Materials

The materials may be for any part of the lesson.

- blank number cubes
- number cubes

Focus

Content Objective	Language Objectives	SEL Objective
• Students relate the value of a digit in a decimal in one place value position to that of the same digit in the place to its right or left.	• Students discuss how the value of a digit in a decimal compares to that of the same digit in a different decimal place-value position, using the terms *hundredths* and *tenths*. • In order to support sense-making, ELs will participate in MLR2: Collect and Display.	• Students discuss and practice strategies for managing stressful situations.

Coherence

Previous	Now	Next
• Students recognized that in a multi-digit whole number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left. (Unit 3)	• Students recognize that in a multi-digit decimal number, a digit in one place represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.	• Students read and write decimals to thousandths using standard form, word form, and expanded form. (Unit 3)

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students deepen and extend their understanding of place-value patterns by reading and writing decimals, and by making multiplicative comparisons by 10 of decimals.	• Students have some early experiences developing proficiency. *Procedural skill and fluency is not a targeted element of rigor for this standard.*	• Students apply their understanding of place value to solve contextual problems. *Application is not a targeted element of rigor for this standard.*

Number Routine

Decompose It! 5–7 min

Build Fluency Students strengthen place-value understanding by decomposing decimal numbers. Students are given a decimal and break it apart in three different ways such that the sum of the parts is equal to the original decimal.

Remind students that there is more than one solution to the problem. As solutions are given, record them for students to evaluate and compare.

These prompts encourage students to talk about their reasoning:

- *What strategy to break apart a decimal do you typically think about first?*
- *How could you break apart this number to show the sum of the values of the digits? What do you call that decomposition of the number?*
- *How can a pattern help you find new "break aparts?"*

Purpose Students share thinking about patterns among 1, $\frac{1}{10}$ and $\frac{1}{100}$.

Notice & Wonder™

- What do you notice?
- What do you wonder?

Teaching Tip You may want to have students record things they notice and wonder before sharing their ideas with the class.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' noticing of the representations presented and are based on possible comments and questions students may make during the share out.

- How does the amount shaded change from square to square?
- Have you seen this type of representation before? If so, when did you use it?

Math is... Mindset

- What are some ways you can avoid or manage stress?

SEL Self-Management: Manage Stress

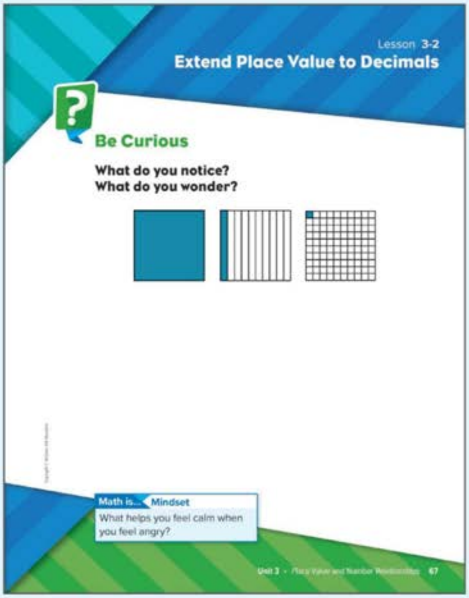
After students have completed the Notice & Wonder routine, invite them to share what may have caused them stress. For example, students may have experienced stress if they did not understand a peer's reasoning for the patterns they notice or struggled with describing the patterns they noticed. Discuss ways students can avoid that stress in the future as well as how they can manage or relieve it now. Strategies such as developing a manageable plan, getting organized, taking breaks, and asking for help can help students manage emotional reactions to stress.

Transition to Explore & Develop

Ask questions that focus students' attention on the part of the whole square that is shaded.

ETP Establish Goals to Focus Learning

- Let's think about what part of the squares are shaded and ways we can represent place value in decimal numbers.



Lesson 3-2

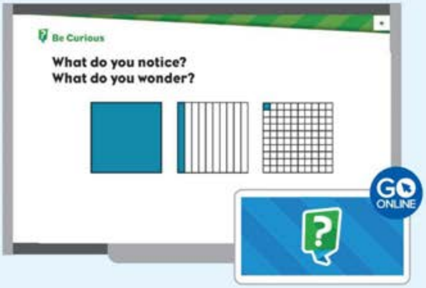
Extend Place Value to Decimals

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

What helps you feel calm when you feel angry?

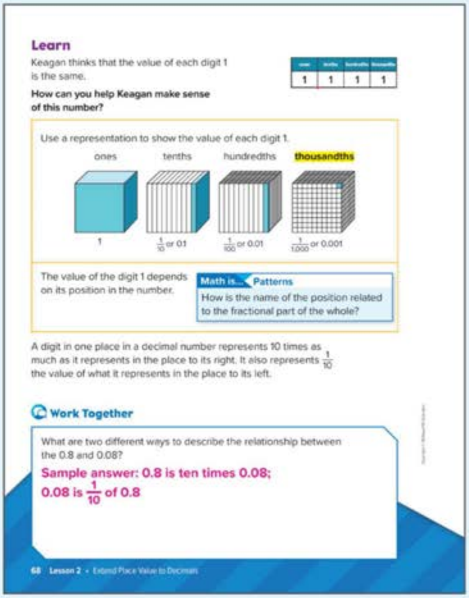


Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

Keagan thinks that the value of each digit 1 is the same.

How can you help Keagan make sense of this number?

1	1	1	1

Use a representation to show the value of each digit 1.

ones	tenths	hundredths	thousandths
1	$\frac{1}{10}$ or 0.1	$\frac{1}{100}$ or 0.01	$\frac{1}{1,000}$ or 0.001

The value of the digit 1 depends on its position in the number.

Math is... Patterns

How is the name of the position related to the fractional part of the whole?

A digit in one place in a decimal number represents 10 times as much as it represents in the place to its right. It also represents $\frac{1}{10}$ the value of what it represents in the place to its left.

Work Together

What are two different ways to describe the relationship between the 0.8 and 0.08?

Sample answer: 0.8 is ten times 0.08; 0.08 is $\frac{1}{10}$ of 0.8

68 Lesson 2 • Extend Place Value to Decimals

❶ Pose the Problem

MLR Collect and Display

As students discuss the questions, write key words and phrases you hear, such as decimal point, fraction, tenth, hundredth, thousandth, and patterns. Display the words and phrases for student reference and use the student-generated expressions to help make connections between student language and math vocabulary. Update the collection with new understandings as the lesson progresses.

ETP Pose Purposeful Questions

- What does the place-value chart tell you?
- What mathematical patterns about whole number place value do you know? Explain how you could use them to improve Keagan's thinking.
- Could other models or tools help improve Keagan's thinking? Explain how.

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- Explain the pattern you see in place values as you move to the right in a decimal number. Explain the pattern you see in place values as you move to the left.
- How could you describe the relationship between hundredths and thousandths? Tenths and thousandths? Ones and thousandths?

Key Takeaways

- The relationship between adjacent place value positions in decimal numbers is the same as in whole numbers. A digit in one place in a decimal number represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left.
- Thousandths are $\frac{1}{1,000}$ of one whole.

Work Together

Students describe the relationships among the tenths and hundredths places in a decimal number in both directions. Students can work on the problem in pairs before sharing their work.

Common Misconception Students may think that tenths, hundredths, thousandths go from right to left as tens, hundreds, thousands do for the whole number part of a decimal. Point out that to the right of the decimal point, they go the opposite way.

LOM Language of Math

Decimal is from the Latin word *decem* meaning *ten*. Students should see *ten*'s role in place value. Other words from the same root are *December* (which was the tenth month) and *decagon* (a 10-sided polygon).

CHOOSE YOUR OPTION

Activity-Based Exploration

Students construct arguments to support their thinking about the values of the digits in decimal numbers.

Directions: Have students work in pairs or small groups to construct arguments to support their responses to Pose the Problem. Explain to students that they need to have at least two examples to support their arguments. Suggest that they may want to make use of base-ten blocks, drawings, or a place-value chart in their arguments.

ETP Implement Tasks that Support Reasoning and Problem Solving

- What do you notice about the value of a digit when it is in different place-value positions in a number?
- How does the place-value chart help explain the relationship of the values of a digit in different positions in a number?
- What relationship did you notice between the values of the digits in your examples?

Math is... Patterns

- How is the name of the position related to the fractional part of the whole?

Students are seeing the connections between the name of the place and the fraction that represents it.

Activity Debrief: Have students share their arguments. Look for examples such as the digit 1 in the tenths place has a value of 0.1, which is $\frac{1}{10}$ the value of the digit 1 in the ones place. Encourage students to use precise language, such as *decimal*, *decimal point*, *tenths*, *hundredths*, and *thousandths*.

Guided Exploration

Students extend their understanding of whole-number place value to decimal numbers.

ETP Facilitate Meaningful Discourse

- Why do 0.1 and $\frac{1}{10}$ represent the same quantity?
- **Think About It:** How does the representation show that 0.1 is $\frac{1}{10}$ of 1?
- **Think About It:** How does the representation show that 0.01 is $\frac{1}{10}$ of 0.1?

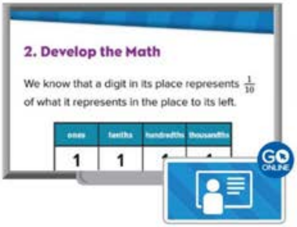
Have students discuss patterns representing the tenths and hundredths, such as partitioning into 10 equal parts and shading 1 of those parts.

Math is... Patterns

- How is the name of the position related to the fractional part of the whole?

Students are seeing the connections between the name of the place and the fraction that represents it.

- How could you explain to Keagan the difference between the digit 1 and the values of each digit 1 in 1.111?



2. Develop the Math

We know that a digit in its place represents $\frac{1}{10}$ of what it represents in the place to its left.

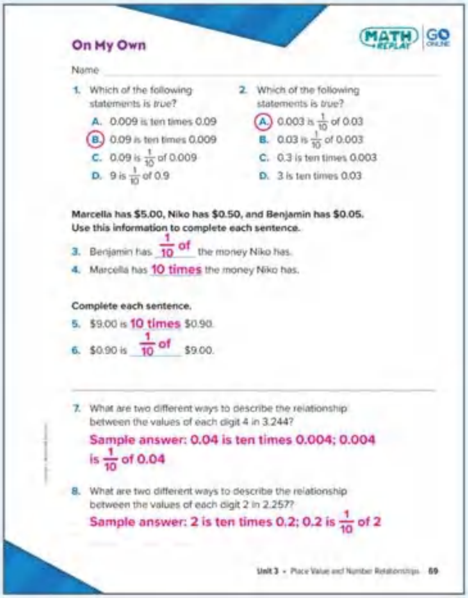
EL English Learner Scaffolds

Entering/Emerging Support students in understanding the meaning of the word *related*. Using manipulatives, show two objects that are related in some way. Say *I'm going to show you how these items are related to each other.* Then explain to students how the items are related. Show another pair of objects that are related somehow. Give one statement that correctly explains how the objects are related to each other, and one statement that does not. Ask students after each sentence, *Did I explain how they are related to each other?*

Developing/Expanding Support students in understanding the meaning of the word *related*. Using manipulatives, show two objects that are related in some way. Say *I'm going to show you how these items are related to each other.* Then explain to students how the items are related. Show another pair of objects that are related somehow. Give one statement that correctly explains how the objects are related to each other, and one statement that does not. Ask students after each sentence, *Did I explain how they are related to each other?* Ask them to explain how they know and provide a sentence frame for students who may need more help or prompting.

Bridging/Reaching To support students in answering the questions, ask them to explain how two objects of their choice can be related to each other. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, that doesn't show how they relate to each other...* or *No, that's not correct because...*

Practice & Reflect 10 min



On My Own

Name ____________

1. Which of the following statements is *true*?
   - A. 0.009 is ten times 0.09
   - [✓ B.] 0.09 is ten times 0.009
   - C. 0.09 is $\frac{1}{10}$ of 0.009
   - D. 9 is $\frac{1}{10}$ of 0.9

2. Which of the following statements is *true*?
   - [✓ A.] 0.003 is $\frac{1}{10}$ of 0.03
   - B. 0.03 is $\frac{1}{10}$ of 0.003
   - C. 0.3 is ten times 0.003
   - D. 3 is ten times 0.03

Marcella has $5.00, Niko has $0.50, and Benjamin has $0.05. Use this information to complete each sentence.

3. Benjamin has **$\frac{1}{10}$ of** the money Niko has.
4. Marcella has **10 times** the money Niko has.

Complete each sentence.

5. $9.00 is **10 times** $0.90.
6. $0.90 is **$\frac{1}{10}$ of** $9.00.

7. What are two different ways to describe the relationship between the values of each digit 4 in 3.244?
   Sample answer: 0.04 is ten times 0.004; 0.004 is $\frac{1}{10}$ of 0.04

8. What are two different ways to describe the relationship between the values of each digit 2 in 2.257?
   Sample answer: 2 is ten times 0.2; 0.2 is $\frac{1}{10}$ of 2

Unit 3 • Place Value and Number Relationships 69

9. **Error Analysis** Toby writes the number 23.2 and says that the value of the digit 2 in the tens place is 10 times the value of the digit 2 in the tenths place. How do you respond to him?
   Sample answer: I do not agree. 20 is not 10 times 0.2; 20 is 10 times 2; the value of the tens place is 10 times the value of the ones place.

10. For which numbers is the value of the digit 8 ten times the value of the digit 8 in the number 4.984?
    - [✓ A.] 3.814
    - [✓ B.] 5.820
    - C. 6.982
    - D. 8.492

11. **STEM Connection** The world's biggest submarine can sail at a speed of about 25.5 miles per hour on the surface. How can you describe the relationship between 5 and 0.5?
    Sample answer: 5 is ten times 0.5; 0.5 is $\frac{1}{10}$ of 5

12. **Extend Your Thinking** Using only the digits 1, 4, and 5, write a number so that the value of the digit 5 is ten times the value of the digit 5 in the number 1.45. Write another number so that the value of the digit 4 is $\frac{1}{10}$ the value of the digit 4 in 1.45.
    Sample answer: 1.54

Reflect

How is the relationship between the values of digits in a decimal the same as the relationship between the values of digits in a whole number?

Answers may vary.

Math is... Mindset
How have you felt calm when you felt angry?

70 Lesson 2 • Extend Place Value to Decimals

Practice

Build Fluency from Understanding

Common Error: Exercises 3–6 Students may extend *10 times* to *$\frac{1}{10}$ times*. While correct ($\frac{1}{10}$ of a number is $\frac{1}{10}$ times that number), students are not aware of why yet. Encourage the use of *$\frac{1}{10}$ of.*

Item Analysis

Item	DOK	Rigor
1–6	2	Procedural Skill & Fluency
7–8	3	Conceptual Understanding
9	4	Conceptual Understanding
10	3	Conceptual Understanding
11	3	Application
12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How is the relationship between the values of digits in a decimal the relationship between the values of digits in a whole number?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What are some ways you can avoid or manage stress?

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can extend the place value relationship to decimal numbers.
- I can explain the relationship of place values in decimal numbers.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Compare the value of digits of decimals	5.NBT.A.1
2	2	Compare the value of digits of decimals	5.NBT.A.1
3	2	Compare the value of digits of decimals	5.NBT.A.1

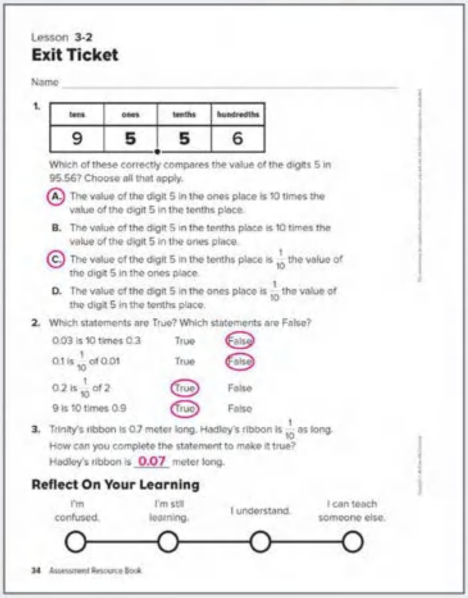
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 3-2

Exit Ticket

Name ________________

1.

tens	ones	tenths	hundredths
9	5	5	6

Which of these correctly compares the value of the digits 5 in 95.56? Choose all that apply.

[✓ A.] The value of the digit 5 in the ones place is 10 times the value of the digit 5 in the tenths place.

B. The value of the digit 5 in the tenths place is 10 times the value of the digit 5 in the ones place.

[✓ C.] The value of the digit 5 in the tenths place is $\frac{1}{10}$ the value of the digit 5 in the ones place.

D. The value of the digit 5 in the ones place is $\frac{1}{10}$ the value of the digit 5 in the tenths place.

2. Which statements are True? Which statements are False?

0.03 is 10 times 0.3 True [✓ False]

0.1 is $\frac{1}{10}$ of 0.01 True [✓ False]

0.2 is $\frac{1}{10}$ of 2 [✓ True] False

9 is 10 times 0.9 [✓ True] False

3. Trinity's ribbon is 0.7 meter long. Hadley's ribbon is $\frac{1}{10}$ as long. How can you complete the statement to make it true?

Hadley's ribbon is 0.07 meter long.

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

34 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Is It a Challenge or Not?

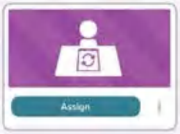
Work with students in small groups. Each student writes 0.0 on a piece of paper. The first student rolls a number cube and writes the number rolled as a digit to the left or right, then rolls an "operation cube" that has × 10 and × $\frac{1}{10}$ on its faces. That student rewrites the number, moving the digit to the appropriate place. Help the group discuss how to confirms the answer. The next student repeats this process. If students have difficulty, encourage them to think about whether the product will be greater than or less than the original number.

GO ONLINE

Take Another Look Lesson

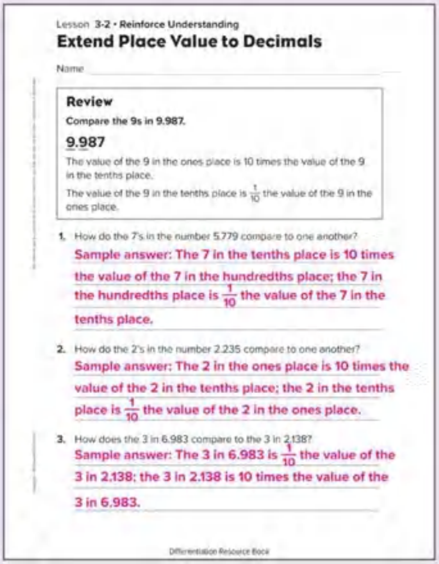
Assign the interactive lesson to reinforce targeted skills.

- One-Tenth & 10 Times as Much (Decimals)



INDEPENDENT WORK

Differentiation Resource Book, p. 13



Lesson 3-2 • Reinforce Understanding

Extend Place Value to Decimals

Name

Review

Compare the 9s in 9.987.

9.987

The value of the 9 in the ones place is 10 times the value of the 9 in the tenths place.

The value of the 9 in the tenths place is $\frac{1}{10}$ the value of the 9 in the ones place.

1. How do the 7's in the number 5.779 compare to one another?
Sample answer: The 7 in the tenths place is 10 times the value of the 7 in the hundredths place; the 7 in the hundredths place is $\frac{1}{10}$ the value of the 7 in the tenths place.

2. How do the 2's in the number 2.235 compare to one another?
Sample answer: The 2 in the ones place is 10 times the value of the 2 in the tenths place; the 2 in the tenths place is $\frac{1}{10}$ the value of the 2 in the ones place.

3. How does the 3 in 6.983 compare to the 3 in 2.138?
Sample answer: The 3 in 6.983 is $\frac{1}{10}$ the value of the 3 in 2.138; the 3 in 2.138 is 10 times the value of the 3 in 6.983.

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Place Value with Decimals Sort

Students practice comparing the values of digits in adjacent places within decimal numbers.

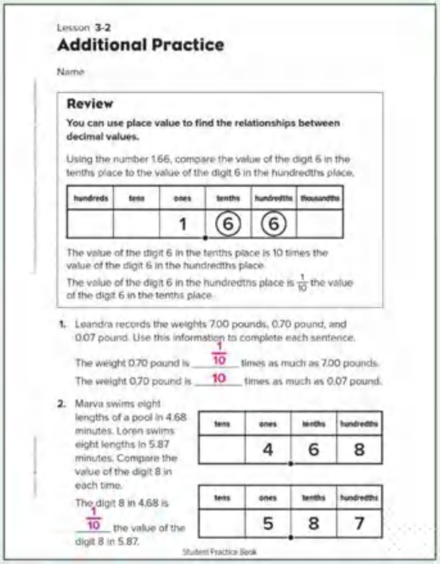
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 13–14



Lesson 3-2

Additional Practice

Name

Review

You can use place value to find the relationships between decimal values.

Using the number 1.66, compare the value of the digit 6 in the tenths place to the value of the digit 6 in the hundredths place.

hundreds	tens	ones	tenths	hundredths	thousandths
		1	⑥	⑥	

The value of the digit 6 in the tenths place is 10 times the value of the digit 6 in the hundredths place.

The value of the digit 6 in the hundredths place is $\frac{1}{10}$ the value of the digit 6 in the tenths place.

1. Leandra records the weights 7.00 pounds, 0.70 pound, and 0.07 pound. Use this information to complete each sentence.

The weight 0.70 pound is $\frac{1}{10}$ times as much as 7.00 pounds.

The weight 0.70 pound is 10 times as much as 0.07 pound.

2. Marva swims eight lengths of a pool in 4.68 minutes. Loren swims eight lengths in 5.87 minutes. Compare the value of the digit 8 in each time.

tens	ones	tenths	hundredths
	4	6	8

tens	ones	tenths	hundredths
	5	8	7

The digit 8 in 4.68 is $\frac{1}{10}$ the value of the digit 8 in 5.87.

Student Practice Book

Own It! Digital Station

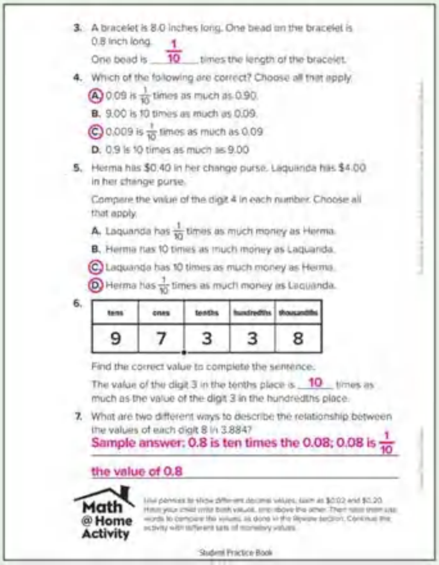
Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting within 1,000,000.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 13–14



3. A bracelet is 8.0 inches long. One bead on the bracelet is 0.8 inch long.
One bead is $\frac{1}{10}$ times the length of the bracelet.

4. Which of the following are correct? Choose all that apply.
[✓ A.] 0.09 is $\frac{1}{10}$ times as much as 0.90.
B. 9.00 is 10 times as much as 0.09.
[✓ C.] 0.009 is $\frac{1}{10}$ times as much as 0.09
D. 0.9 is 10 times as much as 9.00

5. Herma has $0.40 in her change purse. Laquanda has $4.00 in her change purse.
Compare the value of the digit 4 in each number. Choose all that apply.
A. Laquanda has $\frac{1}{10}$ times as much money as Herma.
B. Herma has 10 times as much money as Laquanda.
[✓ C.] Laquanda has 10 times as much money as Herma.
[✓ D.] Herma has $\frac{1}{10}$ times as much money as Laquanda.

6.

tens	ones	tenths	hundredths	thousandths
9	7	3	3	8

Find the correct value to complete the sentence.
The value of the digit 3 in the tenths place is 10 times as much as the value of the digit 3 in the hundredths place.

7. What are two different ways to describe the relationship between the values of each digit 8 in 3.884?
Sample answer: 0.8 is ten times the 0.08; 0.08 is $\frac{1}{10}$ the value of 0.8

Math @ Home Activity Use pennies to show different decimal values, such as $0.02 and $0.20. Have your child write both values, one above the other. Then have them use words to compare the values, as done in the Review section. Continue the activity with different sets of monetary values.

Student Practice Book

Extend Thinking

WORKSTATIONS

Use It! Application Station

State Sales Tax Student investigate and compare state sales tax rates. *The content of this card has concepts covered later in Lesson 3-5. You may want to assign this card to students ready to explore content covered later in this unit.*

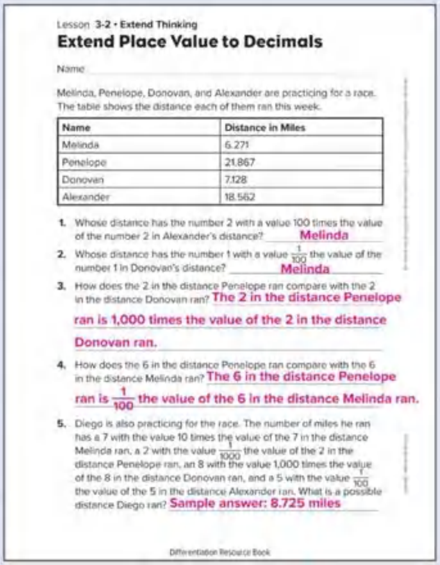
GO ONLINE

STEM Activity

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 14



Lesson 3-2 • Extend Thinking

Extend Place Value to Decimals

Name

Melinda, Penelope, Donovan, and Alexander are practicing for a race. The table shows the distance each of them ran this week.

Name	Distance in Miles
Melinda	6.271
Penelope	21.867
Donovan	7.128
Alexander	18.562

1. Whose distance has the number 2 with a value 100 times the value of the number 2 in Alexander's distance? Melinda
2. Whose distance has the number 1 with a value $\frac{1}{100}$ the value of the number 1 in Donovan's distance? Melinda
3. How does the 2 in the distance Penelope ran compare with the 2 in the distance Donovan ran? The 2 in the distance Penelope ran is 1,000 times the value of the 2 in the distance Donovan ran.
4. How does the 6 in the distance Penelope ran compare with the 6 in the distance Melinda ran? The 6 in the distance Penelope ran is $\frac{1}{100}$ the value of the 6 in the distance Melinda ran.
5. Diego is also practicing for the race. The number of miles he ran has a 7 with the value 10 times the value of the 7 in the distance Melinda ran, a 2 with the value $\frac{1}{1000}$ the value of the 2 in the distance Penelope ran, an 8 with the value 1,000 times the value of the 8 in the distance Donovan ran, and a 5 with the value $\frac{1}{100}$ the value of the 5 in the distance Alexander ran. What is a possible distance Diego ran? Sample answer: 8.725 miles

Differentiation Resource Book

LESSON **3-3**

Read and Write Decimals

Learning Targets

- I can read and write decimals to thousandths using standard form, expanded form, and word form.
- I can make sense of decimals to the thousandths place.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.3.a** Read and write decimals to thousandths using base-ten numerals, number names, and expanded **form.**

Math Practices and Processes

MPP Construct viable arguments and critique the reasoning of others.

MPP Attend to precision.

Vocabulary

Math Terms	**Academic Terms**
expanded form	expand
standard form	quality
word form	

Materials

The materials may be for any part of the lesson.

- *Decimal Forms* Teaching Resource
- number cubes

Focus

Content Objective

- Students read and write decimals to the thousandths place in standard form, expanded form, and word form.

Language Objectives

- Students explain how to read and write decimals to the thousandths place while make sure to include *and*.
- In order to support maximizing meta-awareness, ELs will participate in MLR1: Stronger and Clearer Each Time.

SEL Objective

- Students actively listen without interruption as peers describe how they approached a complex mathematical task.

Coherence

Previous

- Students wrote multi-digit whole numbers using standard form, word form, and expanded form. (Grade 4)
- Students explain the relationship of the value of digits in different place value positions. (Unit 3)

Now

- Students read and write decimals to thousandths using standard form, word form, and expanded form.

Next

- Students apply their understanding of decimals to compare decimals. (Unit 3)

Rigor

Conceptual Understanding

- Students build on their understanding of place-value patterns to read and write decimals to the thousandths place.

Procedural Skill & Fluency

- Students build proficiency with decimals to the thousandths.

Application

- Students apply understanding of decimals to solve real-world problems.

Application is not a targeted element of rigor for this standard.

Number Routine

Decompose It! 5–7 min

Build Fluency Students build place-value understanding as they decompose decimal numbers. Students decompose the given decimal in at least three different ways.

As students offer solutions, record them for students to evaluate and compare.

These prompts encourage students to talk about their reasoning:

- What strategy to break apart a decimal do you typically think about first?
- How could you decompose this number to show the sum of the values of the digits? What do you call that decomposition of the number?
- What pattern do you see as you compare the value relationship between two adjacent places?
- How can a pattern help you find new "break aparts?"

Launch 5–7 min

Sense-Making Routine

Purpose Students discuss decimal numbers, thinking about ways to read and write decimal numbers.

Notice & Wonder™

- What do you notice?
- What do you wonder?

Teaching Tip Encourage students to add onto another student's idea. This promotes opportunities for participation from a variety of students. You can ask questions, such as *Would someone like to add on?* to help elicit more discussion when few students are talking.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' thinking about ways to read and write decimal numbers and are based on possible comments and questions students may make during the share out.

- How can you read the weight of the strawberries?
- If the decimal point were changed to a comma, do you think the number is a reasonable weight for the strawberries?

Math is... Mindset

- Why is active listening important?

SEL Relationship Skills: Communication

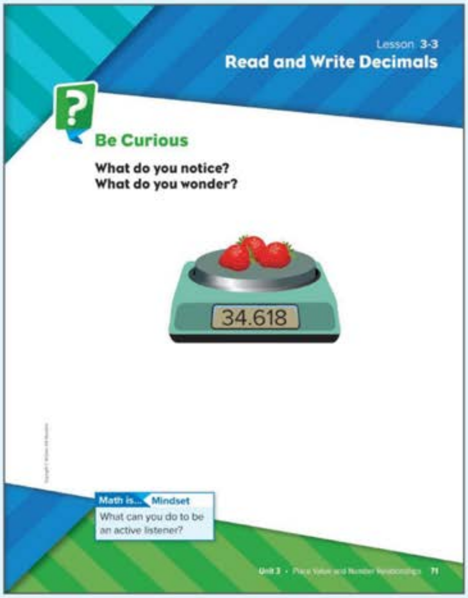
As students engage in collaborative discourse around the Notice & Wonder routine, encourage them to actively and respectfully listen to one another. Invite students to think about and share what active listening looks and sounds like. As students discuss reading and writing decimals, encourage classmates to listen as well as provide thoughtful feedback. Capitalize on opportunities to also model these behaviors when students are speaking.

Transition to Explore & Develop

Ask questions that focus students' attention on ways to read and write decimal numbers.

ETP Establish Goals to Focus Learning

- Let's think about ways to read and write decimal numbers.



Lesson 3-3

Read and Write Decimals

Be Curious

What do you notice?
What do you wonder?

34.618

Math is... Mindset

What can you do to be an active listener?

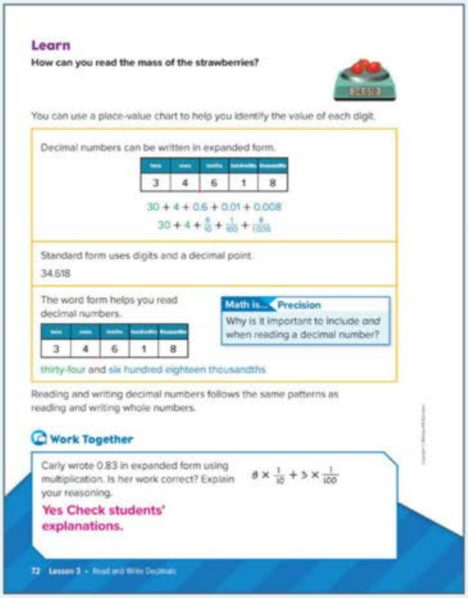
Unit 3 • Place Value and Number Relationships 71

Be Curious

What do you notice?
What do you wonder?

34.618

Explore & Develop 20 min



Learn

How can you read the mass of the strawberries?

You can use a place-value chart to help you identify the value of each digit.

Decimal numbers can be written in expanded form.

3	4	6	1	8

$30 + 4 + 0.6 + 0.01 + 0.008$

$30 + 4 + \frac{6}{10} + \frac{1}{100} + \frac{8}{1000}$

Standard form uses digits and a decimal point.

34.618

The word form helps you read decimal numbers.

3	4	6	1	8

thirty-four and six hundred eighteen thousandths

Math is... Precision
Why is it important to include *and* when reading a decimal number?

Reading and writing decimal numbers follows the same patterns as reading and writing whole numbers.

Work Together

Carly wrote 0.83 in expanded form using multiplication. Is her work correct? Explain your reasoning.

$8 \times \frac{1}{10} + 3 \times \frac{1}{100}$

Yes Check students' explanations.

72 Lesson 3 • Read and Write Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- Based on what you already know, can you make a conjecture about how to read the decimal? Explain what you base your conjecture on.
- What tool might you use to help you read the decimal? Why do you think it would help you?
- Explain how you could use patterns about place value to help you read the decimal.

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Ask students to write about how a place-value chart can help them identify the value of digits in decimals. Then have students share their writing with a partner, comparing their sentences, and if needed, make corrections.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- What is the last word in the word form for 34.27? Explain why.
- In word form, how are place values the same before and after the *and*? How are they different?
- Billy said expanded form can be written using just multiplication. Is he correct? Explain why or why not.

Key Takeaways

- Reading and writing decimals to thousandths in word form follows the same pattern as reading and writing numbers to 999, but are always followed by the least place value position.
- The word *and* indicates the location of the decimal point when reading and writing decimals in word form.
- Expanded form can be written using multiplication to show the value of each digit.

Work Together

Students explore writing a decimal in expanded form using multiplication. Students can work on the problem in pairs before sharing their work.

Common Misconception Students may be confused by the use of multiplication in this expanded form, and may need a quick refresh on multiplying a fraction by a whole number. Remind them that $\frac{6}{10}$ is the same as $6 \times \frac{1}{10}$.

LOM Language of Math

Any zero digits that occur to the right of the last non-zero digit in a decimal number are called *trailing zeros*. Five and four-hundred fifty thousandths, 5.450, has a trailing zero. 007 has two *leading zeros*.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students use their understanding of different forms of whole numbers to identify different forms of decimals.

Materials: *Decimal Forms* Teaching Resource

Directions: Cut and distribute each pair or small group a set of *Decimal Forms* Teaching Resource. Students should match the standard form, word form, and expanded form for each decimal.

ETP Support Productive Struggle

- What knowledge can you use to help you get started?
- When have you used word form or expanded form before?
- What if you started with a different number?
- What patterns do you see in the word form of each decimal number?
- What is the same about the expanded form of a decimal number and the expanded form of a whole number? What is different?

Math is... Precision

- Why is it important to include *and* when reading a decimal number?

Students practice communicating precisely to others.

Activity Debrief: After students have completed the activity, display their work for a gallery walk. Have students compare solutions. Facilitate a discussion to identify patterns to develop an understanding of writing decimals in different forms.

Have students revisit the Pose the Problem question and discuss answers.

- How can we read the mass of the strawberries?

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students extend their understanding of word form, standard form, and expanded form to decimal numbers.

ETP Use and Connect Mathematical Representations

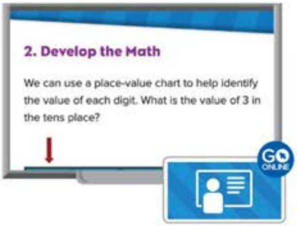
- Why is thirty-four and six hundred eighteen *tenths* incorrect?
- How are word form, standard form, and expanded form for decimal numbers the same as they are for whole numbers? How are they different?
- Describe the patterns you see in the denominators of the fractions in the expanded form of a decimal number using fractions.

Have students share strategies for writing a number given in expanded form in standard form. Make sure they can explain their strategies clearly and that they can understand other students' strategies.

Math is... Precision

- Why is it important to include *and* when reading a decimal number?

Students practice communicating precisely to others.



2. Develop the Math

We can use a place-value chart to help identify the value of each digit. What is the value of 3 in the tens place?

EL English Learner Scaffolds

Entering/Emerging Support students' understanding of the phrase *the same as* using manipulatives. Show students two objects that are exactly the same. Say *This one is the same as that one.* Show two objects that are related but different from each other. Point to one of the objects and say *This one is not the same as that one. They have differences.*

Developing/Expanding Support students' understanding of the phrase *the same as* using manipulatives.

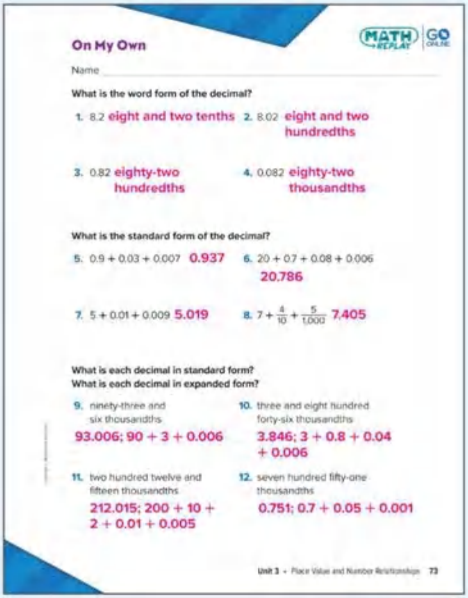
Choose two pairs of objects, one pair being exactly the same, and one pair being different. Ask students to choose the pair of objects that are the same and explain how they know. Provide a sentence frame as needed.

Bridging/Reaching Ask students to explain how different forms for decimals are the same for whole numbers. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding.

For example, *I disagree because...* or *No, that's not correct because...*

Practice & Reflect

10 min



On My Own

Name

What is the word form of the decimal?

1. 8.2 eight and two tenths
2. 8.02 eight and two hundredths
3. 0.82 eighty-two hundredths
4. 0.082 eighty-two thousandths

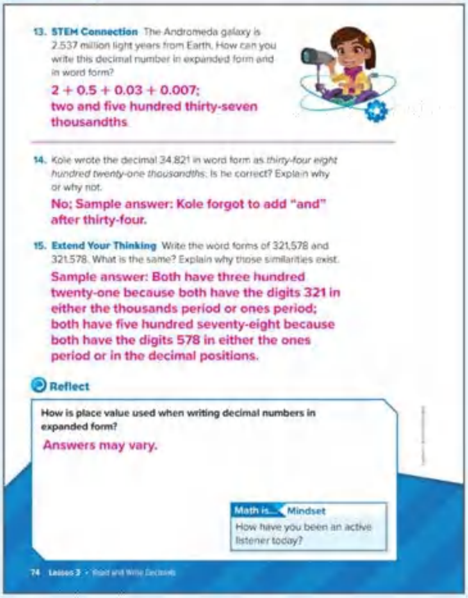
What is the standard form of the decimal?

5. 0.9 + 0.03 + 0.007 0.937
6. 20 + 0.7 + 0.08 + 0.006 20.786
7. 5 + 0.01 + 0.009 5.019
8. $7 + \frac{4}{10} + \frac{5}{1,000}$ 7.405

What is each decimal in standard form?
What is each decimal in expanded form?

9. ninety-three and six thousandths
93.006; 90 + 3 + 0.006
10. three and eight hundred forty-six thousandths
3.846; 3 + 0.8 + 0.04 + 0.006
11. two hundred twelve and fifteen thousandths
212.015; 200 + 10 + 2 + 0.01 + 0.005
12. seven hundred fifty-one thousandths
0.751; 0.7 + 0.05 + 0.001

Unit 3 • Place Value and Number Relationships 73



13. **STEM Connection** The Andromeda galaxy is 2.537 million light years from Earth. How can you write this decimal number in expanded form and in word form?
2 + 0.5 + 0.03 + 0.007; two and five hundred thirty-seven thousandths

14. Kole wrote the decimal 34.821 in word form as *thirty-four eight hundred twenty-one thousandths*. Is he correct? Explain why or why not.
No; Sample answer: Kole forgot to add "and" after thirty-four.

15. **Extend Your Thinking** Write the word forms of 321,578 and 321.578. What is the same? Explain why those similarities exist.
Sample answer: Both have three hundred twenty-one because both have the digits 321 in either the thousands period or ones period; both have five hundred seventy-eight because both have the digits 578 in either the ones period or in the decimal positions.

Reflect

How is place value used when writing decimal numbers in expanded form?
Answers may vary.

Math is... Mindset
How have you been an active listener today?

74 Lesson 3 • Read and Write Decimals

Practice

Build Fluency from Understanding

Common Error: Exercise 7 Students may think that there is only a 1 and 9 in the decimal part of the number and write 5.19. Make sure they remember that thousandths have 3 decimal places and that they need to include a zero.

Item Analysis

Item	DOK	Rigor
1–12	2	Procedural Skill & Fluency
13	3	Application
14–15	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How is place value used when writing decimal numbers in expanded form?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What have you done to be an active listener today?

Students reflect on how they developed stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can read and write decimals to thousandths using standard form, expanded form, and word form.
- I can make sense of decimals to the thousandths place.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Write decimals in word form	5.NBT.A.3.a
2	2	Write decimals in standard form	5.NBT.A.3.a
3	2	Write decimals in expanded form	5.NBT.A.3.a
4	2	Write decimals in standard form	5.NBT.A.3.a
5	2	Match fractions and decimal fractions	5.NBT.A.3.a

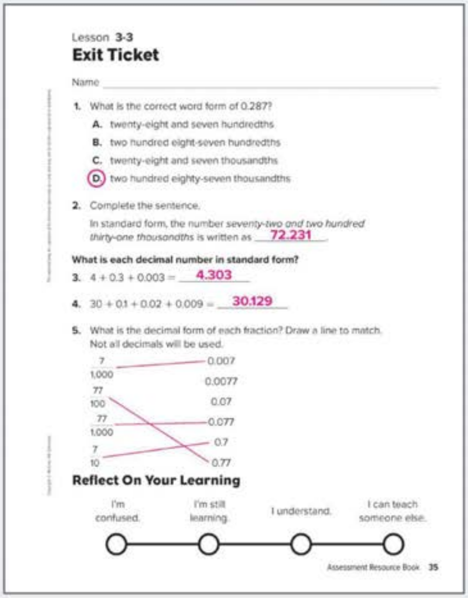
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
5 of 5	Additional Practice or any of the B or E activities
4 of 5	*Take Another Look* or any of the B activities
3 or fewer of 5	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 3-3

Exit Ticket

Name ______

1. What is the correct word form of 0.287?
   - A. twenty-eight and seven hundredths
   - B. two hundred eight-seven hundredths
   - C. twenty-eight and seven thousandths
   - [✓ D.] two hundred eighty-seven thousandths

2. Complete the sentence.

   In standard form, the number *seventy-two and two hundred thirty-one thousandths* is written as 72.231

What is each decimal number in standard form?

3. 4 + 0.3 + 0.003 = 4.303

4. 30 + 0.1 + 0.02 + 0.009 = 30.129

5. What is the decimal form of each fraction? Draw a line to match. Not all decimals will be used.

$\frac{7}{1,000}$	0.007
	0.0077
$\frac{77}{100}$	0.07
$\frac{77}{1,000}$	0.077
$\frac{7}{10}$	0.7
	0.77

Reflect On Your Learning

I'm confused. ○ — I'm still learning. ○ — I understand. ○ — I can teach someone else. ○

Assessment Resource Book 35

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Roll and Expand

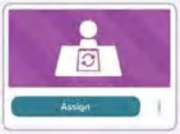
Provide pairs of students with a number cube. Have the students roll three numbers. They record each roll, placing the decimal point so the decimal is to the hundredths. Students then work together to write the decimal in expanded form. Make sure students understand the meaning of the decimal point and the value of each digit. After five successful turns, have students roll four numbers. This time, ask them to place the decimal point so the decimal is to the thousandths. Then have them write each decimal in expanded form.

GO ONLINE

Take Another Look Lessons

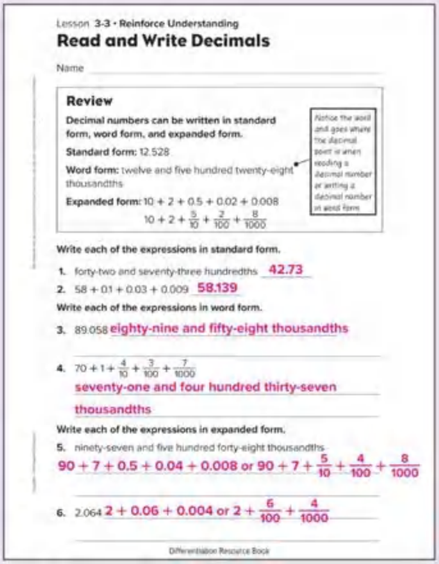
Assign the interactive lessons to reinforce targeted skills.

- Standard & Word Form (Large Numbers)
- Expanded Form of Decimal Powers of Ten



INDEPENDENT WORK

Differentiation Resource Book, p. 15



Lesson 3-3 • Reinforce Understanding

Read and Write Decimals

Name ______

Review

Decimal numbers can be written in standard form, word form, and expanded form.

Standard form: 12.528

Word form: twelve and five hundred twenty-eight thousandths

Expanded form: $10 + 2 + 0.5 + 0.02 + 0.008$

$10 + 2 + \frac{5}{10} + \frac{2}{100} + \frac{8}{1000}$

Notice the word and goes where the decimal point is when reading a decimal number or writing a decimal number in word form.

Write each of the expressions in standard form.

1. forty-two and seventy-three hundredths 42.73
2. $58 + 0.1 + 0.03 + 0.009$ 58.139

Write each of the expressions in word form.

3. 89.058 eighty-nine and fifty-eight thousandths
4. $70 + 1 + \frac{4}{10} + \frac{3}{100} + \frac{7}{1000}$ seventy-one and four hundred thirty-seven thousandths

Write each of the expressions in expanded form.

5. ninety-seven and five hundred forty-eight thousandths $90 + 7 + 0.5 + 0.04 + 0.008$ or $90 + 7 + \frac{5}{10} + \frac{4}{100} + \frac{8}{1000}$
6. 2.064 $2 + 0.06 + 0.004$ or $2 + \frac{6}{100} + \frac{4}{1000}$

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Reading and Writing Decimals Concentration

Students practice matching the word form, standard form, and expanded form of decimal numbers.

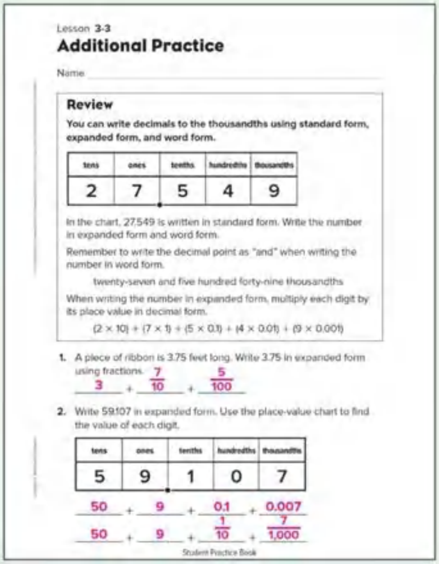
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 15–16



Lesson 3-3

Additional Practice

Name ______

Review

You can write decimals to the thousandths using standard form, expanded form, and word form.

tens	ones	tenths	hundredths	thousandths
2	7	5	4	9

In the chart, 27.549 is written in standard form. Write the number in expanded form and word form.

Remember to write the decimal point as "and" when writing the number in word form.

twenty-seven and five hundred forty-nine thousandths

When writing the number in expanded form, multiply each digit by its place value in decimal form.

$(2 \times 10) + (7 \times 1) + (5 \times 0.1) + (4 \times 0.01) + (9 \times 0.001)$

1. A piece of ribbon is 3.75 feet long. Write 3.75 in expanded form using fractions. $3 + \frac{7}{10} + \frac{5}{100}$
2. Write 59.107 in expanded form. Use the place-value chart to find the value of each digit.

tens	ones	tenths	hundredths	thousandths
5	9	1	0	7

$50 + 9 + 0.1 + 0.007$

$50 + 9 + \frac{1}{10} + \frac{7}{1,000}$

Student Practice Book

Own It! Digital Station

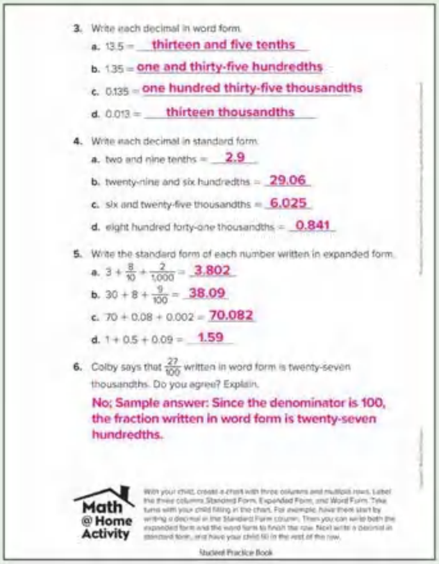
Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting within 1,000,000.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 15–16



3. Write each decimal in word form.
   a. 13.5 = thirteen and five tenths
   b. 1.35 = one and thirty-five hundredths
   c. 0.135 = one hundred thirty-five thousandths
   d. 0.013 = thirteen thousandths

4. Write each decimal in standard form.
   a. two and nine tenths = 2.9
   b. twenty-nine and six hundredths = 29.06
   c. six and twenty-five thousandths = 6.025
   d. eight hundred forty-one thousandths = 0.841

5. Write the standard form of each number written in expanded form.
   a. $3 + \frac{8}{10} + \frac{2}{1,000} =$ 3.802
   b. $30 + 8 + \frac{9}{100} =$ 38.09
   c. $70 + 0.08 + 0.002 =$ 70.082
   d. $1 + 0.5 + 0.09 =$ 1.59

6. Colby says that $\frac{27}{100}$ written in word form is twenty-seven thousandths. Do you agree? Explain.
   No; Sample answer: Since the denominator is 100, the fraction written in word form is twenty-seven hundredths.

Math @ Home Activity With your child, create a chart with three columns and multiple rows. Label the three columns Standard Form, Expanded Form, and Word Form. Take turns with your child filling in the chart. For example, have them start by writing a decimal in the Standard Form column. Then you can write both the expanded form and the word form to finish the row. Next write a decimal in standard form, and have your child fill in the rest of the row.

Student Practice Book

WORKSTATIONS

GO ONLINE

INDEPENDENT WORK

E Extend Thinking

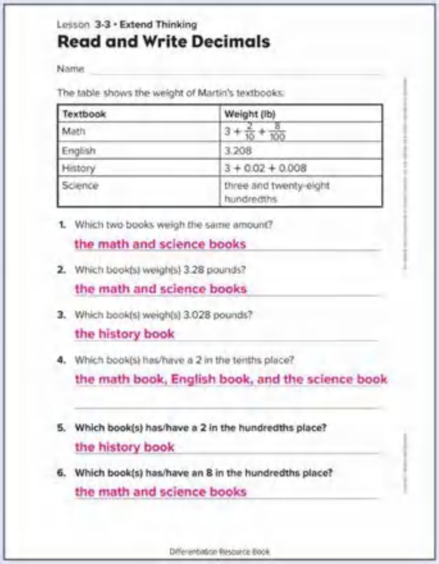
Use It! Application Station

How Far? Students research stars and create a model or drawing showing the stars and their distances from Earth. *The content of this card has concepts covered later in Lesson 3-5. You may want to assign this card to students ready to explore content covered later in this unit.*

STEM Activity

Assign a digital simulation to apply skills and extend thinking.

Differentiation Resource Book, p. 16



Lesson 3-3 • Extend Thinking

Read and Write Decimals

Name

The table shows the weight of Martin's textbooks.

Textbook	Weight (lb)
Math	$3 + \frac{2}{10} + \frac{8}{100}$
English	3.208
History	3 + 0.02 + 0.008
Science	three and twenty-eight hundredths

1. Which two books weigh the same amount?
   the math and science books
2. Which book(s) weigh(s) 3.28 pounds?
   the math and science books
3. Which book(s) weigh(s) 3.028 pounds?
   the history book
4. Which book(s) has/have a 2 in the tenths place?
   the math book, English book, and the science book
5. Which book(s) has/have a 2 in the hundredths place?
   the history book
6. Which book(s) has/have an 8 in the hundredths place?
   the math and science books

Differentiation Resource Book

LESSON **3-4**

Compare Decimals

Learning Target

- I can compare two decimals to the thousandths place using place value.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.3.b** Compare two decimals to thousandths based on meanings of the digits in each place, **using** >, =, **and** < symbols to record the results of comparisons.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	**Academic Terms**
greater than (>)	address
less than (<)	negate

Materials

The materials may be for any part of the lesson.

- number cube

Focus

Content Objective	Language Objectives	SEL Objective
• Students compare two decimals to the thousandths place using place value and record the comparison using appropriate symbols.	• Students explain how to use place value and number lines to compare two decimals, using the terms greater than, less than, and equal to. • In order to support cultivating conversation, ELs will participate in MLR8: Discuss Supports.	• Students engage in respectful discourse with peers about various perspectives for approaching a mathematical challenge.

Coherence

Previous	Now	Next
• Students compared two multi-digit numbers based on meanings of the digits in each place, using >, <, and = symbols to record the results of comparisons. (Grade 4) • Students read and wrote decimals to thousandths using standard form, word form, and expanded form. (Unit 3)	• Students apply their understanding of decimals to compare decimals.	• Students use place value understanding to round decimals to any place. (Unit 3)

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their number sense by examining patterns that extend place-value concepts from previous lessons to decimals in the thousandths.	• Students build proficiency in comparing decimals to the thousandths place using >, <, and = symbols to record the results of comparisons.	• Students apply their knowledge of using patterns to compare decimals based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Find the Pattern, Make a Pattern

5–7 min

Build Fluency Students build number sense as they determine a pattern and find missing terms. Students then create a new sequence that follows the pattern but uses different numbers.

Remind students that there is more than one way to create a new sequence based on the pattern.

These prompts encourage students to talk about their reasoning:

- *What did you notice first?*
- *What did you do first? What did you do next? How do you know your pattern works?*
- *How did you choose your numbers for the new pattern?*

Launch 5–7 min

Purpose Students compare and contrast backpacks, thinking about how to compare decimal numbers.

Notice & Wonder™

- How are they the same?
- How are they different?

Teaching Tip You may want to implement a Turn and Talk routine, which allows students to think about the problem and then turn to a classmate to talk about their thinking. This provides students an opportunity to engage in student-to-student discourse before sharing ideas with the whole group.

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' thinking about how to compare decimal numbers and are based on possible comments and questions students may make during the share out.

- How are the place values of the numbers similar? How are they different?
- How did you decide that the bags have different weights?

Math is... Mindset

- How can you recognize and respond to the emotions of others?

SEL Social Awareness: Develop Perspective

After the Notice & Wonder routine, invite students to share and discuss the emotions they have experienced as they compared the weights of the bookbags. Collectively discuss how these emotions may make them feel or behave. Engaging in open discourse about their feelings can help students recognize, understand, and respond appropriately to the emotions of others

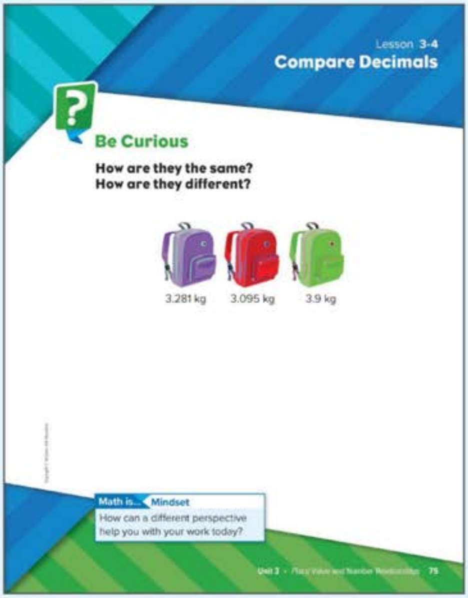
Transition to Explore & Develop

Ask questions that focus students' attention on how to compare decimal numbers.

ETP Establish Goals to Focus Learning

- Let's think about how to compare decimal numbers.

Sense-Making Routine



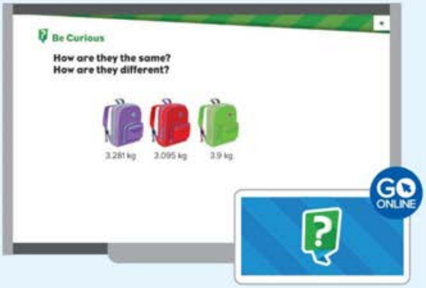
Lesson 3-4
Compare Decimals

Be Curious

How are they the same?
How are they different?

3.281 kg 3.095 kg 3.9 kg

Math is... Mindset
How can a different perspective help you with your work today?



Be Curious

How are they the same?
How are they different?

3.281 kg 3.095 kg 3.9 kg

Explore & Develop
20 min

Learn

Which bag weighs more?

3.281 kg 3.095 kg

Compare the digits in each place starting with the greatest place-value position.

ones	tenths	hundredths	thousandths
3	2	8	1
3	0	9	5

Both numbers have 3 ones.

2 tenths > 0 tenths

Math is... Thinking
Why was it not necessary to compare the hundredths place?

3.281 > 3.095. So, the purple bag weighs more than the red bag.

You can compare decimals the same way you compare multi-digit numbers.

Work Together

Compare the weights of these bags.

ones	tenths	hundredths	thousandths
3	2	8	1
3	9		

3.281 < 3.9

3.281 kg 3.9 kg

76 Lesson 4 • Compare Decimals

❶ Pose the Problem

MLR Discussion Supports

As students engage in discussing the answers to the questions, prompt them to think about how what they learned about comparing whole numbers can help them to compare decimal numbers. Encourage students to challenge each other's ideas when warranted, as well as to elaborate on their ideas and give examples.

ETP Pose Purposeful Questions

- Based on what you know, can you make a conjecture about how to compare decimal numbers? Explain how you would do it and why you think it would work.
- What tools do you think would help you compare decimal numbers? Explain why you think they would help.
- What symbols do you think are used to compare decimal numbers? Explain why.

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How would you explain to a friend how to use a place-value chart to compare decimal numbers?

Key Takeaway

- Comparing decimals follows the same process as comparing multi-digit numbers; one compares digits in the same place value position starting with the greatest place value.

Work Together

Students use place value to compare decimal numbers. Students can work on the problem in pairs before sharing their work. Ask students to write the comparison statement they have found another way.

Common Misconception Students may be confused by there being no digits in the hundredths or thousandths places in the lower number. It may help them to write 3.9 as 3.900 and compare, 281 thousandths to 900 thousandths.

LOM Language of Math

Exercise 9 provides an opportunity to discuss metric prefixes and their relationships and how they are similar to place value. A *kilo*meter is 1,000 meters. A *centi*meter is $\frac{1}{100}$ of a meter.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students extend their understanding of comparing whole numbers using place value to decimal numbers.

Materials: number cube

Directions: Each student rolls a number cube five times. Students use those five digits to create the greatest possible number that includes a digit in each position from tens to thousandths. If time permits, have students complete the activity to create the least possible number.

ETP Implement Tasks that Support Reasoning and Problem Solving

- What strategies did you use to determine the best position for each digit? Will your strategy always work?
- How would you change your strategy if you could not use the same digit twice?
- How would you change your strategy if you could not use the same digit as your partner?

Math is... Thinking

- How did your understanding of place value relationships help you determine the best position for each digit?

Students are making sense of quantities and their relationships.

Activity Debrief: Have students share their strategies for creating the greatest possible decimal. Identify similarities in their strategies, such as placing the greatest digit in the greatest place value position.

Have students revisit the Pose the Problem question and discuss answers.

- Which bag weighs more?

Guided Exploration

Students extend their understanding of comparing whole numbers using place value to decimal numbers.

ETP Pose Purposeful Questions

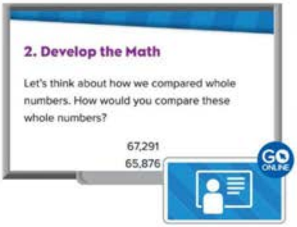
- What different ways can you write the comparison statement? How are they the same? How are they different? Explain your reasoning.
- **Think About It:** Are there other models or tools you could use to compare decimal numbers? How could writing them in expanded form help?

Have students work in pairs or groups to share tips or mnemonic devices to remember whether to use > or < in a comparison statement, e.g., *one side of the sign is bigger... that side goes by the greater number*.

Math is... Thinking

- Why was it not necessary to compare to the hundredths place?

Students are making sense of quantities and their relationships.



2. Develop the Math

Let's think about how we compared whole numbers. How would you compare these whole numbers?

67,291

65,876

EL English Learner Scaffolds

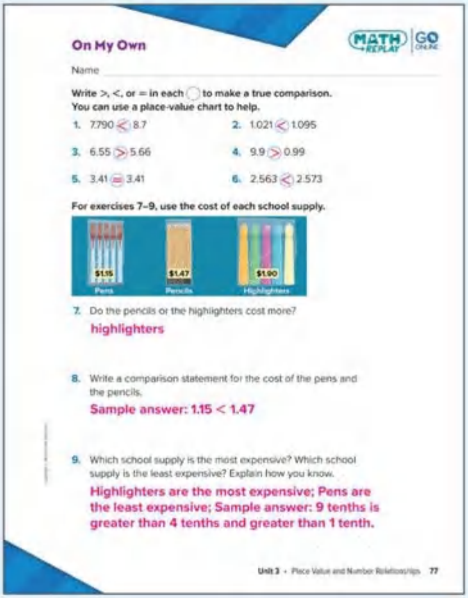
Entering/Emerging Use manipulatives such as counting chips to support students' understanding of the terms *greater than, less than,* and *compare*. Put two unequal groups of counting chips on the table. Say, *I'm going to compare these two groups.* Count each group and say the numbers aloud. Point to the group with more and say *This group has more chips. [5] is greater than [3].* Point to the group with fewer chips and say *This group has fewer chips. [3] is less than [5].* Repeat the task, and ask *Is [4] greater than or less than [6]?*

Developing/Expanding Use manipulatives such as counting chips to support students' understanding of the terms *greater than, less than,* and *compare*. Put two unequal groups of counting chips on the table. Say *I'm going to compare these two groups.* Count each group and say the numbers aloud. Point to the group with more and say *This group has more chips. [5] is greater than [3].* Point to the group with fewer chips and say *This group has fewer chips. [3] is less than [5].* Have students repeat the task, using the counting chips, by having them compare two groups using *greater than* or *less than.*

Bridging/Reaching To support students in responding to questions regarding comparing digits, ask students to explain the meaning of the word *compare* and how it relates to decimal numbers. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, to compare* means to.... and, *No, you compare the numbers by....*

Practice & Reflect

10 min



On My Own

Name

Write >, <, or = in each ◯ to make a true comparison. You can use a place-value chart to help.

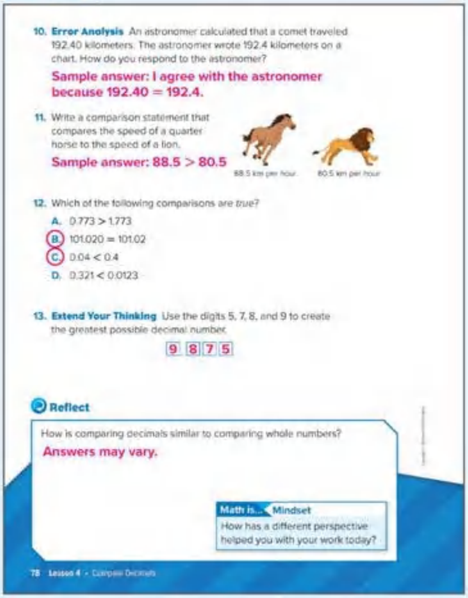
1. 7.790 < 8.7
2. 1.021 < 1.095
3. 6.55 > 5.66
4. 9.9 > 0.99
5. 3.41 = 3.41
6. 2.563 < 2.573

For exercises 7–9, use the cost of each school supply.

7. Do the pencils or the highlighters cost more?
highlighters

8. Write a comparison statement for the cost of the pens and the pencils.
Sample answer: 1.15 < 1.47

9. Which school supply is the most expensive? Which school supply is the least expensive? Explain how you know.
Highlighters are the most expensive; Pens are the least expensive; Sample answer: 9 tenths is greater than 4 tenths and greater than 1 tenth.



10. **Error Analysis** An astronomer calculated that a comet traveled 192.40 kilometers. The astronomer wrote 192.4 kilometers on a chart. How do you respond to the astronomer?
Sample answer: I agree with the astronomer because 192.40 = 192.4.

11. Write a comparison statement that compares the speed of a quarter horse to the speed of a lion.
Sample answer: 88.5 > 80.5

12. Which of the following comparisons are *true*?
    - A. 0.773 > 1.773
    - [✓ B.] 101.020 = 101.02
    - [✓ C.] 0.04 < 0.4
    - D. 0.321 < 0.0123

13. **Extend Your Thinking** Use the digits 5, 7, 8, and 9 to create the greatest possible decimal number.
9.875

Reflect

How is comparing decimals similar to comparing whole numbers?
Answers may vary.

Math is... Mindset
How has a different perspective helped you with your work today?

Practice

Build Fluency from Understanding

Common Error: Exercises 1–6 Students often neglect the whole number part of decimal numbers and will conclude that 6.55 < 5.66 because the first decimal place in 5.66 is greater. Make sure they compare the whole number part first, and, if they are different, the comparison can be made without looking at the decimal part at all.

Item Analysis

Item	DOK	Rigor
1–6	2	Procedural Skill & Fluency
7–8	3	Application
10	4	Application
11	3	Application
12	3	Conceptual Understanding
13	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How is comparing decimals similar to comparing whole numbers?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you recognize and respond to the emotions of others?

Students reflect on how they practiced social awareness.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can compare two decimals to the thousandths place using place value.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket **Formative Assessment**

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflet on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Compare decimals	5.NBT.A.3.b
2	2	Compare decimals	5.NBT.A.3.b
3	3	Compare decimals	5.NBT.A.3.b

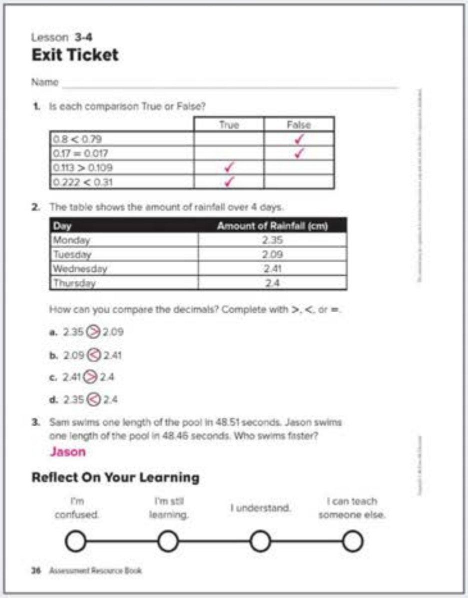
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 3-4

Exit Ticket

Name ______________________

1. Is each comparison True or False?

	True	False
$0.8 < 0.79$		✓
$0.17 = 0.017$		✓
$0.113 > 0.109$	✓	
$0.222 < 0.31$	✓	

2. The table shows the amount of rainfall over 4 days.

Day	Amount of Rainfall (cm)
Monday	2.35
Tuesday	2.09
Wednesday	2.41
Thursday	2.4

How can you compare the decimals? Complete with >, <, or =.

a. $2.35 > 2.09$

b. $2.09 < 2.41$

c. $2.41 > 2.4$

d. $2.35 < 2.4$

3. Sam swims one length of the pool in 48.51 seconds. Jason swims one length of the pool in 48.46 seconds. Who swims faster?

Jason

Reflect On Your Learning

I'm confused. ○ — I'm still learning. ○ — I understand. ○ — I can teach someone else. ○

36 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Place Value War

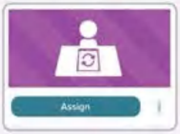
Work with students in pairs. Provide each student with a stack of number cards between 0–9. Each student draws 3 cards from the stack and places them in numerical order. Have students determine which number is greater. Remind students to compare place values from left to right. If students have difficulty comparing the numbers, help them draw a place-value chart for tenths, hundredths, and thousandths and place their cards inside the chart. Repeat until all cards have been played.

GO ONLINE

Take Another Look Lessons

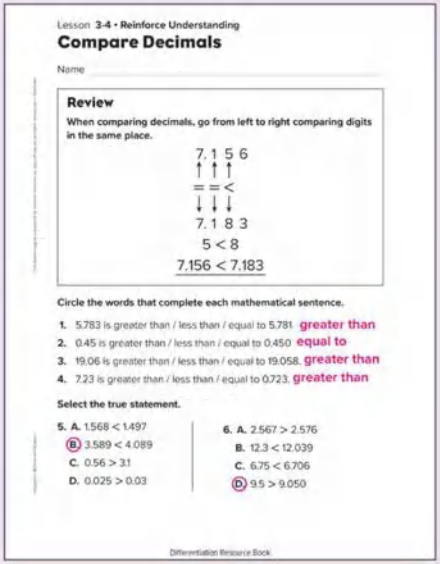
Assign the interactive lessons to reinforce targeted skills.

- Compare Decimal Numbers in Tenths
- Compare Decimal Numbers (100ths)



INDEPENDENT WORK

Differentiation Resource Book, p. 17



Lesson **3-4 • Reinforce Understanding**

Compare Decimals

Name ______________________

Review

When comparing decimals, go from left to right comparing digits in the same place.

7.1 5 6
↑ ↑ ↑
= = <
↓ ↓ ↓
7.1 8 3
$5 < 8$
$7.156 < 7.183$

Circle the words that complete each mathematical sentence.

1. 5.783 is greater than / less than / equal to 5.781 greater than
2. 0.45 is greater than / less than / equal to 0.450 equal to
3. 19.06 is greater than / less than / equal to 19.058. greater than
4. 7.23 is greater than / less than / equal to 0.723. greater than

Select the true statement.

5. A. $1.568 < 1.497$
[✓ **B.**] $3.589 < 4.089$
C. $0.56 > 3.1$
D. $0.025 > 0.03$

6. A. $2.567 > 2.576$
B. $12.3 < 12.039$
C. $6.75 < 6.706$
[✓ **D.**] $9.5 > 9.050$

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Decimal Showdown

Students practice comparing decimals.

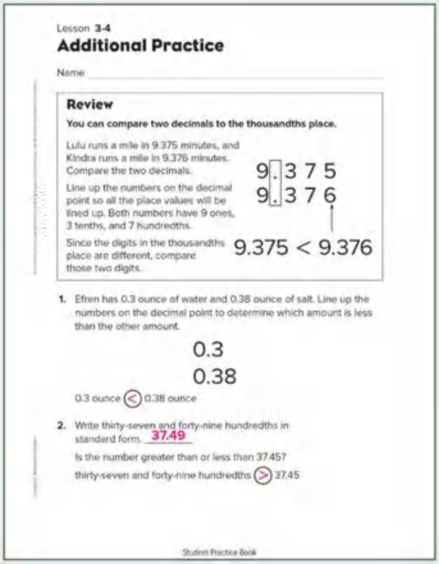
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 17–18



Lesson **3-4**

Additional Practice

Name ______________________

Review

You can compare two decimals to the thousandths place.

Lulu runs a mile in 9.375 minutes, and Kindra runs a mile in 9.376 minutes. Compare the two decimals.

Line up the numbers on the decimal point so all the place values will be lined up. Both numbers have 9 ones, 3 tenths, and 7 hundredths.

Since the digits in the thousandths place are different, compare those two digits.

9 . 3 7 5
9 . 3 7 6

$9.375 < 9.376$

1. Efren has 0.3 ounce of water and 0.38 ounce of salt. Line up the numbers on the decimal point to determine which amount is less than the other amount.

0.3
0.38

0.3 ounce [✓ <] 0.38 ounce

2. Write thirty-seven and forty-nine hundredths in standard form. 37.49

Is the number greater than or less than 37.45?

thirty-seven and forty-nine hundredths [✓ >] 37.45

Student Practice Book

Own It! Digital Station

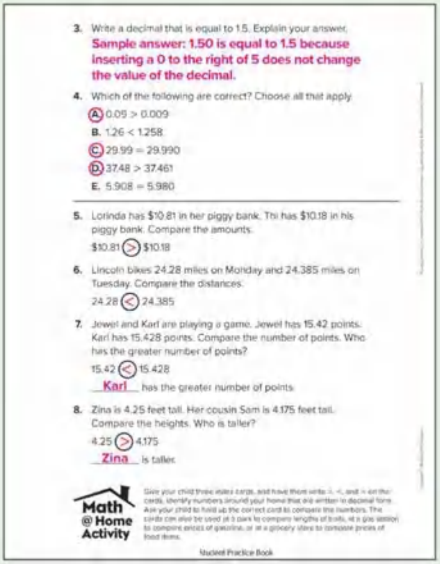
Build Fluency **Games**

Assign the digital game to build fluency with adding and subtracting within 1,000,000.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 17–18



3. Write a decimal that is equal to 1.5. Explain your answer.
Sample answer: 1.50 is equal to 1.5 because inserting a 0 to the right of 5 does not change the value of the decimal.

4. Which of the following are correct? Choose all that apply.
[✓ A.] 0.09 > 0.009
B. 1.26 < 1.258
[✓ C.] 29.99 = 29.990
[✓ D.] 37.48 > 37.461
E. 5.908 = 5.980

5. Lorinda has $10.81 in her piggy bank. Thi has $10.18 in his piggy bank. Compare the amounts.
$10.81 > $10.18

6. Lincoln bikes 24.28 miles on Monday and 24.385 miles on Tuesday. Compare the distances.
24.28 < 24.385

7. Jewel and Karl are playing a game. Jewel has 15.42 points. Karl has 15.428 points. Compare the number of points. Who has the greater number of points?
15.42 < 15.428
Karl has the greater number of points.

8. Zina is 4.25 feet tall. Her cousin Sam is 4.175 feet tall. Compare the heights. Who is taller?
4.25 > 4.175
Zina is taller.

Math @ Home Activity

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

On Your Mark, Get Set, Go! Students create a list of times in a swimming meet and compare the times to the results of Olympic swimming events.

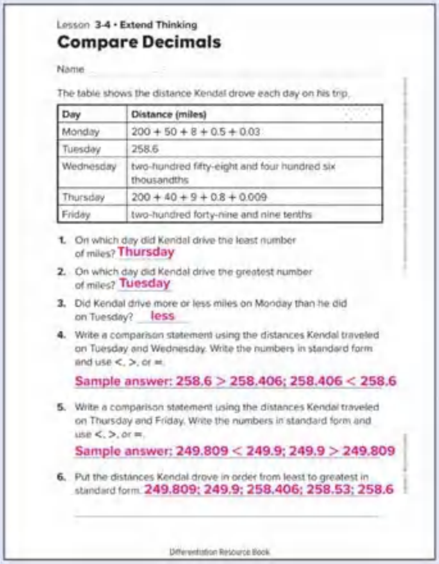
GO ONLINE

STEM Activity

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 18



Lesson 3-4 • Extend Thinking

Compare Decimals

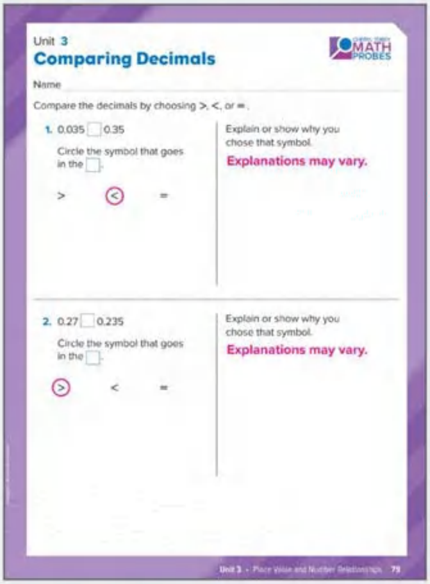
Name

The table shows the distance Kendal drove each day on his trip.

Day	Distance (miles)
Monday	200 + 50 + 8 + 0.5 + 0.03
Tuesday	258.6
Wednesday	two-hundred fifty-eight and four hundred six thousandths
Thursday	200 + 40 + 9 + 0.8 + 0.009
Friday	two-hundred forty-nine and nine tenths

1. On which day did Kendal drive the least number of miles? Thursday
2. On which day did Kendal drive the greatest number of miles? Tuesday
3. Did Kendal drive more or less miles on Monday than he did on Tuesday? less
4. Write a comparison statement using the distances Kendal traveled on Tuesday and Wednesday. Write the numbers in standard form and use <, >, or =.
Sample answer: 258.6 > 258.406; 258.406 < 258.6
5. Write a comparison statement using the distances Kendal traveled on Thursday and Friday. Write the numbers in standard form and use <, >, or =.
Sample answer: 249.809 < 249.9; 249.9 > 249.809
6. Put the distances Kendal drove in order from least to greatest in standard form. 249.809; 249.9; 258.406; 258.53; 258.6

Differentiation Resource Book



Unit 3

Comparing Decimals

Name

Compare the decimals by choosing >, <, or =.

1. 0.035 ☐ 0.35

Circle the symbol that goes in the ☐.

> [✓ <] =

Explain or show why you chose that symbol.

Explanations may vary.

2. 0.27 ☐ 0.235

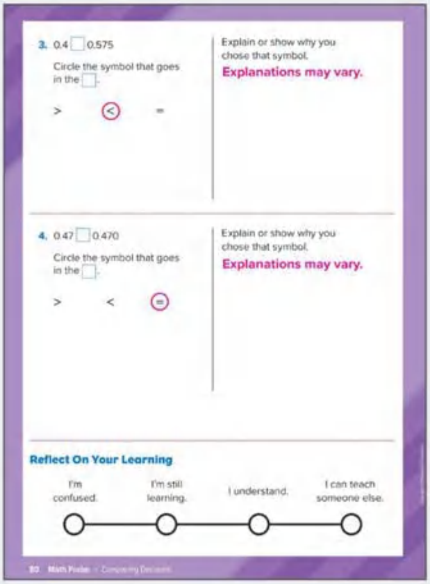
Circle the symbol that goes in the ☐.

[✓ >] < =

Explain or show why you chose that symbol.

Explanations may vary.

Unit 3 • Place Value and Number Relationships 79



3. 0.4 ☐ 0.575

Circle the symbol that goes in the ☐.

> [✓ <] =

Explain or show why you chose that symbol.

Explanations may vary.

4. 0.47 ☐ 0.470

Circle the symbol that goes in the ☐.

> < [✓ =]

Explain or show why you chose that symbol.

Explanations may vary.

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

80 Math Probe • Comparing Decimals

Analyze the Probe

Formative Assessment

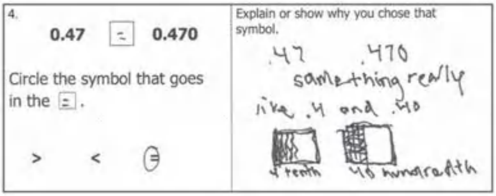
Targeted Concept Compare two decimals by reasoning about the digits and their values based on place-value positions.

Targeted Misconceptions Compare two decimals by reasoning about the digits and their values based on place-value positions.

Authentic Student Work

Below are examples of correct student work and explanations.

Sample A



4. 0.47 ☐ 0.470

Circle the symbol that goes in the ☐.

> < [✓ =]

Explain or show why you chose that symbol.

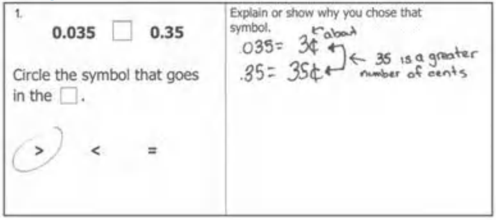
.47 .470

same thing really

like .4 and .40

4 tenth 40 hundredth

Sample B



1. 0.035 ☐ 0.35

Circle the symbol that goes in the ☐.

[✓ >] < =

Explain or show why you chose that symbol.

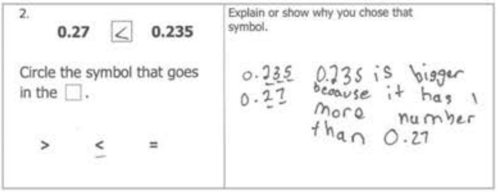
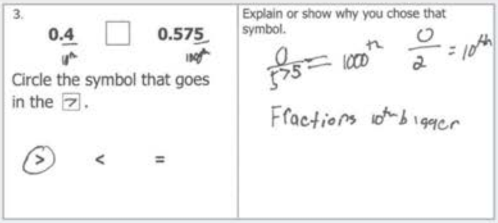
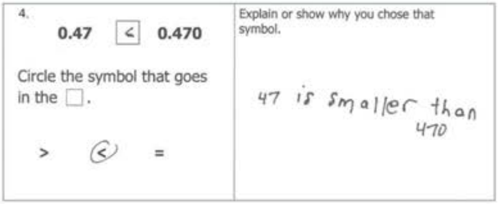
.035 = 3¢ ← about

.35 = 35¢

← 35 is a greater number of cents

Collect and Assess Student Work

Collect and review student response to determine possible misconceptions. See examples in If-Then chart.

IF incorrect…	THEN the student likely…	Sample Misconceptions
1. > 2. < 4. <	thinks that the decimal that contains more digits to the right of the decimal point is the *greater* decimal. This student does not compare decimals by first considering the digits in the greatest place-value position. Note that this misconception leads to the correct answer for Exercise 3.	 2. 0.27 ☐< 0.235 Circle the symbol that goes in the ☐. > < = Explain or show why you chose that symbol. 0.235 0.27 0.235 is bigger because it has 1 more number than 0.27
3. >	thinks that the decimal that contains more digits to the right of the decimal point is the *smaller* decimal. The student reasons that because 0.4 extends only to the tenths place, it is therefore greater than 0.575 that extends to the thousandths place (because thousandths are smaller than tenths). This student does not compare decimals by first considering the digits in the greatest place-value position. Note that this misconception leads to the correct answers for Exercises 1 and 2.	 3. 0.4 ☐ 0.575 10th 1000th Circle the symbol that goes in the ☐. > < = Explain or show why you chose that symbol. $\frac{0}{575}$ = 1000th $\frac{0}{2}$ = 10th Fractions 10th bigger
1. = 4. > or <	thinks that inserting a 0 to the left of a digit in the decimal portion of a number does not change the number's value; OR does not realize that annexing a 0 to the right of a decimal does *not* change its value. For example, in Exercise 4, a 0 can be annexed to the right of 0.47 without changing its value (0.47 = 0.470). However, in Exercise 1, inserting a 0 to the left of the 3 in 0.35 changes its value (0.035 ≠ 0.35).	 4. 0.47 ☐< 0.470 Circle the symbol that goes in the ☐. > < = Explain or show why you chose that symbol. 47 is smaller than 470

Many of the above difficulties result in a combination of correct and incorrect responses. For correct responses, be sure to check for sound reasoning.

Take Action

Choose from the following resources or suggestions:

- Revisit a place-value chart, number lines, and other representations in Lessons 3-2 and 3-3 to build decimal place-value ideas and the comparison of decimals.
- Support students in representing decimals with money and interpreting the meaning of digits in various place-value positions.
- Build place-value ideas by using language that reinforces place value. For example, rather than reading 3.45 as *three point four five*, students should read it as *three and forty-five hundredths*.
- Provide a variety of decimals with 0s in different locations. Discuss cases where inserting a 0 changes the value of a number (such as the 0 in 1.405) and cases where it does not (such as the 0 in 1.450).

Revisit the Probe after additional instruction. Have students review their initial answers to the Probe. Use these questions for discussion:

- Are there any answers you would like to change? Explain why you might want to change them.
- Are there any questions that you still have about any of the exercises on this Probe?

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

LESSON **3-5**

Use Place Value to Round Decimals

Learning Targets

- I can use rounding strategies to round decimals.
- I can explain how to apply rounding strategies to decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.4** Use place value understanding to round decimals to any place.

Math Practices and Processes

MPP Attend to precision.

MPP Look for and express regualrity in repeated reasoning.

Vocabulary

Math Terms	Academic Terms
round	prove
estimate	variation

Materials

The materials may be for any part of the lesson.

- number cubes
- *Number Cards 0–10* Teaching Resource

Focus

Content Objectives	Language Objectives	SEL Objective
• Students round decimals to any place value position. • Students identify situations that call for rounding decimals and determine the place to which to round.	• Students identify place values to the nearest whole and tenths place using *about*. • In order to support optimizing output, ELs will participate in MLR5: Co-Craft Questions and Problems.	• Students demonstrate thoughtful reflection through identifying the causes of challenges and successes while completing a mathematical task.

Coherence

Previous	Now	Next
• Students used place value understanding to round multi-digit whole numbers to any place. (Grade 4) • Students applied their understanding of decimals to compare decimals. (Unit 3)	• Students use place value understanding to round decimals to any place.	• Students add and subtract decimals. (Unit 4)

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students learn that rounding decimals can make them easier to understand and use to solve problems.	• Students build proficiency with rounding decimals using a place value.	• Students apply their understanding of rounding decimals based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Find the Pattern, Make a Pattern 5–7 min

Build Fluency Students build number sense as they determine the pattern and find missing terms. Students then create a new sequence that follows the pattern but uses different numbers.

These prompts encourage students to talk about their reasoning:

- *How do you know your pattern works?*
- *How did you choose your numbers for the new pattern?*
- *Will other numbers fit into this pattern? Explain.*

Launch 5–7 min

Sense-Making Routine

Purpose Students share thoughts on estimated cost of popcorn.

Notice & Wonder™

- What do you notice?
- What do you wonder?

Teaching Tip You may want to encourage other students to repeat other's ideas by asking *Can you repeat what they just said in your own words?*

ETP Pose Purposeful Questions

The questions that follow are not intended to be asked in the sequence presented. They are meant to help advance students' thinking about how to round decimal numbers and are based on possible comments and questions students may make during the share out.

- Why do you think they are using the word *about*?
- What do you think the cost of the popcorn might be?

Math is... Mindset

- What was challenging for you? What have you enjoyed?

SEL Responsible Decision-Making: Reflection

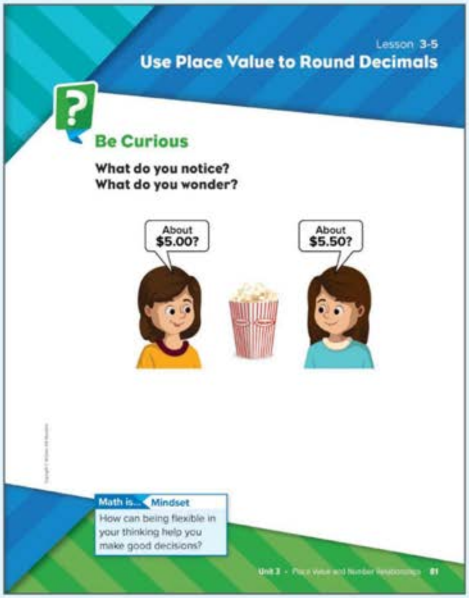
After working through the Notice & Wonder routine, allow students time to thoughtfully reflect on their work. Invite them to think about what may have been challenging as well as the ways in which they were successful and why. Encourage students to also consider what parts of the Notice & Wonder routine that they enjoyed and why.

Transition to Explore & Develop

Ask questions that focus students' attention on thinking about how to round decimal numbers.

ETP Establish Goals to Focus Learning

- Let's think about how to round decimal numbers.



Lesson 3-5

Use Place Value to Round Decimals

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

How can being flexible in your thinking help you make good decisions?

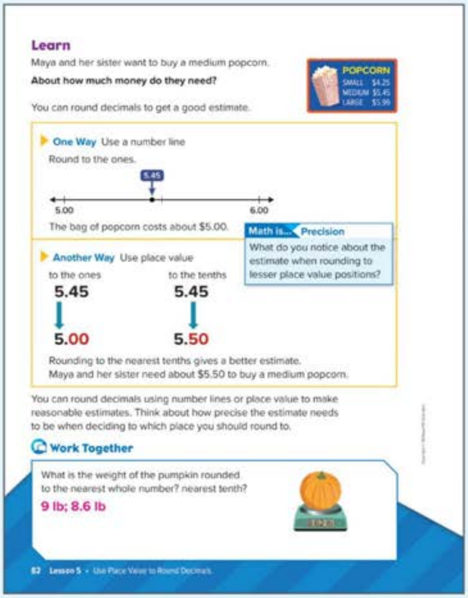
Unit 3 • Place Value and Number Relationships 81

Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

Maya and her sister want to buy a medium popcorn.

About how much money do they need?

You can round decimals to get a good estimate.

POPCORN
SMALL $4.25
MEDIUM $5.45
LARGE $5.99

One Way Use a number line

Round to the ones.

The bag of popcorn costs about $5.00.

Math is... Precision

What do you notice about the estimate when rounding to lesser place value positions?

Another Way Use place value

to the ones

5.45 → 5.00

to the tenths

5.45 → 5.50

Rounding to the nearest tenths gives a better estimate.
Maya and her sister need about $5.50 to buy a medium popcorn.

You can round decimals using number lines or place value to make reasonable estimates. Think about how precise the estimate needs to be when deciding to which place you should round to.

Work Together

What is the weight of the pumpkin rounded to the nearest whole number? nearest tenth?

9 lb; 8.6 lb

82 Lesson 5 • Use Place Value to Round Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- How have you rounded whole numbers in the past?
- Based on what you know, can you make a conjecture about how to round decimal numbers? Explain how you would do it and why you think it would work.
- What tools do you think would help you round decimal numbers? Explain why you think they would help.

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Co-Craft Questions and Problems

Have pairs co-create a problem similar to the one on the student page. Have them work together to solve their problem and then trade their problem with another pair.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How is rounding decimals based on place value the same as rounding whole numbers based on place value?

Key Takeaway

- Rounding decimals to any place follows the same process as rounding multi-digit numbers.

Work Together

Students round a decimal number to the ones and tenths places. Students can work on the activity in pairs before sharing their work.

Common Misconception Students may use front-end estimation to round to the nearest one by ignoring the decimal part of 8.62 and finding 8. That is a reasonable estimate, but it is not the process of rounding.

LOM Language of Math

Estimate and *round* are two different things. An estimate is a reasonable guess. Estimates of the weight of an 18.62 pound pumpkin could be *about 18 pounds* (front-end), *about 19 pounds* (rounding to the ones place), or *about 20 pounds* (rounding to the tens place). Even *about 15 pounds* is a reasonable estimate. Rounding is a very specific process. 18.62 rounded to the nearest whole number is exactly 19.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students look for patterns when rounding decimals.

Material: *Number Cards 0–10* Teaching Resource

Directions: Using only the digits 0–9, each student selects one card to create a decimal number between 4 and 5. Students will sort their decimals into two categories; decimals that are closer to 4 and decimals that are closer to 5.

ETP Implement Tasks that Support Reasoning and Problem Solving

- What strategies did you use to determine whether your decimal number was closer to 4 or closer to 5? Will it always work?
- What generalizations can you make about decimal numbers that are closer to 4 than to 5?
- How can you use your generalizations to write rules for rounding decimals?

Math is... Precision

- What language can you use to explain your generalizations to others?

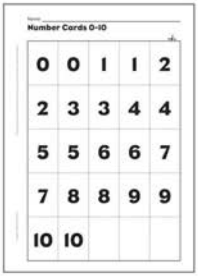
Students are thinking about precise language when explaining their reasoning.

Activity Debrief: Have students look for patterns of decimals that are closer to 4 and decimals that are closer to 5. Discuss methods for rounding decimals.

Have students revisit the Pose the Problem question and discuss answers.

- About how much money do they need?

The PDF of the Teaching Resource is available in the Digital Teacher Center.



Name

Number Cards 0-10

0	0	1	1	2
2	3	3	4	4
5	5	6	6	7
7	8	8	9	9
10	10			

Guided Exploration

Students extend their understanding of rounding whole numbers using place value to decimal numbers.

ETP Facilitate Meaningful Discourse

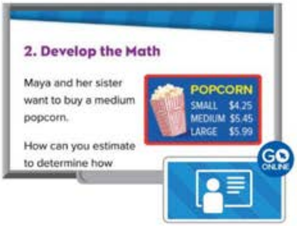
- **Think About It:** What are some tools and strategies you used to help round whole numbers?
- **Think About It:** What if the price of the medium popcorn was $5.65, would you round to $5.00 or $6.00?
- **Think About It:** Is $5.50 a useful estimate?

Have students explain why $5.00 is a good estimate, even though it is not useful for this problem.

Math is... Precision

- What do you notice about the estimate when rounding to lesser place value positions?

Students are thinking about the degree of precision appropriate for a problem context.



2. Develop the Math

Maya and her sister want to buy a medium popcorn.

How can you estimate to determine how

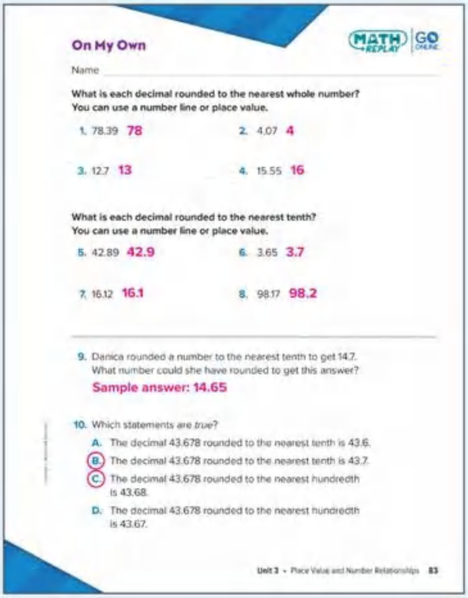
EL English Learner Scaffolds

Entering/Emerging Support students in their comprehension of the word *about* as it is used when estimating. Put $4.65 on the table. Say, *I'm going to give an estimate. This is about $5.00.* Then count the money. Say *This is $4.65. That's close to, or about, $5.00.* Repeat the task again with a new amount, giving both the estimated amount using the word *about,* and the actual amount. Ask students, *Which number is the estimate?*

Developing/Expanding Support students in their comprehension of the word *about* as it is used in estimating. Put $4.65 on the table. Say *I'm going to give an estimate. This is about $5.00.* Then count the money. Say *This is $4.65. That's close to, or about, $5.00.* Repeat the task again with a new amount, giving both the estimated amount using the word *about*, and the actual amount. Ask students which number is the estimate and to explain how they know. Provide sentence frames to students who need more prompting or support.

Bridging/Reaching To support students in using the word *about* when expressing an estimate. Ask students to talk about similar-meaning words that they may have already learned in the past that are appropriate for both math and everyday language. Examples may include *approximately, not exactly, close to,* and *around.*

Practice & Reflect 10 min



On My Own

Name

What is each decimal rounded to the nearest whole number? You can use a number line or place value.

1. 78.39 **78**
2. 4.07 **4**
3. 12.7 **13**
4. 15.55 **16**

What is each decimal rounded to the nearest tenth? You can use a number line or place value.

5. 42.89 **42.9**
6. 3.65 **3.7**
7. 16.12 **16.1**
8. 98.17 **98.2**

9. Danica rounded a number to the nearest tenth to get 14.7. What number could she have rounded to get this answer?

Sample answer: 14.65

10. Which statements are *true*?

A. The decimal 43.678 rounded to the nearest tenth is 43.6.
[✓ B.] The decimal 43.678 rounded to the nearest tenth is 43.7.
[✓ C.] The decimal 43.678 rounded to the nearest hundredth is 43.68.
D. The decimal 43.678 rounded to the nearest hundredth is 43.67.

Unit 3 • Place Value and Number Relationships 83

11. The masses of five different dogs are shown. Round each mass to the nearest whole number.

23; 25; 27; 26; 27

12. **STEM Connection** The mass of the sun takes up about 99.86% of the mass of our solar system. What is 99.86 rounded to the nearest tenth?

99.9

13. Which of the following numbers are closer to 100? Which are closer to 99?

99.03 99.87 99.49 99.27 99.72

99.87, 99.72 are closer to 100; 99.03, 99.49, 99.27 are closer to 99

14. **Extend Your Thinking** The price of a container of orange juice, rounded to the nearest one is $3.00. Between what two amounts could the actual price be?

Between $2.50 and $3.49

Reflect

How is rounding decimals similar to rounding whole numbers?

Answers may vary.

Math is... Mindset

How has being flexible in your thinking helped you make good decisions?

84 Lesson 5 • Use Place Value to Round Decimals

Practice

ETP Build Fluency from Understanding

Common Error: Exercises 5–8 Students may incorrectly identify the range in which the decimal numbers fall on a number line. Writing the decimal in expanded form and focusing on the value of the digit in the tenths place can help students identify the lesser end point of the range.

Item Analysis

Item	DOK	Rigor
1–8	2	Procedural Skill & Fluency
9–10	3	Conceptual Understanding
11–12	3	Application
13	3	Conceptual Understanding
14	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How is rounding decimals similar to rounding whole numbers?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What have you done well today? What did you do that helped you?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use rounding strategies to round decimals.
- I can explain how to apply rounding strategies to decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1–2	1	Round decimals	5.NBT.A.4
3	2	Round decimals	5.NBT.A.4
4–7	2	Round decimals	5.NBT.A.4
8	2	Round decimals	5.NBT.A.4

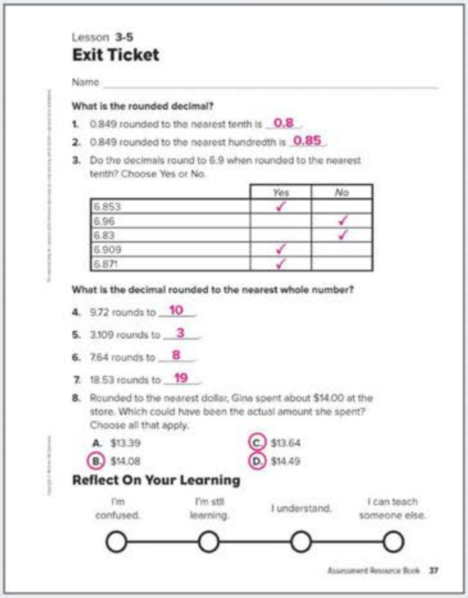
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
8 of 8	Additional Practice or any of the Ⓑ or Ⓔ activities
7 of 8	*Take Another Look* or any of the Ⓑ activities
6 or fewer of 8	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 3-5

Exit Ticket

Name

What is the rounded decimal?

1. 0.849 rounded to the nearest tenth is 0.8
2. 0.849 rounded to the nearest hundredth is 0.85
3. Do the decimals round to 6.9 when rounded to the nearest tenth? Choose Yes or No.

	Yes	No
6.853	✓	
6.96		✓
6.83		✓
6.909	✓	
6.871	✓	

What is the decimal rounded to the nearest whole number?

4. 9.72 rounds to 10
5. 3.109 rounds to 3
6. 7.64 rounds to 8
7. 18.53 rounds to 19
8. Rounded to the nearest dollar, Gina spent about $14.00 at the store. Which could have been the actual amount she spent? Choose all that apply.

A. $13.39
[✓ B.] $14.08
[✓ C.] $13.64
[✓ D.] $14.49

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

Assessment Resource Book 37

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

On a Roll!

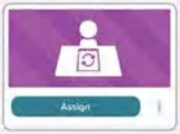
Work with students in pairs. Have students roll a number cube three times to create a number. The first digit rolled goes in the ones place, the second digit goes in the tenths place, and the third digit goes in the hundredths place. Have students round the number to the nearest whole number and to the nearest tenth. Make sure students recognize that the process for rounding decimals is the same as the process for rounding whole numbers. Repeat for other rolls.

GO ONLINE

Take Another Look Lessons

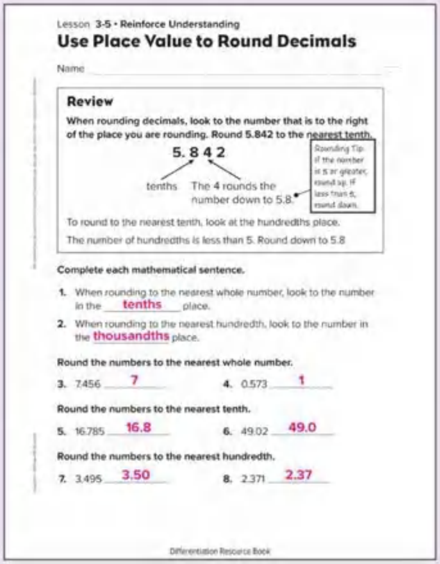
Assign the interactive lessons to reinforce targeted skills.

- Round Decimals to Nearest Whole > 1
- Round Decimals to Nearest Tenth > 1
- Round Decimals to Nearest Hundredth



INDEPENDENT WORK

Differentiation Resource Book, p. 19



Lesson **3-5 • Reinforce Understanding**

Use Place Value to Round Decimals

Name ____________________

Review

When rounding decimals, look to the number that is to the right of the place you are rounding. Round 5.842 to the nearest tenth.

5. 8 4 2

tenths

The 4 rounds the number down to 5.8.

Rounding Tip: If the number is 5 or greater, round up. If less than 5, round down.

To round to the nearest tenth, look at the hundredths place.

The number of hundredths is less than 5. Round down to 5.8

Complete each mathematical sentence.

1. When rounding to the nearest whole number, look to the number in the __tenths__ place.
2. When rounding to the nearest hundredth, look to the number in the __thousandths__ place.

Round the numbers to the nearest whole number.

3. 7.456 __7__
4. 0.573 __1__

Round the numbers to the nearest tenth.

5. 16.785 __16.8__
6. 49.02 __49.0__

Round the numbers to the nearest hundredth.

7. 3.495 __3.50__
8. 2.371 __2.37__

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Rounding Decimals Four in a Row

Students practice rounding decimals.

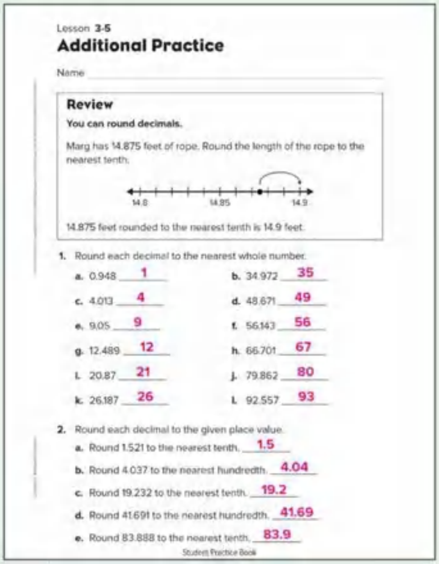
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 19–20



Lesson **3-5**

Additional Practice

Name ____________________

Review

You can round decimals.

Marg has 14.875 feet of rope. Round the length of the rope to the nearest tenth.

14.875 feet rounded to the nearest tenth is 14.9 feet.

1. Round each decimal to the nearest whole number.
   - a. 0.948 __1__
   - b. 34.972 __35__
   - c. 4.013 __4__
   - d. 48.671 __49__
   - e. 9.05 __9__
   - f. 56.143 __56__
   - g. 12.489 __12__
   - h. 66.701 __67__
   - i. 20.87 __21__
   - j. 79.862 __80__
   - k. 26.187 __26__
   - l. 92.557 __93__
2. Round each decimal to the given place value.
   - a. Round 1.521 to the nearest tenth. __1.5__
   - b. Round 4.037 to the nearest hundredth. __4.04__
   - c. Round 19.232 to the nearest tenth. __19.2__
   - d. Round 41.691 to the nearest hundredth. __41.69__
   - e. Round 83.888 to the nearest tenth. __83.9__

Student Practice Book

Own It! Digital Station

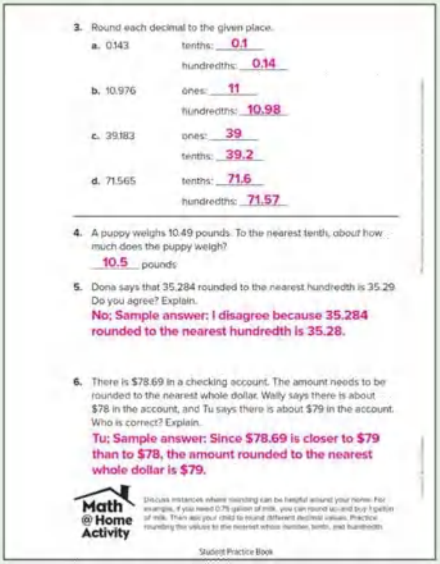
Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting within 1,000,000.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 19–20



3. Round each decimal to the given place.
   - a. 0.143 tenths: 0.1
     hundredths: 0.14
   - b. 10.976 ones: 11
     hundredths: 10.98
   - c. 39.183 ones: 39
     tenths: 39.2
   - d. 71.565 tenths: 71.6
     hundredths: 71.57

4. A puppy weighs 10.49 pounds. To the nearest tenth, about how much does the puppy weigh?
   10.5 pounds

5. Dona says that 35.284 rounded to the nearest hundredth is 35.29. Do you agree? Explain.
   No; Sample answer: I disagree because 35.284 rounded to the nearest hundredth is 35.28.

6. There is $78.69 in a checking account. The amount needs to be rounded to the nearest whole dollar. Wally says there is about $78 in the account, and Tu says there is about $79 in the account. Who is correct? Explain.
   Tu; Sample answer: Since $78.69 is closer to $79 than to $78, the amount rounded to the nearest whole dollar is $79.

Math @Home Activity Discuss instances where rounding can be helpful around your home. For example, if you need 0.75 gallon of milk, you can round up and buy 1 gallon of milk. Then ask your child to round different decimal values. Practice rounding the values to the nearest whole number, tenth, and hundredth.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

State Sales Tax Student investigate and compare state sales tax rates.

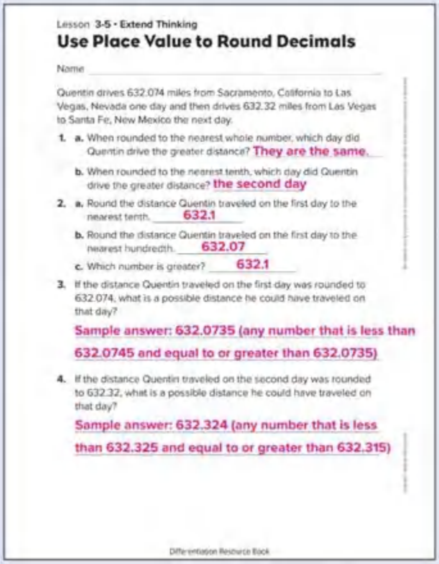
GO ONLINE

STEM Activity

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 20



Lesson 3-5 • Extend Thinking

Use Place Value to Round Decimals

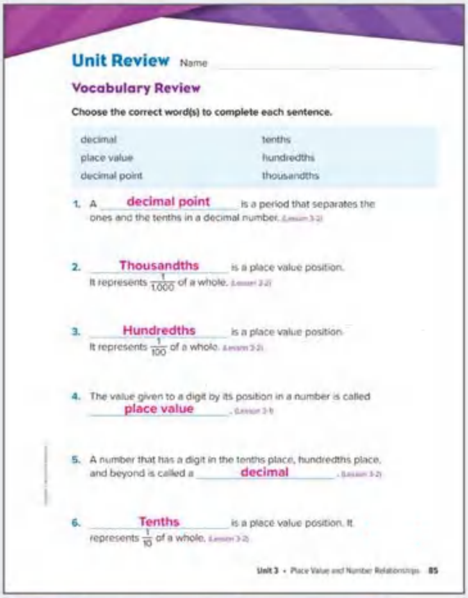
Name ____________________

Quentin drives 632.074 miles from Sacramento, California to Las Vegas, Nevada one day and then drives 632.32 miles from Las Vegas to Santa Fe, New Mexico the next day.

1. a. When rounded to the nearest whole number, which day did Quentin drive the greater distance? They are the same.
   b. When rounded to the nearest tenth, which day did Quentin drive the greater distance? the second day
2. a. Round the distance Quentin traveled on the first day to the nearest tenth. 632.1
   b. Round the distance Quentin traveled on the first day to the nearest hundredth. 632.07
   c. Which number is greater? 632.1
3. If the distance Quentin traveled on the first day was rounded to 632.074, what is a possible distance he could have traveled on that day?
   Sample answer: 632.0735 (any number that is less than 632.0745 and equal to or greater than 632.0735)
4. If the distance Quentin traveled on the second day was rounded to 632.32, what is a possible distance he could have traveled on that day?
   Sample answer: 632.324 (any number that is less than 632.325 and equal to or greater than 632.315)

Differentiation Resource Book

Unit Review



Unit Review Name ____________

Vocabulary Review

Choose the correct word(s) to complete each sentence.

decimal	tenths
place value	hundredths
decimal point	thousandths

1. A **decimal point** is a period that separates the ones and the tenths in a decimal number. (Lesson 3-2)

2. **Thousandths** is a place value position. It represents $\frac{1}{1,000}$ of a whole. (Lesson 3-2)

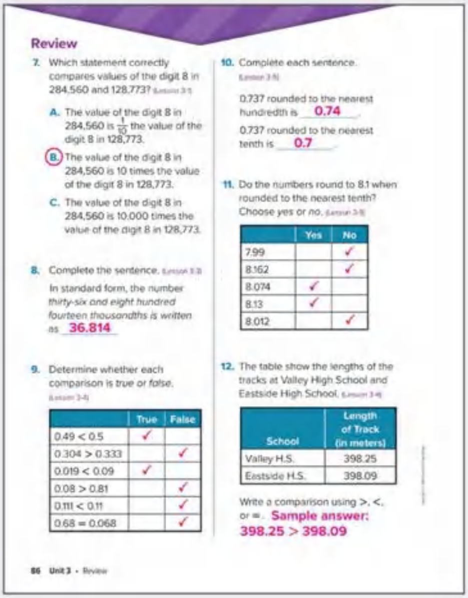
3. **Hundredths** is a place value position. It represents $\frac{1}{100}$ of a whole. (Lesson 3-2)

4. The value given to a digit by its position in a number is called **place value**. (Lesson 3-1)

5. A number that has a digit in the tenths place, hundredths place, and beyond is called a **decimal**. (Lesson 3-2)

6. **Tenths** is a place value position. It represents $\frac{1}{10}$ of a whole. (Lesson 3-2)

Unit 3 • Place Value and Number Relationships 85



Review

7. Which statement correctly compares values of the digit 8 in 284,560 and 128,773? (Lesson 3-1)
   - A. The value of the digit 8 in 284,560 is $\frac{1}{10}$ the value of the digit 8 in 128,773.
   - [✓ B.] The value of the digit 8 in 284,560 is 10 times the value of the digit 8 in 128,773.
   - C. The value of the digit 8 in 284,560 is 10,000 times the value of the digit 8 in 128,773.

8. Complete the sentence. (Lesson 3-3)

   In standard form, the number *thirty-six and eight hundred fourteen thousandths* is written as **36.814**

9. Determine whether each comparison is true or false. (Lesson 3-4)

	True	False
0.49 < 0.5	✓	
0.304 > 0.333		✓
0.019 < 0.09	✓	
0.08 > 0.81		✓
0.111 < 0.11		✓
0.68 = 0.068		✓

10. Complete each sentence. (Lesson 3-5)

    0.737 rounded to the nearest hundredth is **0.74**.

    0.737 rounded to the nearest tenth is **0.7**.

11. Do the numbers round to 8.1 when rounded to the nearest tenth? Choose yes or no. (Lesson 3-5)

	Yes	No
7.99		✓
8.162		✓
8.074	✓	
8.13	✓	
8.012		✓

12. The table show the lengths of the tracks at Valley High School and Eastside High School. (Lesson 3-4)

School	Length of Track (in meters)
Valley H.S.	398.25
Eastside H.S.	398.09

Write a comparison using >, <, or =. **Sample answer: 398.25 > 398.09**

86 Unit 3 • Review

Students can complete the **Unit Review** to prepare for the **Unit Assessment.** Students may complete the Review in their Interactive eBook in the Digital Student Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	3-2
2	3-2
3	3-2
4	3-1
5	3-2
6	3-2

Review

Item Analysis

Item	DOK	Lesson	Standard
7	2	3-1	5.NBT.A.1
8	2	3-3	5.NBT.A.3.a
9	2	3-4	5.NBT.A.3.b
10	2	3-5	5.NBT.A.4
11	2	3-5	5.NBT.A.4
12	2	3-4	5.NBT.A.3.b

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

Item Analysis (continued)

Item	DOK	Lesson	Standard
13	2	3-2	5.NBT.A.1
14	2	3-2	5.NBT.A.1
15	2	3-2	5.NBT.A.1
16	2	3-3	5.NBT.A.3.a
17	2	3-3	5.NBT.A.3.a
18	2	3-3	5.NBT.A.3.a
19	2	3-5	5.NBT.A.4
20	2	3-3	5.NBT.A.3.a

Performance Task

Standards: 5.NBT.A.3.a; 5.NBT.A.3.b

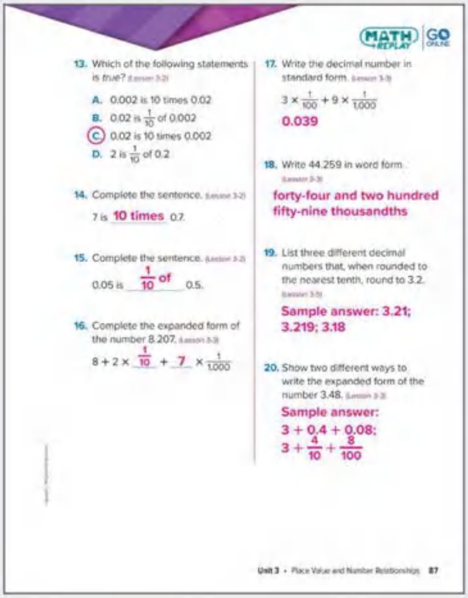
Rubric (4 points)

Part A – 2 points	
2 POINTS	Student's work reflects a proficiency in reading and writing decimals. The student can write a number in word and expanded form.
1 POINT	Students work reflects developing proficiency in reading and writing decimals. The student can write a number in either word or expanded form.
0 POINTS	Student's work reflects a poor understanding in reading and writing decimals. The student cannot write a number in word or expanded form.

Part B – 2 points	
2 POINTS	Student's work reflects a proficiency in comparing decimals. The student's solution is accurate and can explain their answer.
1 POINT	Student's work reflects developing proficiency in comparing decimals. The student's solution may be accurate but may not be able to explain their answer.
0 POINTS	Student's work reflects a weak understanding of comparing decimals. The student's solution is inaccurate, and they are not able explain their answer.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.



MATH REPLAY | GO ONLINE

13. Which of the following statements is *true*? (Lesson 3-2)
    - A. 0.002 is 10 times 0.02
    - B. 0.02 is $\frac{1}{10}$ of 0.002
    - [✓ C.] 0.02 is 10 times 0.002
    - D. 2 is $\frac{1}{10}$ of 0.2

14. Complete the sentence. (Lesson 3-2)
    7 is **10 times** 0.7.

15. Complete the sentence. (Lesson 3-2)
    0.05 is **$\frac{1}{10}$ of** 0.5.

16. Complete the expanded form of the number 8.207. (Lesson 3-3)
    $8 + 2 \times \mathbf{\frac{1}{10}} + \mathbf{7} \times \frac{1}{1{,}000}$

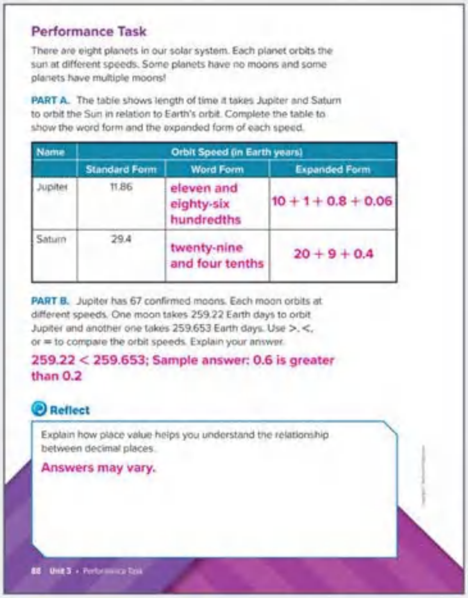
17. Write the decimal number in standard form. (Lesson 3-3)
    $3 \times \frac{1}{100} + 9 \times \frac{1}{1{,}000}$
    0.039

18. Write 44.259 in word form. (Lesson 3-3)
    forty-four and two hundred fifty-nine thousandths

19. List three different decimal numbers that, when rounded to the nearest tenth, round to 3.2. (Lesson 3-5)
    Sample answer: 3.21; 3.219; 3.18

20. Show two different ways to write the expanded form of the number 3.48. (Lesson 3-3)
    Sample answer:
    $3 + 0.4 + 0.08$;
    $3 + \frac{4}{10} + \frac{8}{100}$

Unit 3 • Place Value and Number Relationships 87



Performance Task

There are eight planets in our solar system. Each planet orbits the sun at different speeds. Some planets have no moons and some planets have multiple moons!

PART A. The table shows length of time it takes Jupiter and Saturn to orbit the Sun in relation to Earth's orbit. Complete the table to show the word form and the expanded form of each speed.

Name	Orbit Speed (in Earth years)		
	Standard Form	Word Form	Expanded Form
Jupiter	11.86	**eleven and eighty-six hundredths**	**10 + 1 + 0.8 + 0.06**
Saturn	29.4	**twenty-nine and four tenths**	**20 + 9 + 0.4**

PART B. Jupiter has 67 confirmed moons. Each moon orbits at different speeds. One moon takes 259.22 Earth days to orbit Jupiter and another one takes 259.653 Earth days. Use >, <, or = to compare the orbit speeds. Explain your answer.

259.22 < 259.653; Sample answer: 0.6 is greater than 0.2

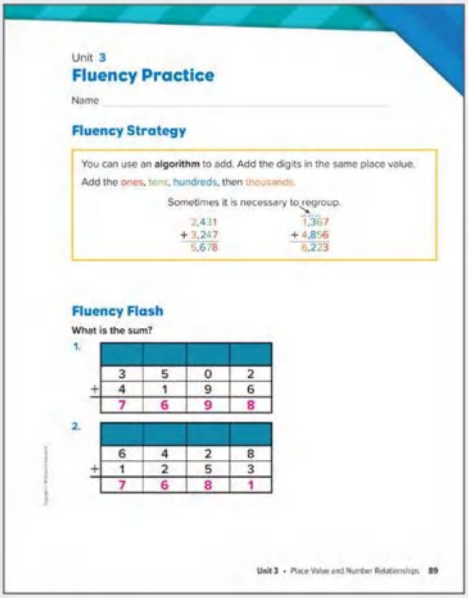
Reflect

Explain how place value helps you understand the relationship between decimal places.

Answers may vary.

88 Unit 3 • Performance Task

Fluency Practice



Unit 3

Fluency Practice

Name

Fluency Strategy

You can use an **algorithm** to add. Add the digits in the same place value.

Add the ones, tens, hundreds, then thousands.

Sometimes it is necessary to regroup.

$$\begin{array}{r} 2{,}431 \\ +\,3{,}247 \\ \hline 5{,}678 \end{array} \qquad \begin{array}{r} 1{,}367 \\ +\,4{,}856 \\ \hline 6{,}223 \end{array}$$

Fluency Flash

What is the sum?

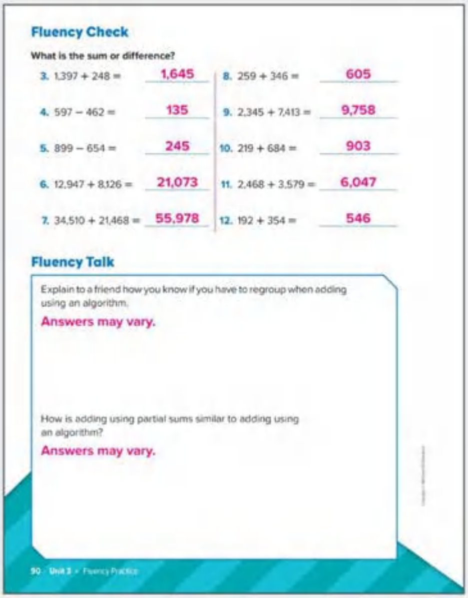
1.

	3	5	0	2
+	4	1	9	6
	7	6	9	8

2.

	6	4	2	8
+	1	2	5	3
	7	6	8	1

Unit 3 • Place Value and Number Relationships 89



Fluency Check

What is the sum or difference?

3. 1,397 + 248 = 1,645
4. 597 − 462 = 135
5. 899 − 654 = 245
6. 12,947 + 8,126 = 21,073
7. 34,510 + 21,468 = 55,978
8. 259 + 346 = 605
9. 2,345 + 7,413 = 9,758
10. 219 + 684 = 903
11. 2,468 + 3,579 = 6,047
12. 192 + 354 = 546

Fluency Talk

Explain to a friend how you know if you have to regroup when adding using an algorithm.

Answers may vary.

How is adding using partial sums similar to adding using an algorithm?

Answers may vary.

90 • Unit 3 • Fluency Practice

Fluency practice helps students develop procedural fluency, that is, the “ability to apply procedures accurately, efficiently, and flexibly.” Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students practice using an algorithm to add.

Fluency Progression

Unit	Skill	Standard
1	Use Partial Sums to Add	4.NBT.B.4
2	Decompose by Place Value to Subtract	4.NBT.B.4
3	**Use an Algorithm to Add**	**4.NBT.B.4**
4	Use an Algorithm to Subtract	4.NBT.B.4
5	Choose a Strategy to Add	4.NBT.B.4
6	Choose a Strategy to Subtract	4.NBT.B.4
7	Multiply by Multiples of 10	5.NBT.B.5
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4
- Add and subtract within 1,000,000.

Grade 5
- Multiply multi-digit whole numbers.

Grade 6
- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Performance Task

A Trip to the Movies

Student draw on their understanding of decimal place value and number relationships. Use the rubric shown to evaluate students' work.

Standards 5.NBT.A.1, 5.NBT.A.3.a, 5.NBT.A.3.b, 5.NBT.A.4

Rubric (10 points)

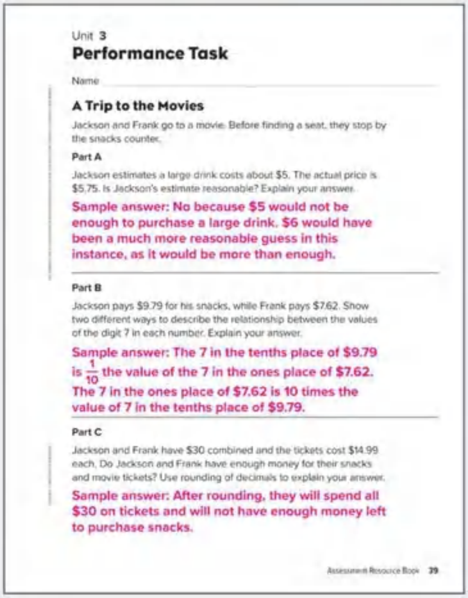
Part A (DOK 2) – 2 points	
2 POINTS	Student's explanation reflects a proficiency with understanding rounding in context.
1 POINT	Student's explanation reflects developing proficiency with understanding rounding products in context.
0 POINTS	Student's explanation reflects a poor understanding of rounding products in context.

Part B (DOK 3) – 2 points	
2 POINTS	Student's work shows proficiency in extending place value to decimals. The student's explanation is reasonable.
1 POINT	Student's work shows developing proficiency in extending place value to decimals. The student's explanation is reasonable.
0 POINTS	Student's work shows weak proficiency in extending place value to decimals. The student's explanation is incorrect.

Part C (DOK 2) – 2 points	
2 POINTS	Student's work identifies correct range of place values for rounding decimals. The student's explanation is reasonable.
1 POINT	Student either identifies correct range of place values for rounding decimals or has a reasonable explanation.
0 POINTS	Student does not identify the correct range of place values for rounding decimals. The student's explanation is not reasonable.

Part D (DOK 2) – 2 points	
2 POINTS	Student's work shows proficiency in generalizing place value. The student's explanation is reasonable.
1 POINT	Student's work shows developing proficiency in generalizing place value. The student's explanation is reasonable.
0 POINTS	Student's work shows weak proficiency in generalizing place value. The student's explanation is incorrect.

Part E (DOK 4) – 2 points	
2 POINTS	Student's explanation shows proficiency in generalizing place value.
1 POINT	Student's explanation shows developing proficiency in generalizing place value.
0 POINTS	Student's explanation does not show proficiency in generalizing place value.



Unit 3

Performance Task

Name ____________________

A Trip to the Movies

Jackson and Frank go to a movie. Before finding a seat, they stop by the snacks counter.

Part A

Jackson estimates a large drink costs about \$5. The actual price is \$5.75. Is Jackson's estimate reasonable? Explain your answer.

Sample answer: No because \$5 would not be enough to purchase a large drink. \$6 would have been a much more reasonable guess in this instance, as it would be more than enough.

Part B

Jackson pays \$9.79 for his snacks, while Frank pays \$7.62. Show two different ways to describe the relationship between the values of the digit 7 in each number. Explain your answer.

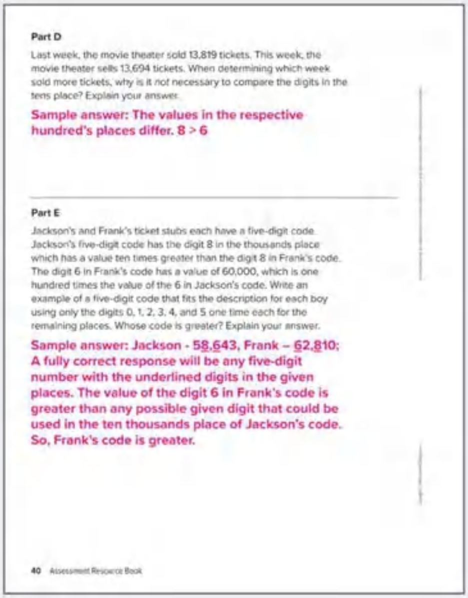
Sample answer: The 7 in the tenths place of \$9.79 is $\frac{1}{10}$ the value of the 7 in the ones place of \$7.62. The 7 in the ones place of \$7.62 is 10 times the value of 7 in the tenths place of \$9.79.

Part C

Jackson and Frank have \$30 combined and the tickets cost \$14.99 each. Do Jackson and Frank have enough money for their snacks and movie tickets? Use rounding of decimals to explain your answer.

Sample answer: After rounding, they will spend all \$30 on tickets and will not have enough money left to purchase snacks.

Assessment Resource Book 39



Part D

Last week, the movie theater sold 13,819 tickets. This week, the movie theater sells 13,694 tickets. When determining which week sold more tickets, why is it *not* necessary to compare the digits in the tens place? Explain your answer.

Sample answer: The values in the respective hundred's places differ. 8 > 6

Part E

Jackson's and Frank's ticket stubs each have a five-digit code. Jackson's five-digit code has the digit 8 in the thousands place which has a value ten times greater than the digit 8 in Frank's code. The digit 6 in Frank's code has a value of 60,000, which is one hundred times the value of the 6 in Jackson's code. Write an example of a five-digit code that fits the description for each boy using only the digits 0, 1, 2, 3, 4, and 5 one time each for the remaining places. Whose code is greater? Explain your answer.

Sample answer: Jackson - $5\underline{8},\underline{6}43$, Frank – $\underline{6}2,\underline{8}10$; A fully correct response will be any five-digit number with the underlined digits in the given places. The value of the digit 6 in Frank's code is greater than any possible given digit that could be used in the ten thousands place of Jackson's code. So, Frank's code is greater.

40 Assessment Resource Book

Unit Assessment

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

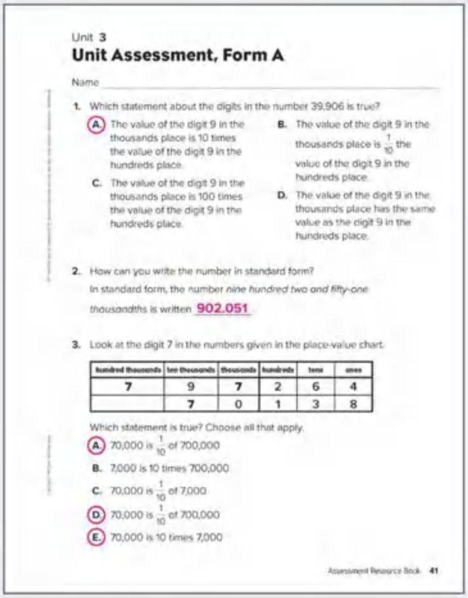
Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	2	1	Digits to the Left and Right	5.NBT.A.1
2	1	3	Standard & Word Form (Large Numbers)	5.NBT.A.3.a
3	2	1	Digits to the Left and Right	5.NBT.A.1
4	2	2	One-Tenth & 10 Times as Much	5.NBT.A.1
5	2	4	Compare Decimal Numbers (1,000ths)	5.NBT.A.3.b
6	2	2	One-Tenth & 10 Times as Much	5.NBT.A.1
7	2	3	Expanded Form of Decimal Powers of Ten	5.NBT.A.3.a
8	2	5	Round Decimals to Nearest Tenth > 1	5.NBT.A.4
9	1	3	Standard & Word Form (Large Numbers)	5.NBT.A.3.a
10	3	4	Compare Decimal Numbers (100ths)	5.NBT.A.3.b
11–12	2	5	Round Decimals to Any Place	5.NBT.A.4
13	1	3	Standard & Word Form (Large Numbers)	5.NBT.A.3.a
14	3	5	Round Decimals to Nearest Whole > 1	5.NBT.A.4
15	3	5	Round Decimals to Nearest Tenth > 1	5.NBT.A.4

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.



Unit 3

Unit Assessment, Form A

Name ______________________

1. Which statement about the digits in the number 39,906 is true?

[✓ A.] The value of the digit 9 in the thousands place is 10 times the value of the digit 9 in the hundreds place.

B. The value of the digit 9 in the thousands place is $\frac{1}{10}$ the value of the digit 9 in the hundreds place.

C. The value of the digit 9 in the thousands place is 100 times the value of the digit 9 in the hundreds place.

D. The value of the digit 9 in the thousands place has the same value as the digit 9 in the hundreds place.

2. How can you write the number in standard form?

In standard form, the number *nine hundred two and fifty-one thousandths* is written **902.051**

3. Look at the digit 7 in the numbers given in the place-value chart.

hundred thousands	ten thousands	thousands	hundreds	tens	ones
7	9	7	2	6	4
	7	0	1	3	8

Which statement is true? Choose all that apply.

[✓ A.] 70,000 is $\frac{1}{10}$ of 700,000

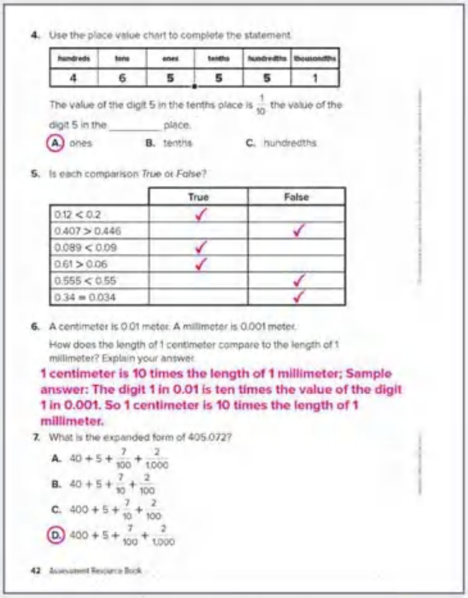
B. 7,000 is 10 times 700,000

C. 70,000 is $\frac{1}{10}$ of 7,000

[✓ D.] 70,000 is $\frac{1}{10}$ of 700,000

[✓ E.] 70,000 is 10 times 7,000

Assessment Resource Book 41



4. Use the place value chart to complete the statement.

hundreds	tens	ones	tenths	hundredths	thousandths
4	6	5	5	5	1

The value of the digit 5 in the tenths place is $\frac{1}{10}$ the value of the digit 5 in the ________ place.

[✓ A.] ones B. tenths C. hundredths

5. Is each comparison *True* or *False*?

	True	False
$0.12 < 0.2$	✓	
$0.407 > 0.446$		✓
$0.089 < 0.09$	✓	
$0.61 > 0.06$	✓	
$0.555 < 0.55$		✓
$0.34 = 0.034$		✓

6. A centimeter is 0.01 meter. A millimeter is 0.001 meter.

How does the length of 1 centimeter compare to the length of 1 millimeter? Explain your answer.

1 centimeter is 10 times the length of 1 millimeter; Sample answer: The digit 1 in 0.01 is ten times the value of the digit 1 in 0.001. So 1 centimeter is 10 times the length of 1 millimeter.

7. What is the expanded form of 405.072?

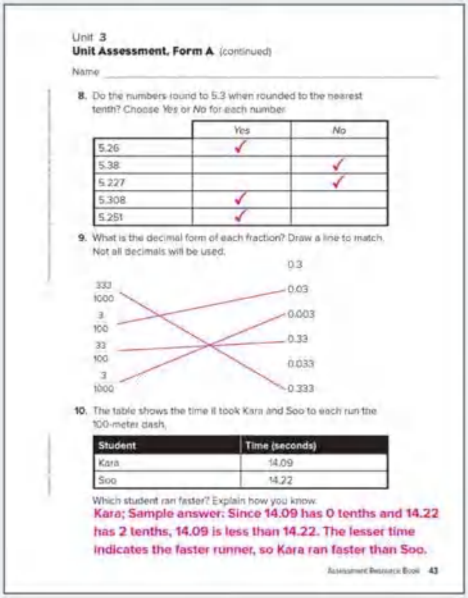
A. $40 + 5 + \frac{7}{100} + \frac{2}{1,000}$

B. $40 + 5 + \frac{7}{10} + \frac{2}{100}$

C. $400 + 5 + \frac{7}{10} + \frac{2}{100}$

[✓ D.] $400 + 5 + \frac{7}{100} + \frac{2}{1,000}$

42 Assessment Resource Book



Unit 3

Unit Assessment, Form A (continued)

Name

8. Do the numbers round to 5.3 when rounded to the nearest tenth? Choose *Yes* or *No* for each number.

	Yes	*No*
5.26	✓	
5.38		✓
5.227		✓
5.308	✓	
5.251	✓	

9. What is the decimal form of each fraction? Draw a line to match. Not all decimals will be used.

$\frac{333}{1000}$ — 0.333

$\frac{3}{100}$ — 0.03

$\frac{33}{100}$ — 0.33

$\frac{3}{1000}$ — 0.003

0.3

0.033

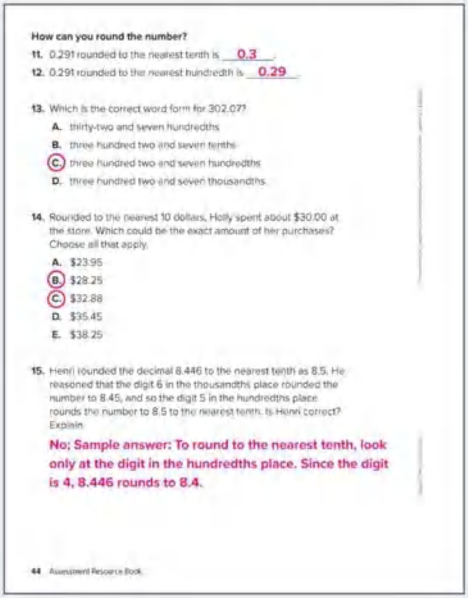
10. The table shows the time it took Kara and Soo to each run the 100-meter dash.

Student	Time (seconds)
Kara	14.09
Soo	14.22

Which student ran faster? Explain how you know.

Kara; Sample answer: Since 14.09 has 0 tenths and 14.22 has 2 tenths, 14.09 is less than 14.22. The lesser time indicates the faster runner, so Kara ran faster than Soo.

Assessment Resource Book 43



How can you round the number?

11. 0.291 rounded to the nearest tenth is **0.3**.

12. 0.291 rounded to the nearest hundredth is **0.29**.

13. Which is the correct word form for 302.07?

- **A.** thirty-two and seven hundredths
- **B.** three hundred two and seven tenths
- [✓ **C.** three hundred two and seven hundredths]
- **D.** three hundred two and seven thousandths

14. Rounded to the nearest 10 dollars, Holly spent about $30.00 at the store. Which could be the exact amount of her purchases? Choose all that apply.

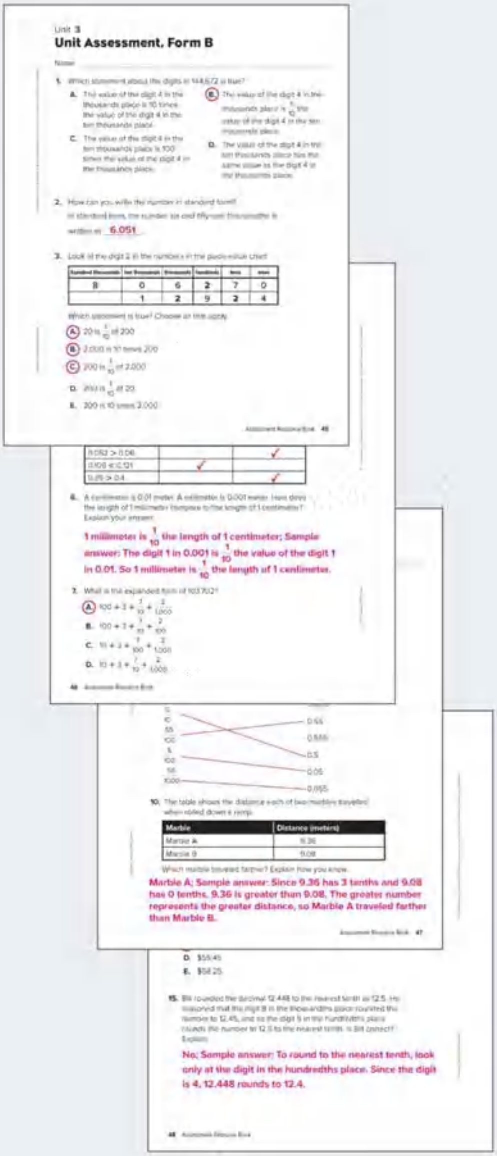
- **A.** $23.95
- [✓ **B.** $28.25]
- [✓ **C.** $32.88]
- **D.** $35.45
- **E.** $38.25

15. Henri rounded the decimal 8.446 to the nearest tenth as 8.5. He reasoned that the digit 6 in the thousandths place rounded the number to 8.45, and so the digit 5 in the hundredths place rounds the number to 8.5 to the nearest tenth. Is Henri correct? Explain.

No; Sample answer: To round to the nearest tenth, look only at the digit in the hundredths place. Since the digit is 4, 8.446 rounds to 8.4.

44 Assessment Resource Book

Form B



Unit 3

Unit Assessment, Form B

Name

2. In standard form, the number six and fifty-one thousandths is written as **6.051**

3. Look at the digit 2 in the numbers in the place-value chart.

Hundred thousands	Ten thousands	Thousands	Hundreds	Tens	Ones
8	0	6	2	7	0
	1	2	9	2	4

6. A centimeter is 0.01 meter. A millimeter is 0.001 meter. How does the length of 1 millimeter compare to the length of 1 centimeter? Explain your answer.

1 millimeter is $\frac{1}{10}$ the length of 1 centimeter; Sample answer: The digit 1 in 0.001 is $\frac{1}{10}$ the value of the digit 1 in 0.01. So 1 millimeter is $\frac{1}{10}$ the length of 1 centimeter.

10. The table shows the distance each of two marbles traveled when rolled down a ramp.

Marble	Distance (meters)
Marble A	9.36
Marble B	9.08

Which marble traveled farther? Explain how you know.

Marble A; Sample answer: Since 9.36 has 3 tenths and 9.08 has 0 tenths, 9.36 is greater than 9.08. The greater number represents the greater distance, so Marble A traveled farther than Marble B.

- **D.** $55.45
- **E.** $58.25

15. Bill rounded the decimal 12.448 to the nearest tenth as 12.5. He reasoned that the digit 8 in the thousandths place rounded the number to 12.45, and so the digit 5 in the hundredths place rounds the number to 12.5 to the nearest tenth. Is Bill correct? Explain.

No; Sample answer: To round to the nearest tenth, look only at the digit in the hundredths place. Since the digit is 4, 12.448 rounds to 12.4.

UNIT 4 PLANNER

Add and Subtract Decimals

PACING: 14 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! How Far? Estimate the width of the classroom using the number of steps.			
4-1 Estimate Sums and Differences of Decimals	Students estimate decimal sums and differences using the same strategies used with whole number sums and differences.	Students discuss estimating sums and differences of decimals while answering *Wh-* questions and using the verb *rounding*.	Students set a focused mathematical goal and make a plan for achieving that goal.
Math Probe Estimating Decimal Sums and Differences Use estimation to determine if the sum of two decimal numbers is greater than or less than a benchmark number.			
4-2 Represent Addition of Decimals	Students use decimal grids to represent addition of decimals with the same number of decimal places.	Students discuss using decimal grids to represent addition of decimals while answering *Wh-* and Yes/No questions.	Students identify and discuss the emotions experienced during math learning.
4-3 Represent Addition of Tenths and Hundredths	Students use decimal grids to represent addition of decimals with different numbers of decimal places.	Students discuss using decimal grids to add decimals while answering *Wh-* questions and using the adjective *similar*.	Students collaborate with peers to complete a mathematical task and offer constructive feedback to the idea posed by others.
4-4 Use Partial Sums to Add Decimals	Students use addition strategies they know, such as partial sums, to add decimals.	Students discuss addition strategies, such as partial sums, to add decimals while answering *Wh-* questions.	Students recognize and work to understand the emotions of others and practice empathetic responses.
4-5 Represent Subtraction of Decimals	Students use decimal grids to represent subtraction of decimals with the same number of decimal places.	Students explain how to use decimal grids to represent subtraction of decimals while answering *Wh-* and using *how much*.	Students collaborate with peers and contribute to group effort to achieve a collective mathematical goal.
4-6 Represent Subtraction of Tenths and Hundredths	Students use decimal grids to represent subtraction of decimals with different numbers of decimal places.	Students discuss using patterns to solve problems while answering *Wh-* questions and using *longer*.	Students break down a situation to identify the problem at hand.
4-7 Strategies to Subtract Decimals	Students can use subtraction strategies they know, such as partial differences, to subtract decimals.	Students discuss using subtraction strategies while answering *Wh-* and Yes/No questions and using adjectives such as *efficient* and *easier*.	Students recognize personal strengths through thoughtful self-reflection.
4-8 Explain Strategies to Add and Subtract Decimals	Students can explain their choice of strategy to solve.	Students discuss their choice of strategy to solve a problem while answering *Wh-* questions and using the adjective *efficient*.	Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing feedback.
Unit Review **Fluency Practice**			
Unit Assessment **Performance Task**			

FOCUS QUESTION:
How do I add and subtract decimals?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER		RIGOR FOCUS	STANDARD
	Math Terms	**Academic Terms**				
4-1	decimal estimate	analyze infer reasonable	• *Decimal Cards* Teaching Resource		Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
Math Probe						
4-2	decimal grid hundredths tenths	benefit drawback evaluate	• number cube • *Tenths and Hundredths* Teaching Resource		Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-3	decimal grid	debate infer	• base-ten blocks • decimal grid • 10 × 10 Teaching Resource	• index cards	Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-4	decompose partial sums	emphasize procedure	• *Decimal Cards* Teaching Resource		Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-5	decimal grid	assert prove	• *Blank Number Lines* Teaching Resource • number cubes	• *Tenths and Hundredths* Teaching Resource	Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-6	decimal grid	accurate evaluate	• *Decimal Grids* Teaching Resource	• 10 × 10 Teaching Resource	Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-7	decompose	analyze prove	• *Blank Open Number Lines* Teaching Resource	• *Decimal Cards* Teaching Resource	Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7
4-8	decomposition partial sums	evaluate procedure	• *Explain and Show Your Strategies* Teaching Resource		Conceptual Understanding Procedural Skill & Fluency	5.NBT.B.7

Unit Overview

Focus

Adding and Subtracting Decimals

As students approach learning to add and subtract decimals, they are equipped with the understanding of whole-number operations and decimal place value. They have experience with using number lines, grids, and other visual representations to help them add and subtract. Students build on this prior knowledge as they develop strategies for adding and subtracting decimals.

The explorations with multiple representations provide students opportunities to visualize and internalize how decimals behave during addition and subtraction. This allows for a much deeper understanding than merely memorizing and applying algorithms.

Students estimate sums and differences by using rounded numbers and compatible numbers. Estimation strategies are taught prior to finding exact results so that students have tools to use to check for reasonableness.

Students learn to find exact sums and differences using multiple representations including tenths and hundredths grids and number lines. Students also learn how to decompose decimals to perform operations on their parts.

Allow students plenty of time to explore the strategies in each lesson. When they ultimately use the standard algorithm for each decimal operation, this learning will give them a foundation of deeper understanding.

Coherence

What Students Have Learned

- **Add and Subtract Whole Numbers** Students fluently added and subtracted multi-digit whole numbers using the standard algorithm. (Grade 4)
- **Understand Decimal Place Value** Students extended place-value understanding to decimals. (Grade 5, Unit 3)

What Students Are Learning

- **Estimate Sums and Differences of Decimals** Students use and describe place-value strategies to estimate sums and differences of decimals.
- **Use Representations to Add and Subtract Decimals** Students use representations including decimal grids and number lines to add and subtract decimals.
- **Use Strategies to Add and Subtract Decimals** Students use strategies including decomposition, partial sums, and partial differences to add and subtract decimals.

What Students Will Learn

- **Multiply Multi-Digit Whole Numbers** Students will fluently multiply multi-digit whole numbers. (Grade 5, Unit 5)
- **Add, Subtract, Multiply, and Divide Multi-Digit Decimals** Students will fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation. (Grade 6)

Rigor

Conceptual Understanding

Students develop understanding of:

- using place-value understanding to estimate sums and differences of decimals;
- using representations to add and subtract decimals;
- using strategies to add and subtract decimals.

Procedural Skill and Fluency

Student build proficiency with:

- procedures for estimating sums and differences of decimals;
- adding and subtracting decimals.

Application

Students apply their knowledge of:

- estimating sums and differences of decimals to solve problems with real-world contexts;
- adding and subtracting decimals to solve problems with real-world contexts;

Application is not a targeted element of rigor for the standards in this unit.

ETP Effective Teaching Practices

Build Procedural Fluency from Conceptual Understanding

It can be tempting to revert to reliance upon memorization of rules and rigid application of those rules. After all, many students have been taught to “line up the decimal points and add or subtract as usual” and succeeded in their math classes.

Students will, however, develop greater fluency and more transferrable skills and understanding when they are allowed and encouraged to explore concepts on a deeper level.

In the early grades, children learn to count, add, and subtract whole numbers by using concrete representations.

Teachers would not expect, for example, for children to learn $2 + 3 = 5$ as a purely abstract concept. Instead, children are presented with a group of two objects and a group of three objects—and are then allowed to count the five objects. Only after this concrete understanding has been established are children guided toward using only the numerical representation of addition within 5.

In the same way, when students work with decimals or fractions, they should be encouraged to explore the fractional parts represented by the numerals and how those parts are taken apart or put together.

When students work with decimals or fractions, too much focus on procedure can lead to lack of conceptual foundation. In contrast, students who focus more on conceptual understanding are often able to articulate procedural explanations based on their own experience. As such, encourage students to use visual representations for decimals whenever possible—even in situations where a problem may be presented with numerals only.

Guide students to continue using estimation for checking their sums and differences, and to maintain their understanding of the magnitude of the numbers they are adding and subtracting. Estimation plays a key role in helping students avoid errors involving place value and the placement of the decimal point.

MPP Math Practices and Processes

Use Appropriate Tools Strategically

This unit provides varied tools and representations to help students understand what is happening when decimals are added and subtracted.

Each student has a unique way of learning and may gravitate toward one or another type of representation or strategy. For example, some students may relate better to decimal grids than to number lines, while others may find it easier to decompose and add than to use a visual representation for each decimal.

Encourage students to gain fluency in using every tool and strategy available to them. Explain that although they may develop preferences, each visual representation may prove valuable— and they will not be able to determine their favorites without experiencing each. In particular, to gain overall fluency, there is value in encouraging students to use tools with which they are *least* comfortable. Students should be encouraged to compare and contrast how each tool shows numbers and operations.

Some suggestions for using tools strategically and choosing appropriate tools include:

- Students work with partners to solve a decimal addition or subtraction problem. Each partner chooses a method and completes the operation. Partners articulate their strategies to one another, including evaluating and comparing tools.
- Students are given a number line that shows a decimal addition or subtraction. Students use the information on the number line to write one or more matching equations.
- Students are given a decimal addition or subtraction problem and are asked to discuss as a class the tools they would choose and explain the reasoning behind their choices.

SEL Social and Emotional Learning

What Skills Will We Develop

- **Self-Management – Goal Setting** (Lesson 4-1): Setting goals can help motivate students to take initiative and stay focused.
- **Self-Awareness – Identify Emotions** (Lesson 4-2): Students who can identify and understand their own feelings and emotions can better manage the reactions to those feelings and emotions.
- **Relationship Skills – Social Engagement** (Lesson 4-3): Engaging with others allows students to develop relationships and establish a sense of security and belonging in the classroom community.
- **Social-Awareness – Empathy** (Lesson 4-4): Students who can empathize with others are more able to build positive relationships.
- **Relationship Skills – Teamwork** (Lesson 4-5): When students work effectively as a team, they establish a stronger learning community.
- **Responsible Decision-Making – Identify Problems** (Lesson 4-6): A key step in problem solving is analyzing information to identify the task.
- **Self-Awareness – Recognize Strengths** (Lesson 4-7): When students recognize their own strengths, they can see themselves as resourceful and may be more willing to attempt to problem solve and help others.
- **Social Awareness – Respect Others** (Lesson 4-8): When students are respectful of one another, they strengthen their class community.

Unit Overview

Language of Math

Mathematical Nouns

Students will be using these key terms in this unit:

- **Estimate** (Lesson 4-1): This is a review term, which students should be familiar with. Ask students to explain how they have used estimation in the past to better understand number relationships and to help check if a solution is reasonable.
- **Round** (Lesson 4-1): Students have used this term throughout previous grades. In the context of estimation, students *round* decimals to the nearest whole number. Students should recognize the difference between rounding and using compatible numbers.
- **Decompose addends** (Lesson 4-4) Students should be familiar with decomposing numbers from earlier grades. Remind them of the meaning of *addends* and how decomposing addends can facilitate finding a sum, especially as they apply this strategy to using partial sums in decimal addition.

Math Language Development

A Focus on Estimation Vocabulary

Help students identify the methods and steps they use in estimation.

Ask students to discuss the difference between the words *exact* and *approximation*, and between *determine* and *guess*. Have them use the word *estimate* as a verb in a sentence. Have them use the word *estimate* as a noun and the word *about* in a sentence. Also have them use the words *calculate* and *exactly* in a sentence.

Guide students to articulate that estimating enables us to quickly determine a "ballpark" result that is close to the actual answer. Students should explain why different estimation strategies may produce different estimates that are all reasonable.

Students may be familiar with the expressions *wild guess* and *educated guess*. Explain that estimation involves using a sound strategy to make an educated guess whereas a wild guess generally does not involve a strategy that would produce a reasonable result.

This module includes other terminology that refines students' understanding of estimation.

Students have used the term *benchmark* before. Encourage them to think of benchmarks in concrete terms: markings on a measurement line with which they can compare other numbers.

The terms *round, halfway point,* and *target number* should need little explanation, but help students attend to their meaning and use them in sentences when describing an estimation process.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to adding and subtracting decimals. Because many of the words (weight, cost, lengths, farther) and phrases (take up, how far, how much more, the difference) used in this section are likely unfamiliar or unknown, students are supported in understanding and using these words so that the instruction is more accessible.

Lesson 4-1 – *take up*

Lesson 4-2 – *how far*

Lesson 4-3 – *weight, lb.*

Lesson 4-4 – *cost (n)*

Lesson 4-5 – *how much more*

Lesson 4-6 – *lengths*

Lesson 4-7 – *the difference*

Lesson 4-8 – *farther*

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

About How Much?

Purpose: Build estimating skills.

Overview: Students estimate the value of expressions (with operations) shown, explaining their strategies and thinking. The teacher records students' estimates, then reveals the value of the expression. Students analyze the estimates and discuss which are closest to the actual value of the expression.

Would You Rather?

Purpose: Build flexibility with number sense and mental math operations; enhance decision-making.

Overview: Students choose between two options, both of which require mental computation. Students explain their choice and their rationale for their choice.

Which Benchmark Is It Closest To?

Purpose: Enhance rounding and reasoning skills.

Overview: Students determine to which benchmark the given number is closest and explain their reasoning.

Can You Make the Number?

Purpose: Build flexible thinking and efficiency with operations.

Overview: Students use all the given numbers to build expressions with a value matching the target number. Students can use a range of operations in their expressions. The teacher records students' expressions, then facilitates a discussion about students' expressions.

Sense-Making Routines

Notice & Wonder: What do you notice? What do you wonder? (Lessons 4-1, 4-5, 4-6) In Lesson 4-1, students notice and wonder about the relationship between different amounts of data storage on a cell phone. The prompt for Lesson 4-5 has students noticing and wondering about relating pixel art on a decimal grid to decimals. In Lesson 4-6, students notice and wonder about what decimals represent and the similarities and differences between decimals with a different number of decimal places.

Numberless Word Problem (Lessons 4-2, 4-8) In Lesson 4-2, students discuss and share their thoughts about a map and the numbers included on a map. In Lesson 4-8, students think about the strategies and operations they can use to solve the problem.

Notice & Wonder: How are they the same? How are they different? (Lesson 4-3) Students consider the same decimal represented as tenths and as hundredths on grids. The decimal grids give students the opportunity to visualize tenths and hundredths on concrete models before they use the decimal grids to add them in the lesson.

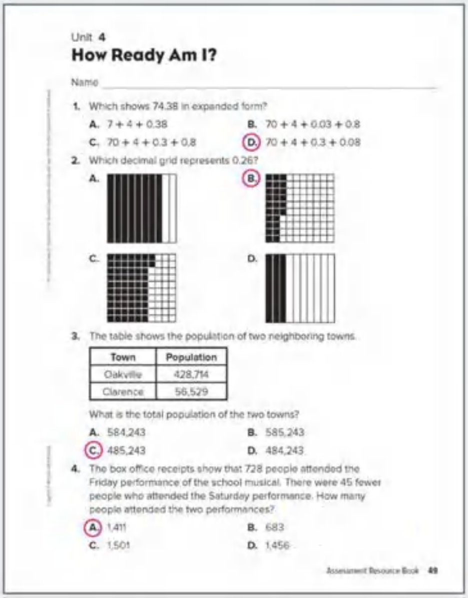
Which Doesn't Belong? (Lessons 4-4, 4-7) In Lesson 4-4, students think about the meaning of decimals and ways to represent decimals. In Lesson 4-7, students look for connections among whole-number addition and subtraction equations.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. For more information on the Math Language Routines, see the Appendix.

- Lesson 4-1 – Students participate in MLR8: Discussion Supports.
- Lesson 4-2 – Students participate in MLR1: Stronger and Clearer Each Time.
- Lesson 4-3 – Students participate in MLR2: Collect and Display.
- Lesson 4-4 – Students participate in MLR7: Compare and Connect.
- Lesson 4-5 – Students participate in MLR4: Information Gap.
- Lesson 4-6 – Students participate in MLR3: Critique, Correct, and Clarify.
- Lesson 4-7 – Students participate in MLR7: Compare and Connect.
- Lesson 4-8 – Students participate in MLR5: Co-Craft Questions and Problems.

Readiness Diagnostic



Unit 4

How Ready Am I?

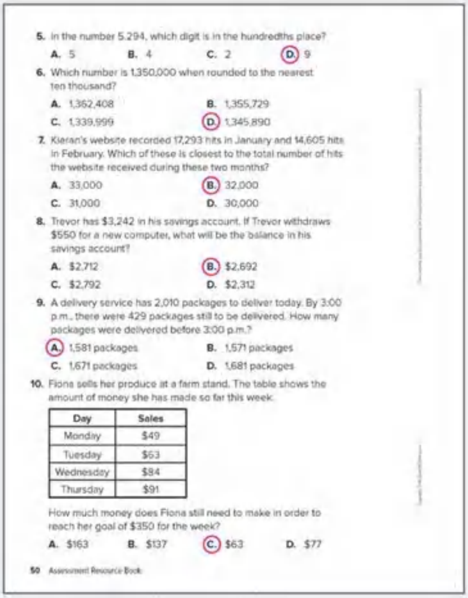
Name ____________________

1. Which shows 74.38 in expanded form?
   - A. $7 + 4 + 0.38$
   - B. $70 + 4 + 0.03 + 0.8$
   - C. $70 + 4 + 0.3 + 0.8$
   - [✓ D.] $70 + 4 + 0.3 + 0.08$
2. Which decimal grid represents 0.26?
   - A.
   - [✓ B.]
   - C.
   - D.
3. The table shows the population of two neighboring towns.

Town	Population
Oakville	428,714
Clarence	56,529

   What is the total population of the two towns?
   - A. 584,243
   - B. 585,243
   - [✓ C.] 485,243
   - D. 484,243
4. The box office receipts show that 728 people attended the Friday performance of the school musical. There were 45 fewer people who attended the Saturday performance. How many people attended the two performances?
   - [✓ A.] 1,411
   - B. 683
   - C. 1,501
   - D. 1,456

Assessment Resource Book 49



5. In the number 5.294, which digit is in the hundredths place?
   - A. 5
   - B. 4
   - C. 2
   - [✓ D.] 9
6. Which number is 1,350,000 when rounded to the nearest ten thousand?
   - A. 1,362,408
   - B. 1,355,729
   - C. 1,339,999
   - [✓ D.] 1,345,890
7. Kieran's website recorded 17,293 hits in January and 14,605 hits in February. Which of these is closest to the total number of hits the website received during these two months?
   - A. 33,000
   - [✓ B.] 32,000
   - C. 31,000
   - D. 30,000
8. Trevor has $3,242 in his savings account. If Trevor withdraws $550 for a new computer, what will be the balance in his savings account?
   - A. $2,712
   - [✓ B.] $2,692
   - C. $2,792
   - D. $2,312
9. A delivery service has 2,010 packages to deliver today. By 3:00 p.m., there were 429 packages still to be delivered. How many packages were delivered before 3:00 p.m.?
   - [✓ A.] 1,581 packages
   - B. 1,571 packages
   - C. 1,671 packages
   - D. 1,681 packages
10. Fiona sells her produce at a farm stand. The table shows the amount of money she has made so far this week.

Day	Sales
Monday	$49
Tuesday	$63
Wednesday	$84
Thursday	$91

   How much money does Fiona still need to make in order to reach her goal of $350 for the week?
   - A. $163
   - B. $137
   - [✓ C.] $63
   - D. $77

50 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

Targeted Intervention

Use Guided Support intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	1	Write decimals in expanded form	Expanded Form of Decimal Powers of Ten	5.NBT.A.3
2	1	Identify decimal grid representation	Expanded Form of Decimal Powers of Ten	5.NBT.A.3.a
3	2	Add whole numbers to hundred thousands	Add Multi-Digit Numbers	4.NBT.B.4
4	2	Subtraction and addition of whole numbers to thousands	Multi-Step Word Problems with Addition and Subtraction	4.OA.A.3
5	1	Identify place value of a digit	Expanded Form of Decimal Powers of Ten	5.NBT.A.3.a
6	2	Round numbers to ten thousands	Round to Any Place	4.NBT.A.3
7	2	Estimate sums	Reasonableness in One-Step Word Problems	4.OA.A.3
8	2	Subtract whole numbers	Subtract Multi-Digit Numbers	4.NBT.B.4
9	2	Subtract whole numbers	Subtract Multi-Digit Numbers	4.NBT.B.4
10	2	Add and subtract whole numbers	Multi-Step Word Problems with Addition and Subtraction	4.OA.A.3

GO ONLINE

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.

Unit Opener

Focus Question

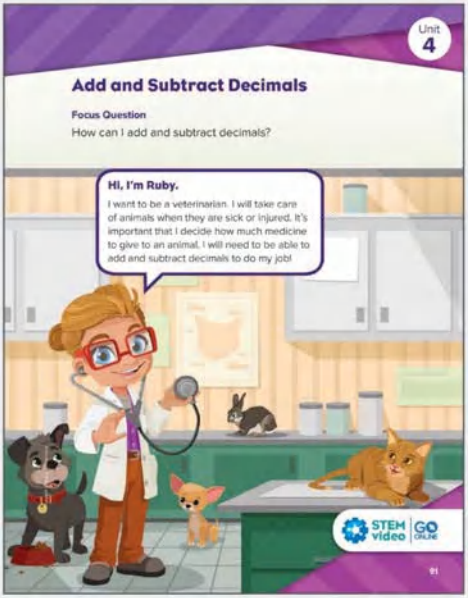
Introduce the Focus Question: *How do I add and subtract decimals?* Ask students to think about what they know about decimals.

- What do you already know about decimals?
- When do you think you might need to add and subtract with decimals?
- What do you think you will be learning in the Unit?

Remind students that at the end of the unit, they will reflect back on what they learned in this unit.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.



Unit 4

Add and Subtract Decimals

Focus Question

How can I add and subtract decimals?

Hi, I'm Ruby.

I want to be a veterinarian. I will take care of animals when they are sick or injured. It's important that I decide how much medicine to give to an animal. I will need to be able to add and subtract decimals to do my job!

STEM in Action

Videos

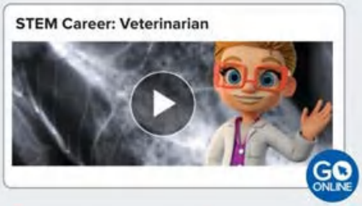
Students can watch the two STEM videos.

STEM Career: Veterinarian Ruby talks about the work of veterinarians.

Ruby Subtracts Decimals Ruby explains how to subtract decimals.

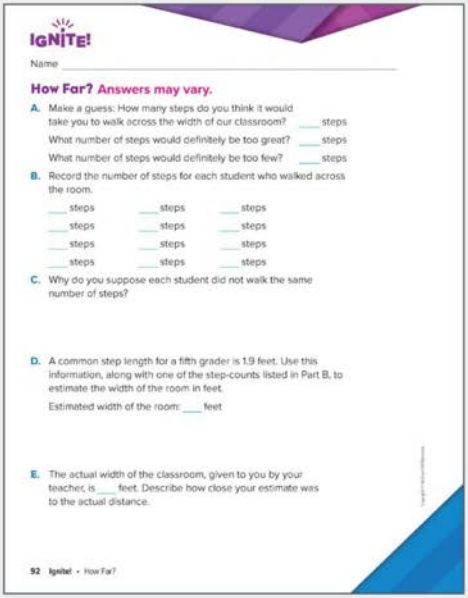
STEM Project Card

Students can complete the STEM Project Card during their workstation time.



STEM Career: Veterinarian

Ruby Subtracts Decimals



IGNITE!

Name ____________________

How Far? Answers may vary.

A. Make a guess: How many steps do you think it would take you to walk across the width of our classroom? ____ steps

What number of steps would definitely be too great? ____ steps

What number of steps would definitely be too few? ____ steps

B. Record the number of steps for each student who walked across the room.

____ steps ____ steps ____ steps

____ steps ____ steps ____ steps

____ steps ____ steps ____ steps

____ steps ____ steps ____ steps

C. Why do you suppose each student did not walk the same number of steps?

D. A common step length for a fifth grader is 1.9 feet. Use this information, along with one of the step-counts listed in Part B, to estimate the width of the room in feet.

Estimated width of the room: ____ feet

E. The actual width of the classroom, given to you by your teacher, is ____ feet. Describe how close your estimate was to the actual distance.

92 Ignite! • How Far?

Ignite!

How Far?

Students review addition, rounding, and estimation. They also apply nonstandard units of measurement and decimals in preparation for their work with adding and subtracting decimals.

1. Before beginning the activity, measure the width of the classroom to the nearest tenth of a foot.
2. Have students observe the four walls of the classroom.
   - How could you measure the width of our classroom without any standard measuring tools such as a ruler or meter stick?
3. Explain that the earliest known units used to measure length were body parts, such as the cubit (the length of the forearm from the elbow to the tip of the middle finger). Explain that the use of an actual foot is how the standard foot came into being. Mention that one unit that people often use to measure distance is the length of their step when they walk (either from heel to heel or from toe to toe).
   - Make a guess as to how many steps it would take for you to walk across the width of the classroom. Record your guess in Part A, and answer the rest of the questions in Part A.
4. Have up to twelve students, representing varying heights, measure the width of the classroom by walking across the room and counting their steps. Record the measurements on the board to the nearest number of complete steps. Have students record the measurements in Part B.
   - What do you notice about the measurements?
5. Have students complete and discuss Part C.
6. Inform students that a common step length for a fifth grader is 1.9 feet. Then have them complete Part D. Have students share their strategies.
   - Why do you suppose our estimates are not all the same?
7. Have students discuss which estimates they prefer. Then reveal the actual width of the classroom and have students complete Part E.

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

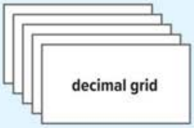
	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with adding and subtracting decimal numbers.	
		• **Estimating Sums and Differences of Decimals Race**	4-1
		• **Represent Addition of Decimals Task Cards**	4-2
		• **Add Tenths and Hundredths Race**	4-3
		• **Decimal Addition Tic Tac Toe**	4-4
		• **Represent Subtraction of Decimals Task Cards**	4-5
		• **Subtract Tenths and Hundredths Race**	4-6
		• **Decimal Subtraction Tic Tac Toe**	4-7
		• **Add or Subtract Decimal Word Problems Race**	4-8
Digital Station	Digital Game	**Batting Practice** Students practice adding and subtracting decimals.	4-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**Let's Get Organized!** Students use decimals to measure and create organizers.	4-8
	Connection Card	**Cost of Living Depends on Where You Live** Students use equations to compare the cost of living in rural towns and urban cities.	4-8
	Real World Card	**Balance a Checkbook** Students research checking accounts and practice balancing a checkbook.	4-7

Additional Resources

Use the resources below to provide additional support for this unit.

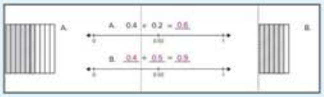
Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the key terms on the front side of the card.



Foldables

Use the unit foldable with Lessons 4-2 and 4-3.



Spiral Review

Students can complete the Spiral Review at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
4-1	5.MD.C.3
4-2	5.MD.C.4
4-3	5.MD.C.5
4-4	5.NBT.A.1
4-5	5.NBT.A.3
4-6	5.NBT.A.4
4-7	5.MD.C.4
4-8	5.NBT.B.7

LESSON **4-1**

Estimate Sums and Differences of Decimals

Learning Targets

- I can estimate sums and differences of decimals.
- I can explain how to estimate sums and differences of decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Use appropriate tools strategically.

MPP Attend to precision.

Vocabulary

Math Terms	Academic Terms
decimal	analyze
estimate	infer
	reasonable

Materials

The materials may be for any part of the lesson.

- *Decimal Cards* Teaching Resource

Focus

Content Objectives	Language Objectives	SEL Objective
• Students estimate sums and differences of decimals using the same strategies used to estimate sums and differences of whole numbers. • Students describe why estimation is useful.	• Students discuss estimating sums and differences of decimals while answering *Wh-* questions and using the verb *rounding* as needed. • To support maximizing cognitive and linguistic meta-awareness, ELs participate in MLR8: Discussion Supports.	• Students set a focused mathematical goal and make a plan for achieving that goal.

Coherence

Previous	Now	Next
• Students fluently added and subtracted multi-digit whole numbers using the standard algorithm (Grade 4). • Students generalized their understanding of place value in decimals (Unit 3).	• Students use place-value strategies to estimate sums and differences of decimals. • Students describe and explain estimation strategies.	• Students use representations to add with decimals and explain their strategies (Unit 4). • Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of decimals and begin to understand operations with decimals by estimating sums and differences.	• Students build fluency with place-value concepts and learn procedures for estimating sums and differences of decimals.	• Students estimate sums and differences of decimals to solve problems with real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine
About How Much?

5–7 min

Build Fluency Students are given three expressions involving subtraction and are asked to estimate each difference.

Remind students that this is a mental activity, and that exact answers are not needed.

These prompts encourage students to talk about their reasoning:

- How did you estimate the differences?
- How else could you estimate the differences?
- Are the calculated answers reasonable? Why or why not?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore various quantities shown in a real-world context.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may want to have students work in pairs as they notice and wonder. This can help build a collaborative classroom culture. It also allows for greater participation among students as they share their thinking with their partners.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' noticing and wondering about estimating sums and differences of decimals and are based on possible comments or questions that students may make during the share out.

- About how many gigabytes are used for photos? Explain your reasoning.
- About how many gigabytes are used for music? Explain your reasoning.
- Which is using more gigabytes, photos or music? Explain your reasoning.
- Is more than 16 gigabytes being used by photos and music? Explain your reasoning.

Math is... Mindset

- What goal do you want to achieve today?

SEL Self-Management: Goal Setting

Before students begin the Notice & Wonder routine, invite them to share or write down one mathematical goal they have for the day. Have students create a plan for how they will work toward achieving their goal. Encourage students to focus their goals around estimating sums and differences of decimals.

Transition to Explore & Develop

Ask questions to get students thinking about how they have used estimation previously. Guide students to think about how estimation might relate to operations with decimals.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about why estimating sums and differences is helpful and what strategies we can use to estimate sums and sifferences of decimals.

Lesson 4-1

Estimate Sums and Differences of Decimals

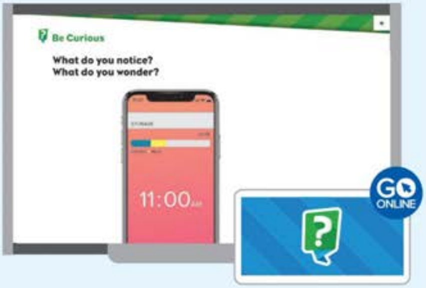
Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

What goal do you want to accomplish today?

Unit 4 • Add and Subtract Decimals 93

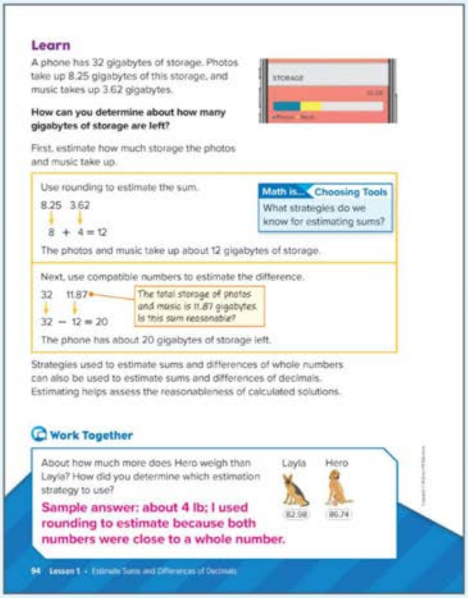


Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

A phone has 32 gigabytes of storage. Photos take up 8.25 gigabytes of this storage, and music takes up 3.62 gigabytes.

How can you determine about how many gigabytes of storage are left?

First, estimate how much storage the photos and music take up.

Use rounding to estimate the sum.

8.25 3.62

8 + 4 = 12

The photos and music take up about 12 gigabytes of storage.

Math is... Choosing Tools
What strategies do we know for estimating sums?

Next, use compatible numbers to estimate the difference.

32 11.87

32 − 12 = 20

The total storage of photos and music is 11.87 gigabytes. Is this sum reasonable?

The phone has about 20 gigabytes of storage left.

Strategies used to estimate sums and differences of whole numbers can also be used to estimate sums and differences of decimals. Estimating helps assess the reasonableness of calculated solutions.

Work Together

About how much more does Hero weigh than Layla? How did you determine which estimation strategy to use?

Sample answer: about 4 lb; I used rounding to estimate because both numbers were close to a whole number.

94 Lesson 1 • Estimate Sums and Differences of Decimals

❶ Pose the Problem

MLR Discussion Supports

As students talk about how they know what's needed to solve the problem, restate statements they make as a question to seek clarification and provide vocabulary or grammar prompts for students who need more guidance.

ETP Pose Purposeful Questions

- Will you need an exact answer or an estimate to solve the problem? Explain how you know.
- Which operations are needed to solve the problem? Explain how you know.

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How can you determine if an answer you calculated is reasonable?
- How is estimating sums and differences of decimals similar to estimating sums and differences of whole numbers?

Key Takeaways

- Estimating sums and differences of decimals helps assess the reasonableness of the calculated solution.
- Strategies used to estimate sums and differences of whole numbers can also be used to estimate sums and differences of decimals.

Work Together

Students work together to think about how to estimate a difference using decimal numbers. After students estimate the difference, have them share and explain the strategies they chose and how they chose them.

Common Error Students often are not sure which place to round when estimating by rounding. Point out that rounding to the nearet one will product a better estimate than rounding to the nearest ten.

LOM Language of Math

Students may not remember common words or phrases used to identify if a problem is asking them to add or subtract. Review words such as all together, in total, combine, and remain. Have students identify what words could be used with addition or subtraction problems.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore estimating sums or differences of decimals.

Material: *Decimal Cards* Teaching Resource

Directions: Students select two decimal cards and write an addition expression. Repeat with new decimal cards until students have 5 addition expressions. Have students order the sums of their addition expressions from least to greatest. Students should use estimation and number sense when ordering the sums. If time permits, have students repeat by ordering subtraction expressions.

Math is... Choosing Tools

- What strategies do you know for estimating sums?

Students are thinking about the strategies they will use to aid and assist them in solving the problem.

ETP Implement Tasks That Promote Reasoning and Problem Solving

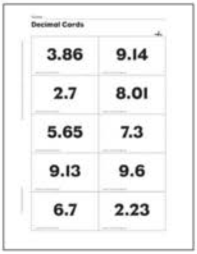
- What strategy did you use to determine whether a sum would be greater than or less than another sum?
- How did you organize your thinking?
- Did you adjust your thinking or strategy after you started? If so, what made you adjust your thinking or strategy?

Activity Debrief: Have students share their addition expressions ordered from least to greatest. Encourage students to challenge their classmates' decisions around ordering their sums. Ask students to share their strategies for estimating the sums so that they were able to order the expressions.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine about how many gigabytes of storage is left?

The PDF of the Teaching Resource is available in the Digital Teacher Center.



Decimal Cards

3.86	9.14
2.7	8.01
5.65	7.3
9.13	9.6
6.7	2.23

Guided Exploration

Students extend strategies they learned for estimating sums and differences of whole numbers to estimating sums and differences of decimals.

ETP Facilitate Meaningful Mathematical Discourse

- What steps do you need to take to solve this problem?
- What operation do you use to find about how much storage the photos and music take up? How do you know?
- Could you have used $3.62 + 8.25 = s$ to represent the amount of storage used by photos and music? Explain why.
- **Think About It:** When would an estimate be more useful than an exact answer?
- Explain why rounding to the nearest tenth would give a more precise estimate than rounding to the nearest whole number.

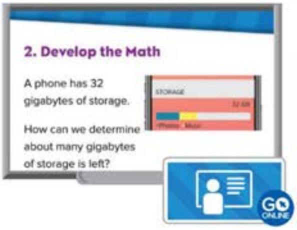
After students have explored estimating the sum by rounding, have students estimate the sum using compatible numbers. Remind students that compatible numbers are numbers that are easy to work with mentally. Have students compare and contrast the estimate by rounding to the estimate by compatible numbers.

- What would be the estimated difference if you used rounding to estimate?

Math is... Choosing Tools

- What strategies do you know for estimating sums?

Students are thinking about the strategies they will use to aid and assist them in solving the problem.



2. Develop the Math

A phone has 32 gigabytes of storage.

How can we determine about many gigabytes of storage is left?

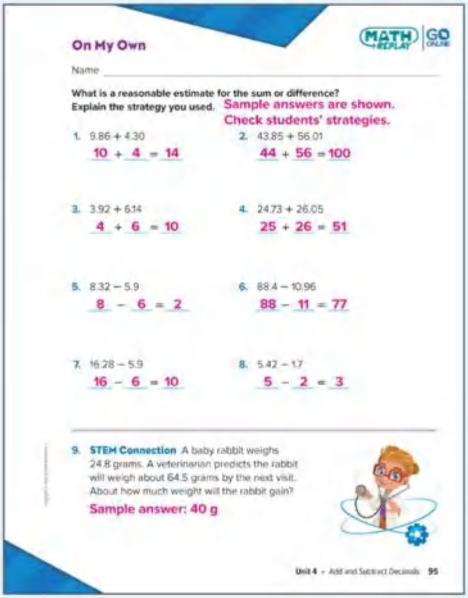
EL English Learner Scaffolds

Entering/Emerging Demonstrate the phrasal verb *take up* using gestures and classroom objects. Point to the desks. Say *The desks take up a lot of space*. Then point to a small object such as a laptop. Say *The laptop doesn't take up a lot of space*. Repeat, pointing to items that take up a lot of space and items that don't. Ask *Does this / Do these take up a lot of space?*

Developing/Expanding Demonstrate the phrasal verb *take up* using gestures and classroom objects. Point to the desks. Say *The desks take up a lot of space*. Then, point to a small object, such as a laptop. Say *The laptop doesn't take up a lot of space*. Repeat once. Then ask students to talk about other classroom objects using *take up*. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students which objects take up the most space and the least space in their desks. Then ask students to express the same idea using *occupy* with *most/least*. Validate and correct answers as necessary and provide sentence prompts for students who may need some extra help.

Practice & Reflect 10 min



On My Own

Name

What is a reasonable estimate for the sum or difference? Explain the strategy you used. Sample answers are shown. Check students' strategies.

1. $9.86 + 4.30$
 $10 + 4 = 14$

2. $43.85 + 56.01$
 $44 + 56 = 100$

3. $3.92 + 6.14$
 $4 + 6 = 10$

4. $24.73 + 26.05$
 $25 + 26 = 51$

5. $8.32 - 5.9$
 $8 - 6 = 2$

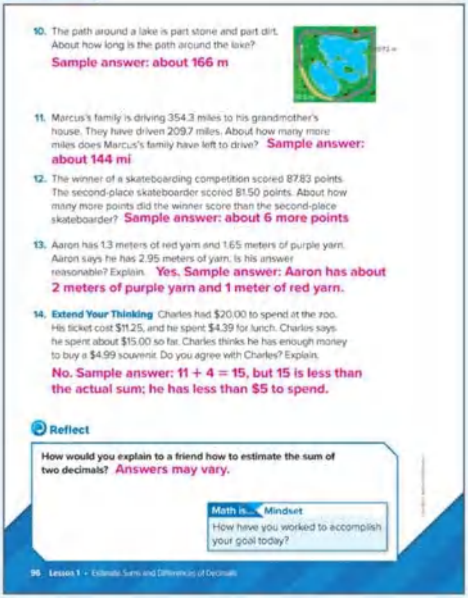
6. $88.4 - 10.96$
 $88 - 11 = 77$

7. $16.28 - 5.9$
 $16 - 6 = 10$

8. $5.42 - 1.7$
 $5 - 2 = 3$

9. **STEM Connection** A baby rabbit weighs 24.8 grams. A veterinarian predicts the rabbit will weigh about 64.5 grams by the next visit. About how much weight will the rabbit gain?
 Sample answer: 40 g

Unit 4 • Add and Subtract Decimals 95



10. The path around a lake is part stone and part dirt. About how long is the path around the lake?
 Sample answer: about 166 m

11. Marcus's family is driving 354.3 miles to his grandmother's house. They have driven 209.7 miles. About how many more miles does Marcus's family have left to drive? Sample answer: about 144 mi

12. The winner of a skateboarding competition scored 87.83 points. The second-place skateboarder scored 81.50 points. About how many more points did the winner score than the second-place skateboarder? Sample answer: about 6 more points

13. Aaron has 1.3 meters of red yarn and 1.65 meters of purple yarn. Aaron says he has 2.95 meters of yarn. Is his answer reasonable? Explain. Yes. Sample answer: Aaron has about 2 meters of purple yarn and 1 meter of red yarn.

14. **Extend Your Thinking** Charles had $20.00 to spend at the zoo. His ticket cost $11.25, and he spent $4.39 for lunch. Charles says he spent about $15.00 so far. Charles thinks he has enough money to buy a $4.99 souvenir. Do you agree with Charles? Explain.
 No. Sample answer: $11 + 4 = 15$, but 15 is less than the actual sum; he has less than $5 to spend.

Reflect

How would you explain to a friend how to estimate the sum of two decimals? Answers may vary.

Math is... Mindset
How have you worked to accomplish your goal today?

96 Lesson 1 • Estimate Sums and Differences of Decimals

Practice

Build Procedural Fluency from Conceptual Understanding

Common Misconception: Exercises 1–8 Students may think there is only one "correct" estimate to these problems. Remind them that their estimates and the estimates of their classmates may, and will, be different since they are based on different estimation strategies.

Item Analysis

Item	DOK	Rigor
1–8	2	Procedural Skill and Fluency
9–13	3	Application
14	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How would you explain to a friend how to estimate the sum of two decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you worked to achieve your goal today?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can estimate sums and differences of decimals.
- I can explain how to estimate sums and differences of decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Estimate difference of decimals	5.NBT.B.7
2	2	Estimate sum of decimals	5.NBT.B.7
3	2	Estimate difference of decimals	5.NBT.B.7
4	3	Estimate sum of decimals	5.NBT.B.7

Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

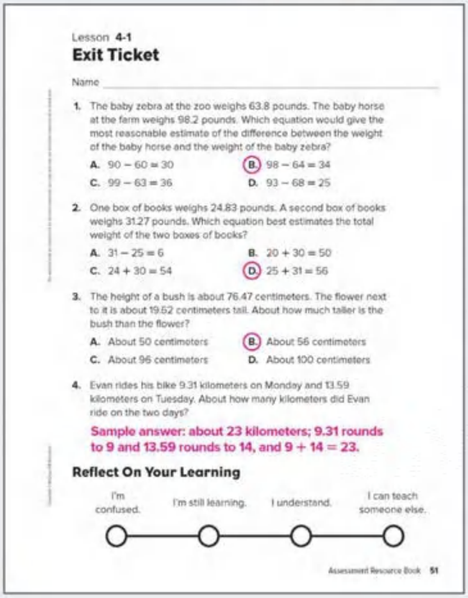
If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

R Reinforce Understanding

B Build Proficiency

E Extend Thinking



Lesson 4-1

Exit Ticket

Name ______

1. The baby zebra at the zoo weighs 63.8 pounds. The baby horse at the farm weighs 98.2 pounds. Which equation would give the most reasonable estimate of the difference between the weight of the baby horse and the weight of the baby zebra?

A. 90 − 60 = 30
[✓ B.] 98 − 64 = 34
C. 99 − 63 = 36
D. 93 − 68 = 25

2. One box of books weighs 24.83 pounds. A second box of books weighs 31.27 pounds. Which equation best estimates the total weight of the two boxes of books?

A. 31 − 25 = 6
B. 20 + 30 = 50
C. 24 + 30 = 54
[✓ D.] 25 + 31 = 56

3. The height of a bush is about 76.47 centimeters. The flower next to it is about 19.52 centimeters tall. About how much taller is the bush than the flower?

A. About 50 centimeters
[✓ B.] About 56 centimeters
C. About 96 centimeters
D. About 100 centimeters

4. Evan rides his bike 9.31 kilometers on Monday and 13.59 kilometers on Tuesday. About how many kilometers did Evan ride on the two days?

Sample answer: about 23 kilometers; 9.31 rounds to 9 and 13.59 rounds to 14, and 9 + 14 = 23.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 51

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

What are the Compatible Numbers?

Provide students with digit cards and calculators. Each student is dealt two cards to create addends in tenths.

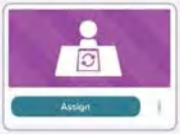
Students use compatible numbers to estimate the sum of their two numbers. If necessary, remind students to look for ways to adjust the numbers to get sums or differences that end in 5 or 10. Students add with a calculator and compare whether the calculated sum is close to their estimated sum. Repeat the activity several times.

GO ONLINE

Take Another Look Lesson

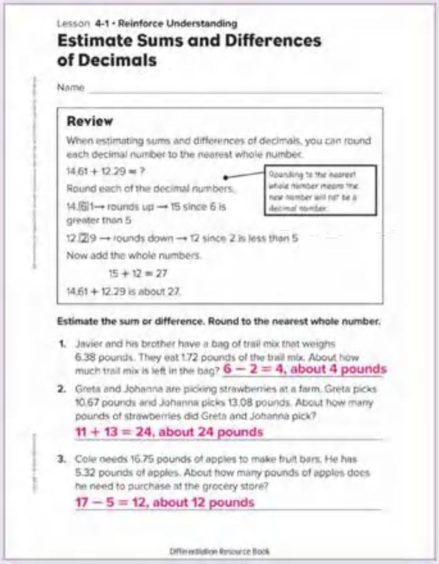
Assign the interactive lesson to reinforce targeted skills.

- Estimate Sums and Differences of Decimals



INDEPENDENT WORK

Differentiation Resource Book, p. 21



Lesson **4-1 • Reinforce Understanding**

Estimate Sums and Differences of Decimals

Name

Review

When estimating sums and differences of decimals, you can round each decimal number to the nearest whole number.

14.61 + 12.29 = ?

Round each of the decimal numbers.

Rounding to the nearest whole number means the new number will not be a decimal number.

14.$\boxed{6}$1 → rounds up → 15 since 6 is greater than 5

12.$\boxed{2}$9 → rounds down → 12 since 2 is less than 5

Now add the whole numbers.

15 + 12 = 27

14.61 + 12.29 is about 27.

Estimate the sum or difference. Round to the nearest whole number.

1. Javier and his brother have a bag of trail mix that weighs 6.38 pounds. They eat 1.72 pounds of the trail mix. About how much trail mix is left in the bag? 6 − 2 = 4, about 4 pounds
2. Greta and Johanna are picking strawberries at a farm. Greta picks 10.67 pounds and Johanna picks 13.08 pounds. About how many pounds of strawberries did Greta and Johanna pick?
11 + 13 = 24, about 24 pounds
3. Cole needs 16.75 pounds of apples to make fruit bars. He has 5.32 pounds of apples. About how many pounds of apples does he need to purchase at the grocery store?
17 − 5 = 12, about 12 pounds

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It Game Station

Estimating Sums and Differences of Decimals Race

Students practice estimating sums and differences of decimals.

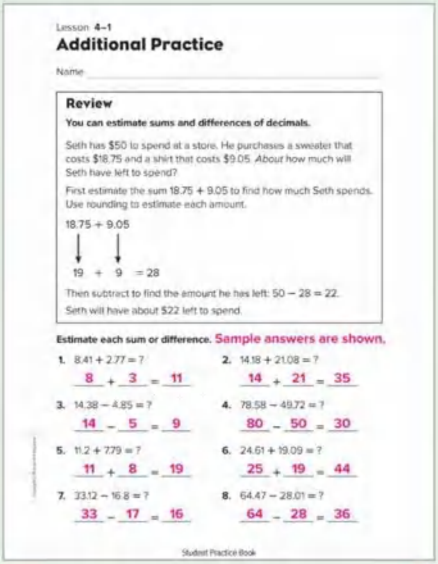
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 21–22



Lesson **4-1**

Additional Practice

Name

Review

You can estimate sums and differences of decimals.

Seth has $50 to spend at a store. He purchases a sweater that costs $18.75 and a shirt that costs $9.05. *About how much will Seth have left to spend?*

First estimate the sum 18.75 + 9.05 to find how much Seth spends. Use rounding to estimate each amount.

$$\begin{array}{ccccc} 18.75 & + & 9.05 & & \\ \downarrow & & \downarrow & & \\ 19 & + & 9 & = & 28 \end{array}$$

Then subtract to find the amount he has left: 50 − 28 = 22.

Seth will have about $22 left to spend.

Estimate each sum or difference. Sample answers are shown.

1. 8.41 + 2.77 = ?
8 + 3 = 11
2. 14.18 + 21.08 = ?
14 + 21 = 35
3. 14.38 − 4.85 = ?
14 − 5 = 9
4. 78.58 − 49.72 = ?
80 − 50 = 30
5. 11.2 + 7.79 = ?
11 + 8 = 19
6. 24.61 + 19.09 = ?
25 + 19 = 44
7. 33.12 − 16.8 = ?
33 − 17 = 16
8. 64.47 − 28.01 = ?
64 − 28 = 36

Student Practice Book

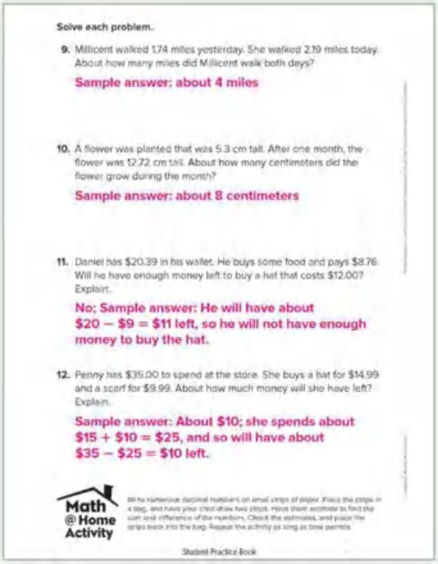
Own It! Digital Station

Build Fluency **Games**
Assign the digital game to develop fluency with adding and subtracting decimals.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 21–22



Solve each problem.

9. Millicent walked 1.74 miles yesterday. She walked 2.19 miles today. About how many miles did Millicent walk both days?
Sample answer: about 4 miles

10. A flower was planted that was 5.3 cm tall. After one month, the flower was 12.72 cm tall. About how many centimeters did the flower grow during the month?
Sample answer: about 8 centimeters

11. Daniel has $20.39 in his wallet. He buys some food and pays $8.76. Will he have enough money left to buy a hat that costs $12.00? Explain.
No; Sample answer: He will have about $20 − $9 = $11 left, so he will not have enough money to buy the hat.

12. Penny has $35.00 to spend at the store. She buys a hat for $14.99 and a scarf for $9.99. About how much money will she have left? Explain.
Sample answer: About $10; she spends about $15 + $10 = $25, and so will have about $35 − $25 = $10 left.

Math @ Home Activity Write numerous decimal numbers on small strips of paper. Place the strips in a bag, and have your child draw two strips. Have them estimate to find the sum and difference of the numbers. Check the estimates, and place the strips back into the bag. Repeat the activity as long as time permits.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Balancing a Checkbook Students research checking accounts and practice balancing a checkbook.

The content of this card has concepts covered later in Lesson 4-7. You may want to assign this card to students ready to explore content covered later in this unit.

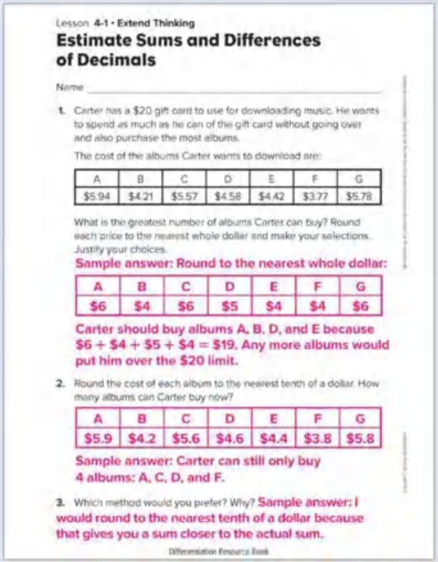
GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 22



Lesson **4-1 • Extend Thinking**

Estimate Sums and Differences of Decimals

Name ____________________

1. Carter has a $20 gift card to use for downloading music. He wants to spend as much as he can of the gift card without going over and also purchase the most albums.

The cost of the albums Carter wants to download are:

A	B	C	D	E	F	G
$5.94	$4.21	$5.57	$4.58	$4.42	$3.77	$5.78

What is the greatest number of albums Carter can buy? Round each price to the nearest whole dollar and make your selections. Justify your choices.
Sample answer: Round to the nearest whole dollar:

A	B	C	D	E	F	G
$6	$4	$6	$5	$4	$4	$6

Carter should buy albums A, B, D, and E because $6 + $4 + $5 + $4 = $19. Any more albums would put him over the $20 limit.

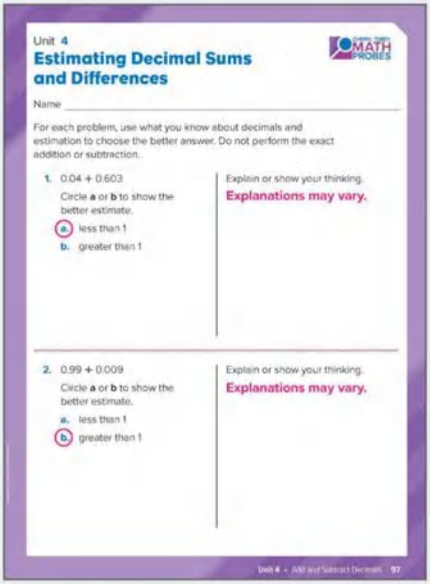
2. Round the cost of each album to the nearest tenth of a dollar. How many albums can Carter buy now?

A	B	C	D	E	F	G
$5.9	$4.2	$5.6	$4.6	$4.4	$3.8	$5.8

Sample answer: Carter can still only buy 4 albums: A, C, D, and F.

3. Which method would you prefer? Why? **Sample answer: I would round to the nearest tenth of a dollar because that gives you a sum closer to the actual sum.**

Differentiation Resource Book



Unit 4

Estimating Decimal Sums and Differences

Name ______________________

For each problem, use what you know about decimals and estimation to choose the better answer. Do not perform the exact addition or subtraction.

1. 0.04 + 0.603

Circle **a** or **b** to show the better estimate.

[✓ **a.**] less than 1

b. greater than 1

Explain or show your thinking.

Explanations may vary.

2. 0.99 + 0.009

Circle **a** or **b** to show the better estimate.

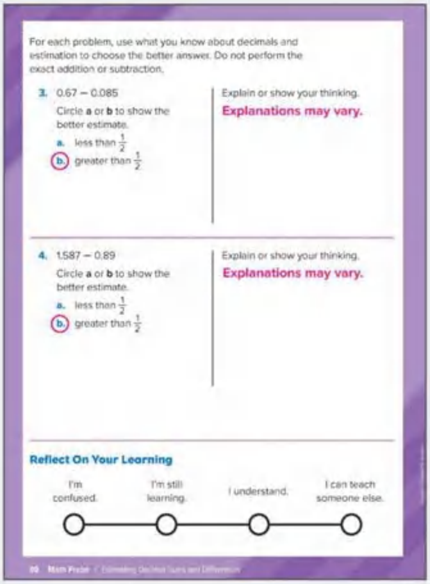
a. less than 1

[✓ **b.**] greater than 1

Explain or show your thinking.

Explanations may vary.

Unit 4 • Add and Subtract Decimals 97



For each problem, use what you know about decimals and estimation to choose the better answer. Do not perform the exact addition or subtraction.

3. 0.67 − 0.085

Circle **a** or **b** to show the better estimate.

a. less than $\frac{1}{2}$

[✓ **b.**] greater than $\frac{1}{2}$

Explain or show your thinking.

Explanations may vary.

4. 1.587 − 0.89

Circle **a** or **b** to show the better estimate.

a. less than $\frac{1}{2}$

[✓ **b.**] greater than $\frac{1}{2}$

Explain or show your thinking.

Explanations may vary.

Reflect On Your Learning

98 Math Probe / Estimating Decimal Sums and Differences

Analyze the Probe

Formative Assessment

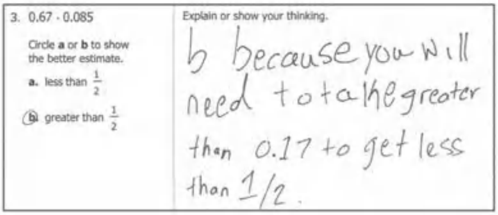
Targeted Concept Determine approximate sums and differences by reasoning about the magnitude of decimals to compare decimal sums and differences to common benchmarks.

Targeted Misconceptions Some students have conceptual misunderstandings with decimal place-value ideas required for reasoning about the size of a decimal. Some students have difficulty comparing decimals to common decimal benchmarks such as 0.5 or 0.25. Watch for students who show exact calculations in their explanations rather than using reasoning about the estimates without actually calculating.

Authentic Student Work

Below are examples of correct student work and explanations.

Sample A



3. 0.67 - 0.085

Circle **a** or **b** to show the better estimate.

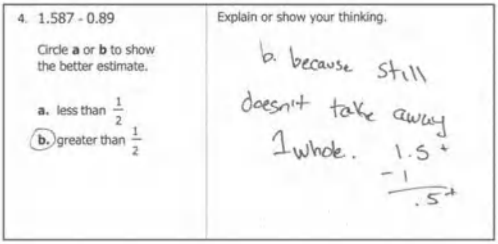
a. less than $\frac{1}{2}$

[✓ **b**] greater than $\frac{1}{2}$

Explain or show your thinking.

b because you will need to take greater than 0.17 to get less than 1/2.

Sample B



4. 1.587 - 0.89

Circle **a** or **b** to show the better estimate.

a. less than $\frac{1}{2}$

[✓ **b.**] greater than $\frac{1}{2}$

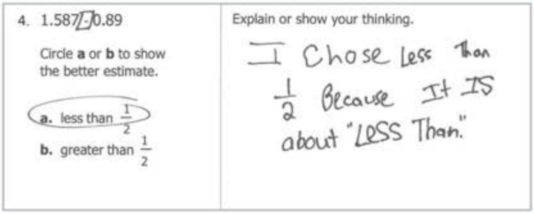
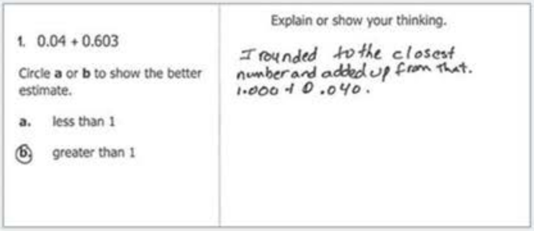
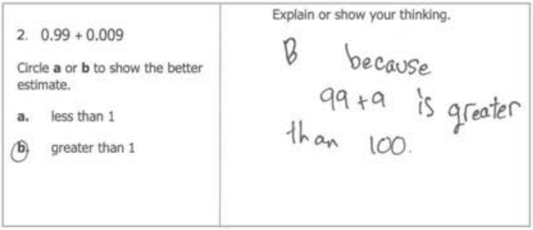
Explain or show your thinking.

b. because still doesn't take away 1 whole.

$$\begin{array}{r} 1.5+ \\ -1 \\ \hline .5+ \end{array}$$

Collect and Assess Student Work

Collect and review student response to determine possible misconceptions. See examples in If-Then chart.

IF incorrect...	THEN the student likely...	Sample Misconceptions
1. b **2.** b **3.** a **4.** a	connects an addition problem to the phrase "greater than" and a subtraction problem to the phrase "less than"—without considering the values being added or subtracted in relation to the benchmarks.	 4. 1.587 - 0.89 Circle **a** or **b** to show the better estimate. [✓ **a.** less than $\frac{1}{2}$] **b.** greater than $\frac{1}{2}$ Explain or show your thinking. I Chose less Than $\frac{1}{2}$ Because It IS about "LESS Than."
1. b **2.** b	rounds the numbers but does not consider the precision needed. For example, in Exercise 1, a student may round 0.603 to 1; in Exercise 2, a student may round 0.99 to 1. In both cases, the student concludes that the sum is greater than 1.	 1. 0.04 + 0.603 Circle **a** or **b** to show the better estimate. **a.** less than 1 [✓ **b.**] greater than 1 Explain or show your thinking. I rounded to the closest number and added up from that. 1.000 + 0.040.
1. b **2.** b **3.** a	does not consider the impact of place value in determining a digit's value. In Exercise 1, a student assumes the answer will be greater than 1 because 6 + 4 = 10. In Exercise 2, a student concludes that the sum must be greater than 1 because there are several 9s. In Exercise 3, a student may conclude that subtracting 0.085 has a much greater impact on the difference than it really has.	 2. 0.99 + 0.009 Circle **a** or **b** to show the better estimate. **a.** less than 1 [✓ **b.**] greater than 1 Explain or show your thinking. B because 99+9 is greater than 100.

Many of the above difficulties result in a combination of correct and incorrect responses. For correct responses, be sure to check for sound reasoning.

Take Action

Choose from the following resources or suggestions:

- Revisit the activities for rounding decimals and estimating decimal sums and differences in Lesson 4-1.
- Help students develop visual images of decimal place-value ideas by using base-ten blocks. When base-ten blocks are used to represent decimals, you may want a large cube to be worth 1, a flat to be worth 0.1, a rod to be worth 0.01, and a small cube to be worth 0.001.
- Do estimation activities in small and large groups, providing opportunities for students to discuss their reasoning strategies.

Revisit the Probe after additional instruction. Have students review their initial answers to the probe. Use these questions for discussion:

- *Are there any answers you would like to change? Explain why you might want to change them.*
- *Are there any questions that you still have about any of the items on this probe?*

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

LESSON **4-2**

Represent Addition of Decimals

Learning Targets

- I can represent addition of decimals using decimal grids.
- I can represent addition of tenths and hundredths.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Model with mathematics.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
decimal grid	benefit
hundredths	drawback
tenths	evaluate

Materials

The materials may be for any part of the lesson.

- number cube
- *Tenths and Hundredths* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students use decimal grids to represent addition of decimals with the same number of places.	• Students discuss using decimal grids to represent addition of decimals while answering *Wh-* and Yes/No questions. • Support optimizing output, MLR1: Stronger and Clearer Each Time.	• Students identify and discuss the emotions experienced during math learning.

Coherence

Previous	Now	Next
• Students fluently added and subtracted multi-digit whole numbers using the standard algorithm (Grade 4). • Students estimated sums and differences of decimals and explained estimation strategies (Unit 4).	• Students use representations to add decimals. • Students describe and explain their strategies for adding decimals.	• Students add decimals using drawings and strategies based on place value (Unit 4). • Students add, subtract, multiply, and divide decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students create and use representations to build their understanding of addition with decimals.	• Students build fluency with place-value concepts and start to develop skills for adding decimals.	• Students represent addition of decimals to solve problems in real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine
About How Much?

5–7 min

Build Fluency Students estimate sums involving 3-digit whole numbers.

Remind students that this is a mental activity, and that exact answers are not needed.

These prompts encourage students to talk about their reasoning:

- How did you estimate the sums?
- Is there more than one way to estimate a sum? Explain.
- How can you tell if an estimate is reasonable?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore what a map can tell them. They consider how numbers might be incorporated into the map.

Numberless Word Problem

- What could you ask?
- What math do you use in this problem?

Teaching Tip You may want to have students to create a list of questions individually first. Then have them form small discussion groups where they can share their questions about the map.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about using decimal grids to represent additon of decimals and are based on possible comments and questions that students might make during the share out.

- What information can you learn from the map?
- What questions could you ask about the map?
- What information would you need to answer your questions?
- How could you find the total distance of the route shown?

Math is... Mindset

- How can my math skills or interests help me with my work?

SEL Self-Awareness: Identify Emotions

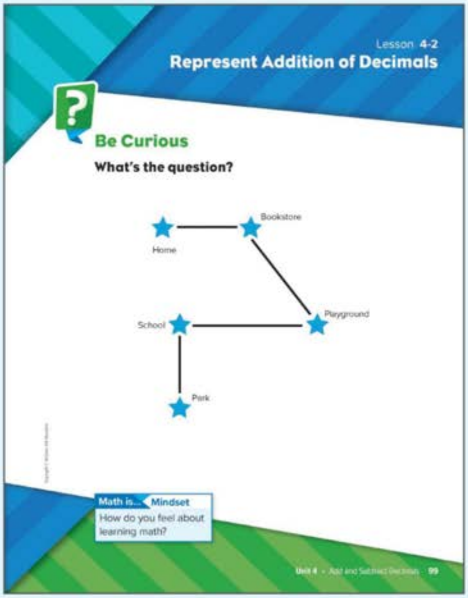
Give students opportunities to share about themselves to reinforce their sense of identity and belonging. As students work collaboratively to complete the Numberless Word Problem routine, invite them to share a personal skill or interest related to math. Encourage them to think about how that skill can help them with their work on adding decimals today.

Transition to Explore & Develop

Ask questions to get students thinking about determining the total distance of the route. Ask them to think about what operations would be used to determine the total distance. Guide students to think about the different kinds of tools they can use to solve distance questions.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we can use decimal grids to represent addition of decimals.



Lesson 4-2

Represent Addition of Decimals

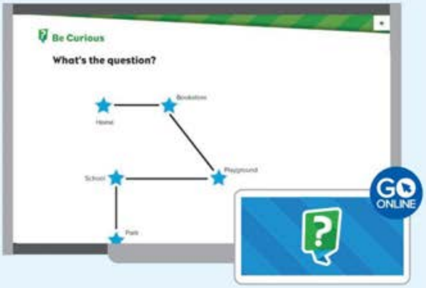
Be Curious

What's the question?

Math is... Mindset

How do you feel about learning math?

Unit 4 • Add and Subtract Decimals 99

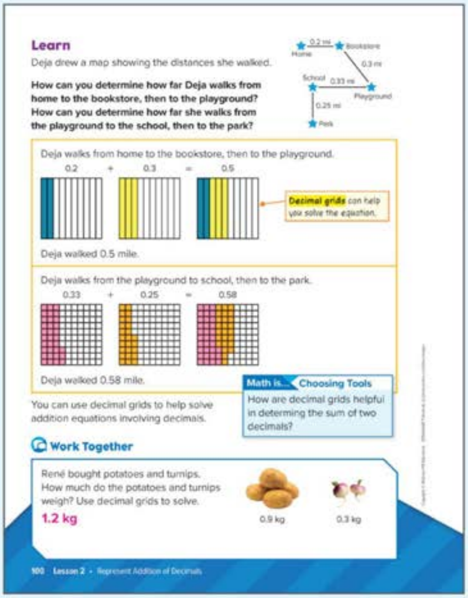


Be Curious

What's the question?

Explore & Develop

20 min



Learn

Deja drew a map showing the distances she walked.

How can you determine how far Deja walks from home to the bookstore, then to the playground? How can you determine how far she walks from the playground to the school, then to the park?

Deja walks from home to the bookstore, then to the playground.

0.2 + 0.3 = 0.5

Decimal grids can help you solve the equation.

Deja walked 0.5 mile.

Deja walks from the playground to school, then to the park.

0.33 + 0.25 = 0.58

Deja walked 0.58 mile.

You can use decimal grids to help solve addition equations involving decimals.

Math is... Choosing Tools

How are decimal grids helpful in determing the sum of two decimals?

Work Together

René bought potatoes and turnips. How much do the potatoes and turnips weigh? Use decimal grids to solve.

1.2 kg

100 Lesson 2 • Represent Addition of Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- What are the problems asking you to find? How do you know?
- How can you find the distance from Deja's home to the bookstore?
- How do you know how far it is from the bookstore to the playground?
- Which operation will you use to determine the answer? How do you know?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and have them solve an addition equation involving decimals using decimal grids. Ask each to work individually and write about how they solved the problem. Then have students share their writing with their partner, comparing their sentences, and if needed, make corrections. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How could you explain to a friend how to represent addition of decimals?

Key Takeaway

- Addition of decimals can be represented using concrete models or drawings, such as decimal grids.

Work Together

You may wish to provide copies of the *Tenths and Hundredths* Teaching Resource for students to use as they solve this problem. Have students to explain how they determined which grid to use to represent 0.9 and 0.3.

Common Misconception Students may think that each small square is a tenth or that each column is a hundredth in a decimal grid. Remind students that the big square represents the whole. Since there are 10 columns and 100 little squares, each column represents 0.1 and each little square represents 0.01.

LOM Language of Math

Encourage students to read each addend using mathematically precise language, such as *nine tenths* and not informal language, such as *zero point nine*. Using precise language can help students understand the value of the quantities, which can then be used to help assess reasonableness of answers.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students will write addition expressions and then use models to add the decimals.

Materials: number cube (labeled 1–6), *Tenths and Hundredths* Teaching Resource

Directions: Have students roll the number cube once to create a decimal number to the tenths with a 0 in the ones place. Students roll again to make another decimal number to the tenths. Have students work together to use decimal grids to find the sum of the decimals. Repeat by rolling two number cubes and using the digits to make a decimal number to the hundredths.

ETP Support Productive Struggle

- How did you determine which grid to use to represent the problem?
- Could you have used the hundredths grid to show tenths? Explain why or why not.
- Explain how you know that is the sum.
- How can you show that your calculated sum is reasonable?

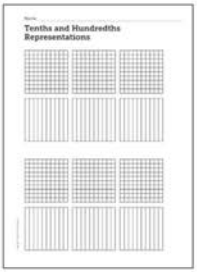
Math is... Choosing Tools

- How are decimal grids helpful in determining the sum of two decimals?

Students are explaining the process for choosing and using decimal grids as tools to aid and assist them in solving an addition problem.

Activity Debrief: After students work through their solutions, encourage them to share their strategies and answers with others. Have students revisit the Pose the Problem question and discuss their answers.

- How can you determine how far Deja walks from home to the bookstore, then to the playground?
- How can you determine how far she walks from the playground to the school, then to the park?


Tenths and Hundredths Representations

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students use concrete models or drawings, such as decimal grids, to add decimal numbers with the same number of decimal places.

ETP Use and Connect Mathematical Representations

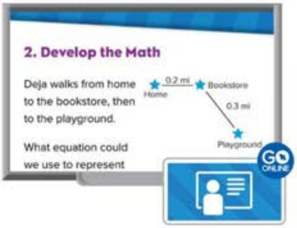
- How do you know that the equation you wrote for the problem is correct?

Provide copies of the *Tenths and Hundredths* Teaching Resource. Have students shade the decimals grids as they work through determining the distance from the playground to the school, then to the park.

Math is... Choosing Tools

- How are decimal grids helpful in determining the sum of two decimals?
- How do the decimal grids represent the amounts in the problem?
- **Think About It:** Are there tools other than decimal grids you could use to solve the problem? Explain how you would use them.

Students are explaining the process for choosing and using decimal grids as tools to aid and assist them in solving an addition problem.


2. Develop the Math

Deja walks from home to the bookstore, then to the playground.

What equation could we use to represent

EL English Learner Scaffolds

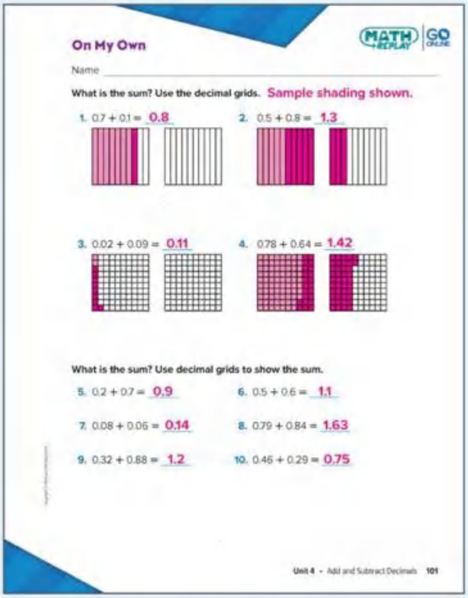
Entering/Emerging Support students' understanding of *how far*. Standing by your desk, point to your door and say *Let's see how far the door is from the desk*. Measure and say *The door is [ten feet] from the desk*. Repeat with new objects. Then prompt students to find the distance between two classroom objects. Ask *How far is the [bookshelf] from [the closet]?*

Developing/Expanding Support students' understanding of *how far*. Standing by your desk, point to your door and say *Let's see how far the door is from the desk*. Measure and say *The door is [ten feet] from the desk*. Repeat with new objects. Then prompt students to choose two classroom items to measure distance and have pairs take turns asking and answering about the distance.

Bridging/Reaching Have students work with maps, either real or drawn, and ask them to talk about how far different places are from a central location. Validate or correct as necessary.

Practice & Reflect

10 min



On My Own

Name ______

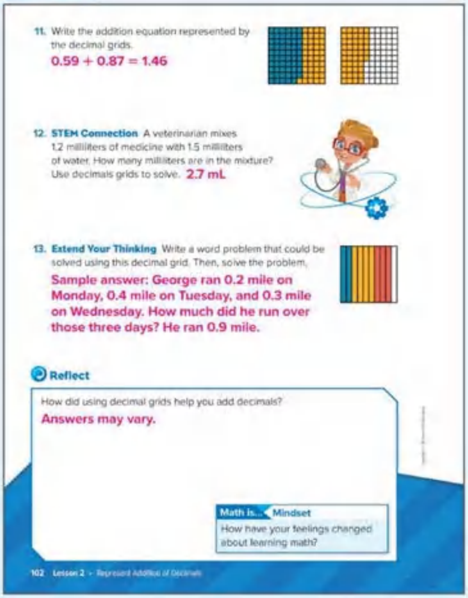
What is the sum? Use the decimal grids. Sample shading shown.

1. 0.7 + 0.1 = 0.8
2. 0.5 + 0.8 = 1.3
3. 0.02 + 0.09 = 0.11
4. 0.78 + 0.64 = 1.42

What is the sum? Use decimal grids to show the sum.

5. 0.2 + 0.7 = 0.9
6. 0.5 + 0.6 = 1.1
7. 0.08 + 0.06 = 0.14
8. 0.79 + 0.84 = 1.63
9. 0.32 + 0.88 = 1.2
10. 0.46 + 0.29 = 0.75

Unit 4 • Add and Subtract Decimals 101



11. Write the addition equation represented by the decimal grids.
0.59 + 0.87 = 1.46

12. **STEM Connection** A veterinarian mixes 1.2 milliliters of medicine with 1.5 milliliters of water. How many milliliters are in the mixture? Use decimals grids to solve. 2.7 mL

13. **Extend Your Thinking** Write a word problem that could be solved using this decimal grid. Then, solve the problem.
Sample answer: George ran 0.2 mile on Monday, 0.4 mile on Tuesday, and 0.3 mile on Wednesday. How much did he run over those three days? He ran 0.9 mile.

Reflect

How did using decimal grids help you add decimals?
Answers may vary.

Math is... Mindset
How have your feelings changed about learning math?

102 Lesson 2 • Represent Addition of Decimals

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 7 Students may incorrectly try to add tenths instead of hundredths. They may assume that since there is only one non-zero digit, that they are adding tenths instead of hundredths. Remind students that the zeros are not just placeholders. Encourage them to say each addend aloud before modeling it on a decimal grid.

Item Analysis

Item	DOK	Rigor
1–4	2	Procedural Skill and Fluency
5–11	2	Conceptual Understanding
12	3	Application
13	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did using decimal grids help you add decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did my math skills or interests help me with my work today?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can represent addition of decimals using decimal grids.
- I can represent addition of tenths and hundredths.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Add decimals with the same number of decimal places using decimal grids	5.NBT.B.7
2	2	Add decimals with the same number of decimal places using decimal grids	5.NBT.B.7
3	2	Add decimals with the same number of decimal places using decimal grids	5.NBT.B.7
4	3	Add decimals with the same number of decimal places using decimal grids	5.NBT.B.7

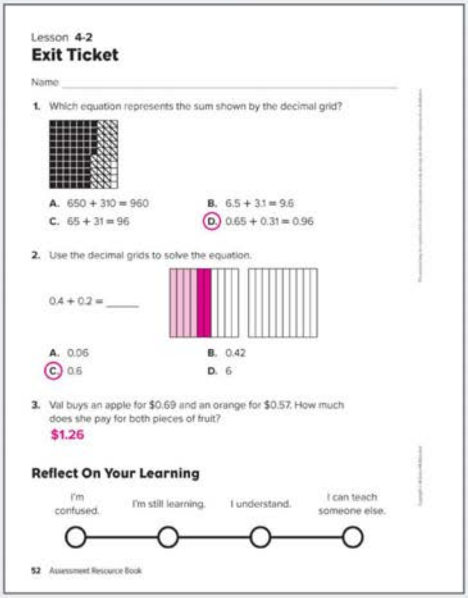
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 4-2

Exit Ticket

Name ______

1. Which equation represents the sum shown by the decimal grid?

A. 650 + 310 = 960
B. 6.5 + 3.1 = 9.6
C. 65 + 31 = 96
[✓ D.] 0.65 + 0.31 = 0.96

2. Use the decimal grids to solve the equation.

0.4 + 0.2 = ______

A. 0.06
B. 0.42
[✓ C.] 0.6
D. 6

3. Val buys an apple for \$0.69 and an orange for \$0.57. How much does she pay for both pieces of fruit?

\$1.26

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

52 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Move It

Use two hundredths number lines from 0 to 2. Roll two number cubes to create a decimal in hundredths. Decompose the decimal and show the decimal on a decimal grid. So, if 0.52 is rolled, students may shade 0.5 on one grid and 0.02 on the other, or shade 0.52 on one decimal grid. Make sure students understand the relationships between hundredths, tenths, and ones. Students build on each other's moves. Play ends when 2 full grids are shaded. Then students may repeat the activity.

GO ONLINE

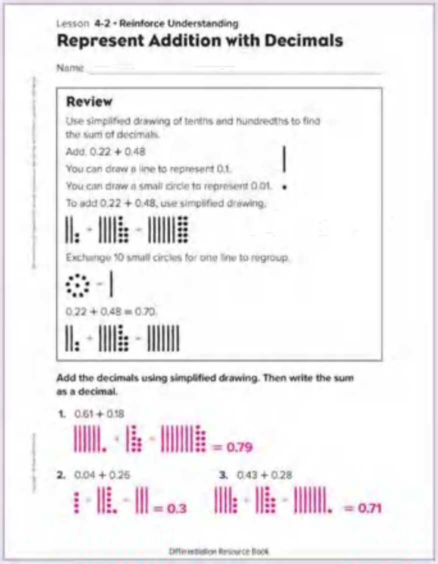
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Model Adding Decimals

INDEPENDENT WORK

Differentiation Resource Book, p. 23



Lesson **4-2 • Reinforce Understanding**

Represent Addition with Decimals

Name

Review

Use simplified drawing of tenths and hundredths to find the sum of decimals.

Add. 0.22 + 0.48

You can draw a line to represent 0.1.

You can draw a small circle to represent 0.01.

To add 0.22 + 0.48, use simplified drawing.

Exchange 10 small circles for one line to regroup.

0.22 + 0.48 = 0.70

Add the decimals using simplified drawing. Then write the sum as a decimal.

1. 0.61 + 0.18 = 0.79
2. 0.04 + 0.26 = 0.3
3. 0.43 + 0.28 = 0.71

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Represent Addition of Decimals Task Cards

Students practice representing the addition of decimals.

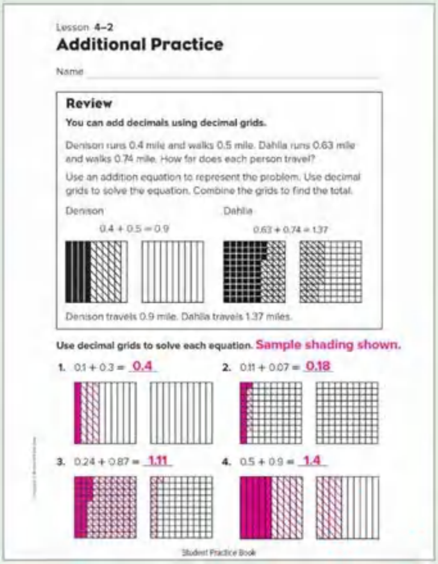
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 23–24



Lesson **4–2**

Additional Practice

Name

Review

You can add decimals using decimal grids.

Denison runs 0.4 mile and walks 0.5 mile. Dahlia runs 0.63 mile and walks 0.74 mile. How far does each person travel?

Use an addition equation to represent the problem. Use decimal grids to solve the equation. Combine the grids to find the total.

Denison 0.4 + 0.5 = 0.9

Dahlia 0.63 + 0.74 = 1.37

Denison travels 0.9 mile. Dahlia travels 1.37 miles.

Use decimal grids to solve each equation. Sample shading shown.

1. 0.1 + 0.3 = 0.4
2. 0.11 + 0.07 = 0.18
3. 0.24 + 0.87 = 1.11
4. 0.5 + 0.9 = 1.4

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting decimals.

Use It! Application Station

Cost of Living Depends on Where You Live

Students use equations to compare the cost of living in rural towns and urban cities.

The content of this card has concepts covered later in Lesson 4-8. You may want to assign this card to students ready to explore content covered later in this unit.

GO ONLINE

Spiral Review

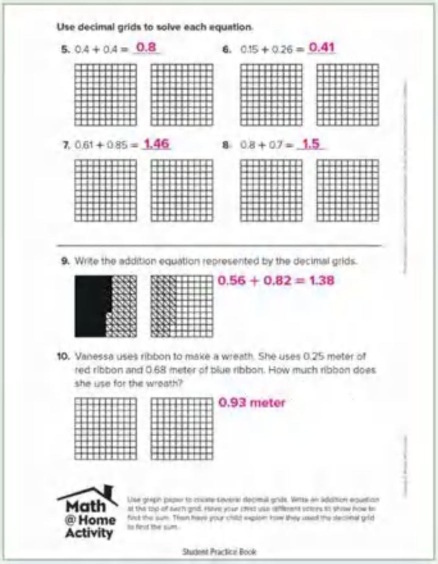
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 23–24



Use decimal grids to solve each equation.

5. 0.4 + 0.4 = 0.8

6. 0.15 + 0.26 = 0.41

7. 0.61 + 0.85 = 1.46

8. 0.8 + 0.7 = 1.5

9. Write the addition equation represented by the decimal grids.

0.56 + 0.82 = 1.38

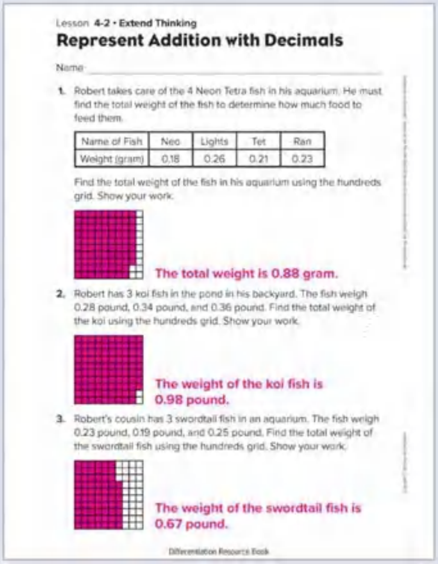
10. Vanessa uses ribbon to make a wreath. She uses 0.25 meter of red ribbon and 0.68 meter of blue ribbon. How much ribbon does she use for the wreath?

0.93 meter

Math @ Home Activity

Student Practice Book

Differentiation Resource Book, p. 24



Lesson **4-2 • Extend Thinking**

Represent Addition with Decimals

Name ______

1. Robert takes care of the 4 Neon Tetra fish in his aquarium. He must find the total weight of the fish to determine how much food to feed them.

Name of Fish	Neo	Lights	Tet	Ran
Weight (gram)	0.18	0.26	0.21	0.23

Find the total weight of the fish in his aquarium using the hundreds grid. Show your work.

The total weight is 0.88 gram.

2. Robert has 3 koi fish in the pond in his backyard. The fish weigh 0.28 pound, 0.34 pound, and 0.36 pound. Find the total weight of the koi using the hundreds grid. Show your work.

The weight of the koi fish is 0.98 pound.

3. Robert's cousin has 3 swordtail fish in an aquarium. The fish weigh 0.23 pound, 0.19 pound, and 0.25 pound. Find the total weight of the swordtail fish using the hundreds grid. Show your work.

The weight of the swordtail fish is 0.67 pound.

Differentiation Resource Book

LESSON **4-3**

Represent Addition of Tenths and Hundredths

Learning Targets

- I can explain how to use various strategies to add decimals.
- I can demonstrate how to use various strategies to add decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Attend to precision.

MPP Look for and make use of structure.

Vocabulary

Math Term	Academic Terms
decimal grid	debate
	infer

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- decimal grid
- index cards

Focus

Content Objective	Language Objectives	SEL Objective
• Students use decimal grids to represent addition of decimals with different number of decimal places.	• Students discuss using decimal grids to add decimals while answering *Wh-* questions and using the adjective *similar*. • Support sense-making, MLR2: Collect and Display.	• Students collaborate with peers to complete a mathematical task and offer constructive feedback to the mathematical ideas posed by others.

Coherence

Previous	Now	Next
• Students added and subtracted whole numbers using the standard algorithm (Grade 4). • Students used representations to add decimals with the same number of decimal places (Unit 4).	• Students add decimals in hundredths using concrete models, drawings, and strategies based on place value.	• Students use addition strategies to add decimals (Unit 4). • Students add, subtract, multiply, and divide decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of place value, decimals, and operations with decimals.	• Students build fluency with place-value concepts and develop their skills for adding decimals.	• Students represent addition of decimals to solve problems in real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine
Would You Rather?

5–7 min

Build Fluency Students build number sense as they compare numbers to products of multiplication expressions,

These prompts encourage students to talk about their reasoning:

- What strategies did you use to find your answers?
- How could you use estimation to compare the amounts?

Launch 5–7 min

Sense-Making Routine

Purpose Students consider how each decimal is represented on the decimal grids to identify similarities and differences.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip You may want to have students use their own decimal grids to display the numbers. This can help reinforce what each grid represents.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' noticing and wondering about representing addition of tenths and hundredths on decimals grids, and are based on possible comments and questions that students may make during the share out.

- What do you notice about the decimal grids?
- What do you think the shaded parts of the decimal grids represent?
- Do you think both decimal grids are shaded equally? Explain.

Math is... Mindset

- Why should you value the ideas of others?

SEL Social Engagement: Value Ideas of Others

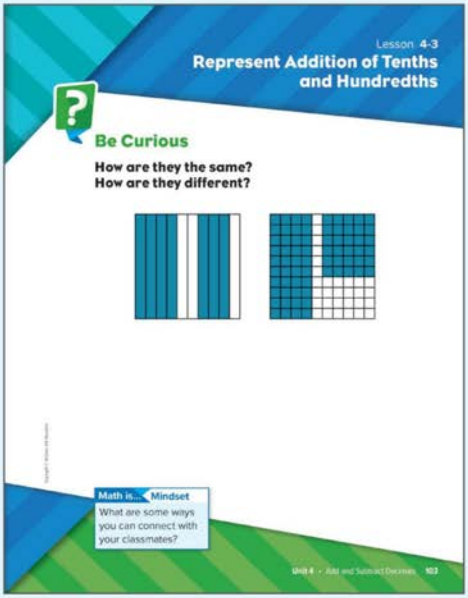
As students engage in collaborative discourse about the Notice & Wonder routine, remind them that valuing ideas of others is an important part of being an effective and respectful communicator. Explain that one way to do this is by listening attentively when other sare sharing their ideas about what how the decimals are the same and how they are different.

Transition to Explore & Develop

Ask questions that get students thinking about the uses of decimal grids. Guide students think about how decimal grids can be used to represernt addition. Students may recall that there are other ways to visually represent math problems, such as using number lines.

ETP Establish Mathematics Goals to Focus Learning

- Lets think about how decimal grids could be useful when representing addition problems that involve decimals that have a different number of decimal places.



Lesson 4-3

Represent Addition of Tenths and Hundredths

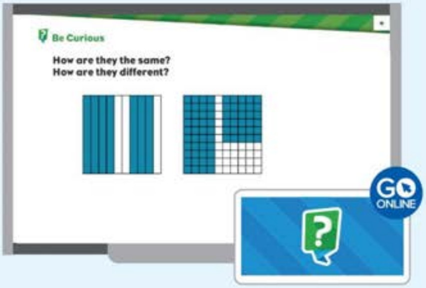
Be Curious

How are they the same?
How are they different?

Math is... Mindset

What are some ways you can connect with your classmates?

Unit 4 • Add and Subtract Decimals 103

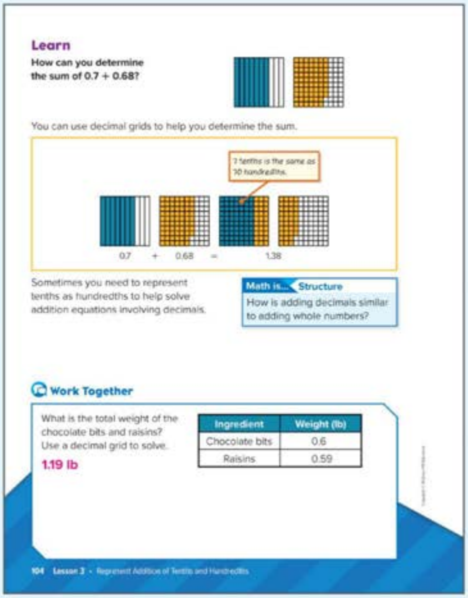


Be Curious

How are they the same?
How are they different?

Explore & Develop

20 min



Learn

How can you determine the sum of 0.7 + 0.68?

You can use decimal grids to help you determine the sum.

7 tenths is the same as 70 hundredths.

0.7 + 0.68 = 1.38

Sometimes you need to represent tenths as hundredths to help solve addition equations involving decimals.

Math is... Structure
How is adding decimals similar to adding whole numbers?

Work Together

What is the total weight of the chocolate bits and raisins? Use a decimal grid to solve.

1.19 lb

Ingredient	Weight (lb)
Chocolate bits	0.6
Raisins	0.59

104 Lesson 3 • Represent Addition of Tenths and Hundredths

❶ Pose the Problem

MLR Collect and Display

As students discuss the questions, record relevant words and phrases they may use such as *represent, shade, less than,* and *greater than*. Display the words for student reference. Use the student-generated expressions to help students make connections between student language and math vocabulary.

ETP Pose Purposeful Questions

- Is this question asking to add or subtract? How do you know?
- Do you think the sum will be less than or greater than 1? Why?

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How is representing and solving addition of decimals having different numbers of decimal places similar to representing and solving addition of decimals having the same of decimals places? How is it different?

Key Takeaway

- Addition of decimals with different numbers of decimal places can be represented using concrete models or drawings, such as decimal grids.

Work Together

You may wish to provide *Decimal Grids* Teaching Resource for students to use for the Work Together. Have students share their thinking when determining how to represent 0.6 using a grid that shows hundredths.

Common Misconception When students see words or phrases such as *more*, *all together*, *total*, *combine*, *increased by*, *plus*, and *sum*, they may assume the problem is looking for a solution that requires addition but that is not always the case. Remind students that they need to carefully consider the meaning of the language in a problem before deciding what operations to use.

LOM Language of Math

Ask students what they look for in a problem to decide that its solution requires addition. They may say they look for particular words. While some addition contexts are communicated using words and phrases such as “more,” “all together,” “in total,” “combine,” “increased by,” “plus,” and “sum,” remind students that they need to carefully consider the meaning of the language in a problem before deciding what operations to use.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students will explore using decimal grids to solve addition equations involving decimal with tenths and hundredths.

Materials: *10* × *10* Teaching Resource

Directions: Provide copies of the *10* × *10* Teaching Resource to each pair or small group. Have students solve the Pose the Problem.

ETP Support Productive Struggle

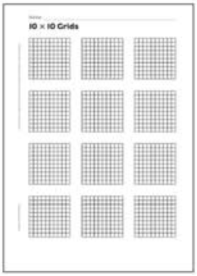
- How did you determine how to represent 0.7 on a decimal grid showing hundredths?
- Will your strategy for adding tenths and hundredths on a decimal grid always work?
- Is there another way to solve the problem?
- How can you prove that your solution is correct?

Math is... Structure

- How is adding decimals similar to adding whole numbers?

Students are thinking about and discussing the structure of mathematics that makes adding decimals and adding whole numbers almost identical processes.

Activity Debrief: After groups work through their solutions, encourage them to share their decimal grids and answers with others. Facilitate a discussion to ensure students understand that when using representation to add tenths and hundredths, it is necessary to represent the tenths as an equivalent hundredths.



10 × 10 Grids

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students extend strategies they learned in Grade 4 for adding decimal fractions. They also think about the different strategies they could use to find their solutions.

Provide *10* × *10* Teaching Resource for students to shade decimal grids as they work through the problem together. Encourage students to shade the two decimal values within the same grid. Students should shade an additional grid only when the first one is completely shaded.

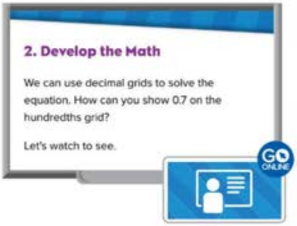
ETP Use and Connect Mathematical Representations

- **Think About It:** How many hundredths should be shaded to show 0.7?
- What are some other strategies you could use to find your answer?
- How could you use estimation to help you assess the reasonableness of your calculated solution?
- How did the different number of decimal places in the numbers affect the solution strategy?

Math is... Structure

- How is adding decimals similar to adding whole numbers?

Students are thinking about and discussing the structure of mathematics that makes adding decimals and adding whole numbers almost identical processes.



2. Develop the Math

We can use decimal grids to solve the equation. How can you show 0.7 on the hundredths grid?

Let's watch to see.

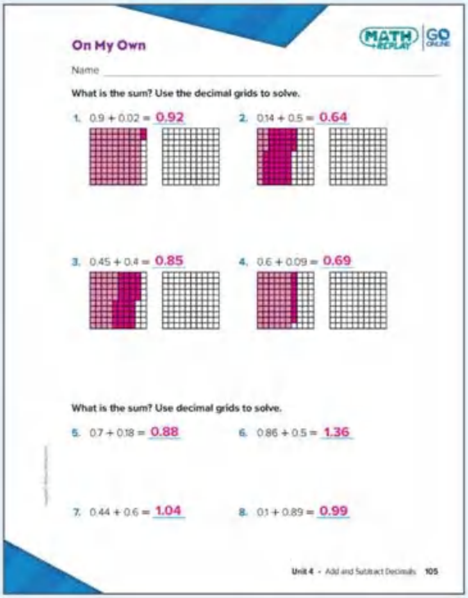
EL English Learner Scaffolds

Entering/Emerging Ensure students know what *weight* means by weighing classroom objects between 1–3 pounds. First, weigh a book. Say *This weighs one and a half pounds. The weight is one and a half pounds*. Be sure to point out that *lb* on the Learn page is short for *pound*. Repeat with another object. Then weighing other objects, ask *What is the weight of this—[two pounds] or [three pounds]?*

Developing/Expanding Ensure students know what *weight* means by weighing classroom objects between 1–3 pounds. First, weigh a book. Say *This weighs one and a half pounds. The weight is one and a half pounds*. Be sure to point out that *lb* on the Learn page is short for pound. Repeat with another object. Then, ask students to weigh other objects and tell you their weight.

Bridging/Reaching Ensure comprehension of the words *weigh, weight,* and *pound* by asking students to weigh objects and tell you their weight. Then discuss with students other weight measurements such as ounces, grams, etc. Finally, ask students to work together to sort the words into two groups: metric and imperial, and to include abbreviations of measurements that they know, such as *lb, oz,* and *g*.

Practice & Reflect 10 min



On My Own

Name ____________________

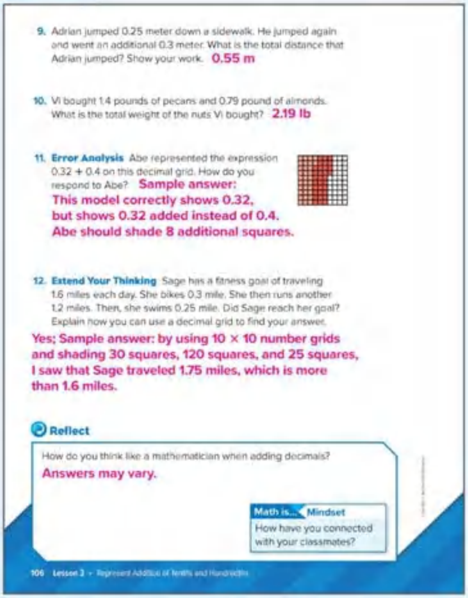
What is the sum? Use the decimal grids to solve.

1. 0.9 + 0.02 = 0.92
2. 0.14 + 0.5 = 0.64
3. 0.45 + 0.4 = 0.85
4. 0.6 + 0.09 = 0.69

What is the sum? Use decimal grids to solve.

5. 0.7 + 0.18 = 0.88
6. 0.86 + 0.5 = 1.36
7. 0.44 + 0.6 = 1.04
8. 0.1 + 0.89 = 0.99

Unit 4 • Add and Subtract Decimals 105



9. Adrian jumped 0.25 meter down a sidewalk. He jumped again and went an additional 0.3 meter. What is the total distance that Adrian jumped? Show your work. **0.55 m**

10. Vi bought 1.4 pounds of pecans and 0.79 pound of almonds. What is the total weight of the nuts Vi bought? **2.19 lb**

11. **Error Analysis** Abe represented the expression 0.32 + 0.4 on this decimal grid. How do you respond to Abe? **Sample answer: This model correctly shows 0.32, but shows 0.32 added instead of 0.4. Abe should shade 8 additional squares.**

12. **Extend Your Thinking** Sage has a fitness goal of traveling 1.6 miles each day. She bikes 0.3 mile. She then runs another 1.2 miles. Then, she swims 0.25 mile. Did Sage reach her goal? Explain how you can use a decimal grid to find your answer.
Yes; Sample answer: by using 10 × 10 number grids and shading 30 squares, 120 squares, and 25 squares, I saw that Sage traveled 1.75 miles, which is more than 1.6 miles.

Reflect

How do you think like a mathematician when adding decimals?
Answers may vary.

Math is... Mindset
How have you connected with your classmates?

106 **Lesson 3** • Represent Addition of Tenths and Hundredths

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 5 Students may focus on adding only the tenths place and forget to add the hundredths place on the decimal grid. Remind students that the second decimal place after the decimal relates to hundredths. Also, encourage them to say the decimals out loud in order to remember to add all of the numbers.

Practice Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9–10	3	Application
11–12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How do you think like a mathematician when adding decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you worked to show others that you value their ideas?

Students reflect on how they develped stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain how to use various strategies to add decimals.
- I can demonstrate how to use various strategies to add decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Add decimals with different number of decimal places using decimal grids	5.NBT.B.7
2	2	Add decimals with different number of decimal places using decimal grids	5.NBT.B.7
3	3	Add decimals with different number of decimal places using decimal grids	5.NBT.B.7

Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

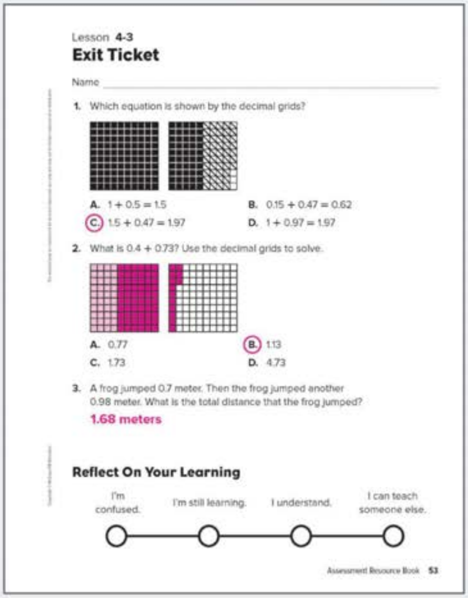
If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

R Reinforce Understanding

B Build Proficiency

E Extend Thinking



Lesson 4-3

Exit Ticket

Name ______________________

1. Which equation is shown by the decimal grids?

A. 1 + 0.5 = 1.5
B. 0.15 + 0.47 = 0.62
[✓ C.] 1.5 + 0.47 = 1.97
D. 1 + 0.97 = 1.97

2. What is 0.4 + 0.73? Use the decimal grids to solve.

A. 0.77
[✓ B.] 1.13
C. 1.73
D. 4.73

3. A frog jumped 0.7 meter. Then the frog jumped another 0.98 meter. What is the total distance that the frog jumped?

1.68 meters

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

Assessment Resource Book 53

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Addition Relay

Create a set of index cards labeled 0.14, 0.72, 0.08, 0.4, and 0.56. Have a student draw two cards and add their numbers. Another student draws a card and adds its number to the sum. Continue until all cards have been drawn. Help students to use decimal grids, if necessary, to model the addition. Repeat with new numbers if students need further reinforcement.

GO ONLINE

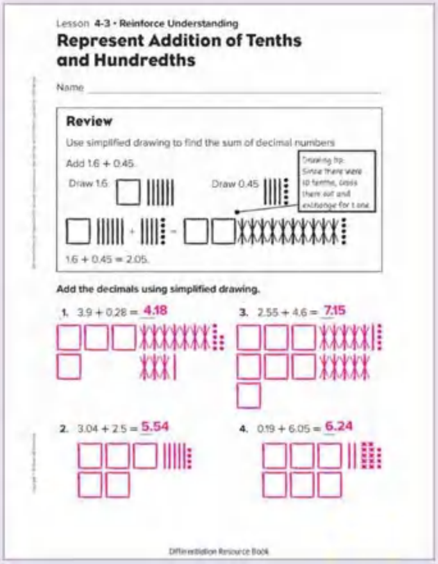
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Represent Adding and Subtracting (Tenths and Hundredths)

INDEPENDENT WORK

Differentiation Resource Book, p. 25



Lesson **4-3 • Reinforce Understanding**

Represent Addition of Tenths and Hundredths

Name

Review

Use simplified drawing to find the sum of decimal numbers

Add 1.6 + 0.45.

Draw 1.6 Draw 0.45

Drawing tip: Since there were 10 tenths, cross them out and exchange for 1 one.

1.6 + 0.45 = 2.05.

Add the decimals using simplified drawing.

1. 3.9 + 0.28 = 4.18
3. 2.55 + 4.6 = 7.15
2. 3.04 + 2.5 = 5.54
4. 0.19 + 6.05 = 6.24

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Add Tenths and Hundredths Race

Students practice adding decimals.

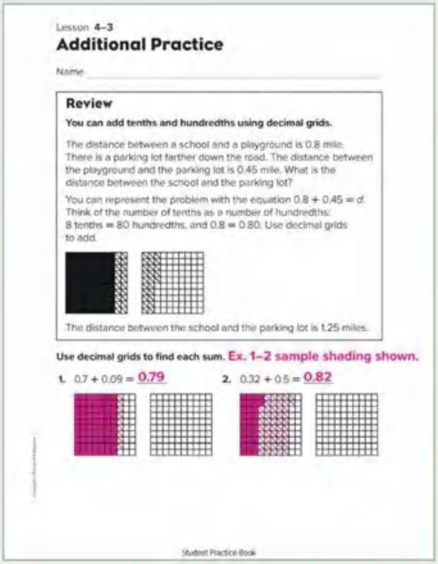
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 25–26



Lesson **4–3**

Additional Practice

Name

Review

You can add tenths and hundredths using decimal grids.

The distance between a school and a playground is 0.8 mile. There is a parking lot farther down the road. The distance between the playground and the parking lot is 0.45 mile. What is the distance between the school and the parking lot?

You can represent the problem with the equation 0.8 + 0.45 = *d*. Think of the number of tenths as a number of hundredths: 8 tenths = 80 hundredths, and 0.8 = 0.80. Use decimal grids to add.

The distance between the school and the parking lot is 1.25 miles.

Use decimal grids to find each sum. Ex. 1–2 sample shading shown.

1. 0.7 + 0.09 = 0.79
2. 0.32 + 0.5 = 0.82

Student Practice Book

Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting decimals.

Use It! Application Station

Let's Get Organized! Students use decimals to measure and create organizers. *The content of this card has concepts covered later in Lesson 4-8. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

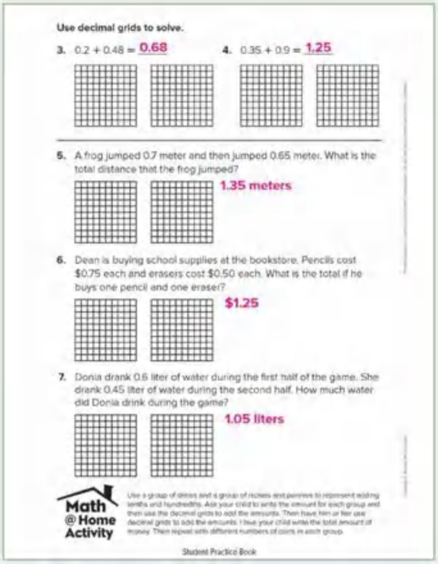
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 25–26



Use decimal grids to solve.

3. 0.2 + 0.48 = 0.68
4. 0.35 + 0.9 = 1.25
5. A frog jumped 0.7 meter and then jumped 0.65 meter. What is the total distance that the frog jumped?

   1.35 meters
6. Dean is buying school supplies at the bookstore. Pencils cost $0.75 each and erasers cost $0.50 each. What is the total if he buys one pencil and one eraser?

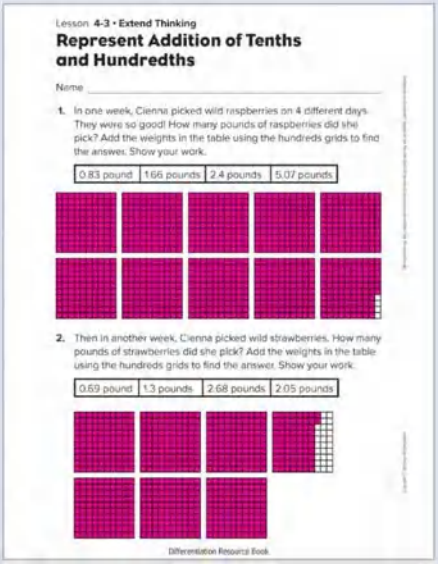
   $1.25
7. Donia drank 0.6 liter of water during the first half of the game. She drank 0.45 liter of water during the second half. How much water did Donia drink during the game?

   1.05 liters

Math @ Home Activity

Student Practice Book

Differentiation Resource Book, p. 26



Lesson **4-3 • Extend Thinking**

Represent Addition of Tenths and Hundredths

Name ____________________

1. In one week, Cienna picked wild raspberries on 4 different days. They were so good! How many pounds of raspberries did she pick? Add the weights in the table using the hundreds grids to find the answer. Show your work.

0.83 pound	1.66 pounds	2.4 pounds	5.07 pounds

2. Then in another week, Cienna picked wild strawberries. How many pounds of strawberries did she pick? Add the weights in the table using the hundreds grids to find the answer. Show your work.

0.69 pound	1.3 pounds	2.68 pounds	2.05 pounds

Differentiation Resource Book

LESSON **4-4**

Use Partial Sums to Add Decimals

Learning Targets

- I can use strategies to add decimals.
- I can explain the strategy I use to add decimals.

Standards

◇ **Major** △ **Supporting** ○ **Additional**

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Construct viable arguments and critique the reasoning of others.

MPP Model with mathematics.

Vocabulary

Math Terms	**Academic Terms**
decompose	emphasize
partial sums	procedure

Materials

The materials may be for any part of the lesson.

- *Decimal Cards* Teaching Resource

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students use addition strategies they know, such as partial sums, to add decimals.	• Students talk about addition strategies they know, such as partial sums, to add decimals while answering *Wh-* questions. • To support optimizing output, ELs participate in MLR7: Compare and Connect.	• Students recognize and work to understand the emotions of others and practice empathetic responses.

Coherence

Previous	**Now**	**Next**
• Students fluently added and subtracted multi-digit whole numbers using the standard algorithm (Grade 4). • Students added decimals in hundredths using concrete models, drawings, and strategies based on place value (Unit 4).	• Students extend their understanding of addition strategies to add decimals.	• Students extend their understanding of decimals by representing subtraction of decimals (Unit 4). • Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build on their understanding of addition as they use strategies to add decimals.	• Students build proficiency in using decomposed numbers to represent decimal addition.	• Students are expected to apply their understanding of addition strategies to add decimals with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine
Would You Rather?

5–7 min

Build Fluency Students build number sense as they compare numbers to products of multiplication expressions.

These prompts encourage students to talk about their reasoning:

- What strategies did you use to find your answers?
- How can you use estimation to compare the distances?

Launch 5–7 min

Sense-Making Routine

Purpose Students compare and contrast different expressions to determine which does not belong.

Which Doesn’t Belong?

- Which doesn’t belong?

Teaching Tip You may want to have students work in pairs as they look at the expressions. This will allow students to collaborate and share ideas.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students’ exploration of choosing and using strategies they know to add dedicmals and are based on possible comments and questions that students may make during the share out.

- What types of numbers are represented by the expressions?
- What is similar about all the expressions?
- Can you determine a reason for each expression to not belong?

Math is… Mindset

- How can you recognize and respond to the emotions of others?

SEL Social Awareness: Empathy

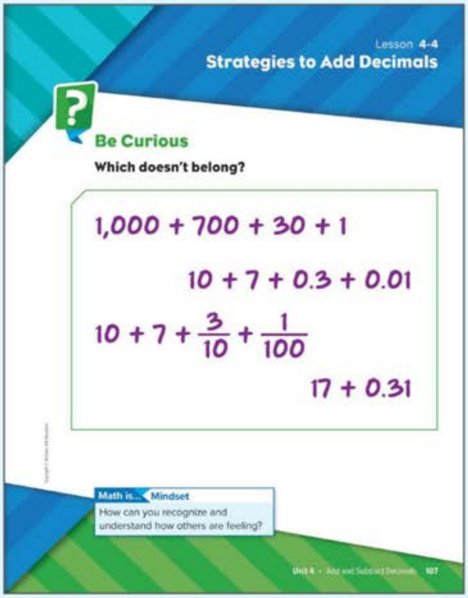
Establish a classroom culture that welcomes openness and empathy by encouraging students to share and discuss their emotions. After students participate in the Which Doesn’t Belong? routine, invite them to share the emotions they were experiencing. Encourage students to think about their own experiences with the emotions being shared. Their work throughout the lesson with adding decimals may be challenging, and they may feel emotions such as happy, excited, or frustrated. Sharing and listening can help students build understanding of their own emotions as well as empathy for others.

Transition to Explore & Develop

Ask questions that get students thinking about adding decimals. Ask them to think about ways to add, without using the standard algorithm. Guide students to think about the different strategies they can use to add decimals.

ETP Establish Mathematics Goals to Focus Learning

- Let’s think about how we can choose and use strategies we know to add decimals.



Lesson 4-4

Strategies to Add Decimals

Be Curious

Which doesn’t belong?

$1{,}000 + 700 + 30 + 1$

$10 + 7 + 0.3 + 0.01$

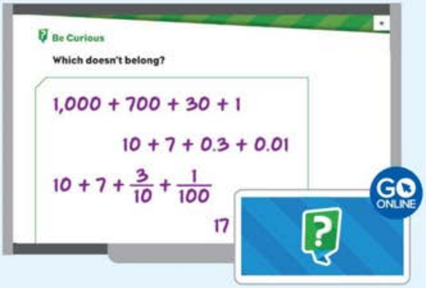
$10 + 7 + \frac{3}{10} + \frac{1}{100}$

$17 + 0.31$

Math is… Mindset

How can you recognize and understand how others are feeling?

Unit 4 • Add and Subtract Decimals 107



Be Curious

Which doesn’t belong?

$1{,}000 + 700 + 30 + 1$

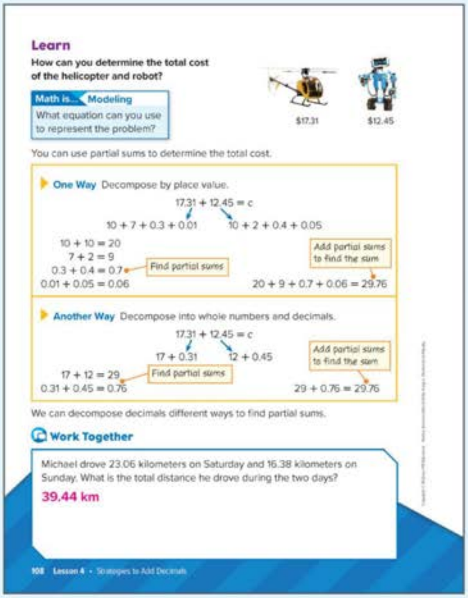
$10 + 7 + 0.3 + 0.01$

$10 + 7 + \frac{3}{10} + \frac{1}{100}$

17

Explore & Develop

20 min



Learn

How can you determine the total cost of the helicopter and robot?

Math is... Modeling
What equation can you use to represent the problem?

You can use partial sums to determine the total cost.

One Way Decompose by place value.

$17.31 + 12.45 = c$

$10 + 7 + 0.3 + 0.01$ $10 + 2 + 0.4 + 0.05$

$10 + 10 = 20$
$7 + 2 = 9$
$0.3 + 0.4 = 0.7$
$0.01 + 0.05 = 0.06$

Find partial sums

Add partial sums to find the sum

$20 + 9 + 0.7 + 0.06 = 29.76$

Another Way Decompose into whole numbers and decimals.

$17.31 + 12.45 = c$

$17 + 0.31$ $12 + 0.45$

$17 + 12 = 29$
$0.31 + 0.45 = 0.76$

Find partial sums

Add partial sums to find the sum

$29 + 0.76 = 29.76$

We can decompose decimals different ways to find partial sums.

Work Together

Michael drove 23.06 kilometers on Saturday and 16.38 kilometers on Sunday. What is the total distance he drove during the two days?

39.44 km

1 Pose the Problem

ETP Pose Purposeful Questions

- Can you describe the problem in your own words?
- Do you have all of the information needed to solve the problem? How do you know?

Math is... Modeling

- What equation can you use to represent the problem?

Students are using an equation as a representation to help them better understand the problem.

2 Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students and give them an equation to solve similar to the one on the Learn page. Instruct one student to decompose by place value and the other into whole numbers and decimals. Then have them compare their strategies. Revisit this activity throughout the lesson to help students build proficiency.

3 Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- What are some ways to decompose decimals?
- How can you use decomposing decimals to help you add decimals?
- How is this strategy to add decimals similar to the strategies you used to add whole numbers?

Key Takeaways

- Finding partial sums and then adding the partial sums to determine the total is one addition strategy.
- Strategies used to add decimals are the same as those used to add whole numbers.

Work Together

Have students explain how they used partial sums to solve the problem. Invite volunteers who decomposed differently to share their work. Have students look for similiarities among the different methods.

Common Error Students may incorrectly decompose by place value. For example, students may add $0.6 + 0.3 + 0.08$, instead of $0.06 + 0.08 + 0.3$, when writing the partial sums for $23.06 + 16.38$.

LOM Language of Math

The term *decompose* is a verb. Ask students to think of some words or phrases that may be used in place of the term. Let students practice using the word correctly to describe their strategies for adding decimals.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore different ways to decompose decimal addends.

Materials: *Decimal Cards* Teaching Resource

Directions: Ask students to write an addition problem involving two 3-digit whole numbers and solve the addition using as many different strategies as they can. Invite students to share different strategies they used, focus attention on methods using decomposition, such as partial sums.

- Do you think these strategies will work to add decimals?

Provide copies of the *Decimal Cards* Teaching Resource. Have students select two decimals to write an addition expression. Students should find different ways to decompose the addends to find partial sums.

Support Productive Struggle

- How can you apply your method of decomposing whole numbers to decomposing decimals?
- Is your answer reasonable? How do you know?
- How is finding partial sums when adding decimals similar to finding partial sums when adding whole numbers?

Activity Debrief: Discuss with students that partial sums is one strategy they can use to add decimals. Using this strategy, they can use place value to decompose each addend, find the partial sums, and then add partial sums to calculate the sum of the decimals.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine the total cost of the helicopter and robot?

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Decimal Cards

3.86	9.14
2.7	8.01
5.65	7.3
9.13	9.6
6.7	2.23

Guided Exploration

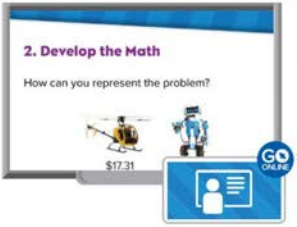
Students extend their understanding of using partial sums to add whole numbers to using partial sums to add decimal numbers.

Facilitate Meaningful Mathematical Discussion

- How can you find an estimate for the sum? What is your estimate?
- **Think About It:** How did you use use partial sums when adding whole numbers?
- How does your understanding of place value and expanded form help you decompose decimal numbers?

Have students discuss different ways to find the partial sums. Ask:

- Which place would you start with? Why?
- Why do you get the same sum if you start with different places?
- How can you assess the reasonableness of the calculated answer?
- How would you decide which strategy to use to add decimals?



2. Develop the Math

How can you represent the problem?

English Learner Scaffolds

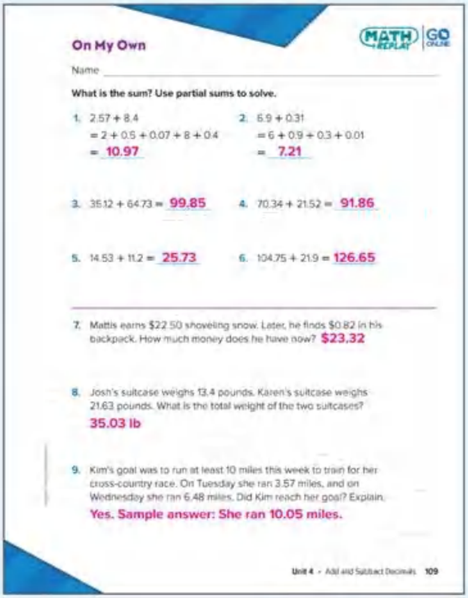
Entering/Emerging Support students' understanding of cost. First, choose a classroom object, such as a book. Write a price on a sticker or piece of paper and put it on the object. Say *It's $5.00. The cost is $5.00.* Repeat the task with a different classroom object. Say *It's $1.50.* Then prompt them to complete the following sentence saying the correct cost aloud: *The* ________ *is $1.50.*

Developing/Expanding Support students' understanding of cost. Choose an object. Say *It's $5.00. The cost is $5.00.* Repeat the task with a new object. Say *It's $1.50.* Prompt students to restate using cost. Finally, ask students to repeat the task, choosing a new object to put a price tag on, and stating its cost.

Bridging/Reaching Ensure comprehension of the meaning of *cost*. Then have students brainstorm other verbs associated with money such as *buy* and *sell*.

Practice & Reflect

10 min



On My Own

Name ____________

What is the sum? Use partial sums to solve.

1. 2.57 + 8.4
= 2 + 0.5 + 0.07 + 8 + 0.4
= 10.97

2. 6.9 + 0.31
= 6 + 0.9 + 0.3 + 0.01
= 7.21

3. 35.12 + 64.73 = 99.85

4. 70.34 + 21.52 = 91.86

5. 14.53 + 11.2 = 25.73

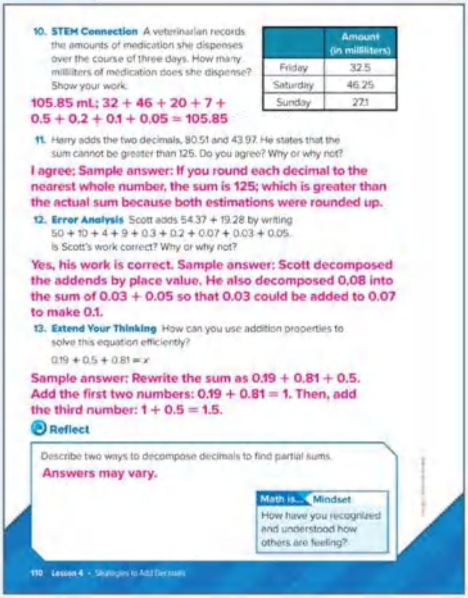
6. 104.75 + 21.9 = 126.65

7. Mattis earns $22.50 shoveling snow. Later, he finds $0.82 in his backpack. How much money does he have now? $23.32

8. Josh's suitcase weighs 13.4 pounds. Karen's suitcase weighs 21.63 pounds. What is the total weight of the two suitcases?
35.03 lb

9. Kim's goal was to run at least 10 miles this week to train for her cross-country race. On Tuesday she ran 3.57 miles, and on Wednesday she ran 6.48 miles. Did Kim reach her goal? Explain.
Yes. Sample answer: She ran 10.05 miles.

Unit 4 • Add and Subtract Decimals 109



10. **STEM Connection** A veterinarian records the amounts of medication she dispenses over the course of three days. How many milliliters of medication does she dispense? Show your work.

	Amount (in milliliters)
Friday	32.5
Saturday	46.25
Sunday	27.1

105.85 mL; 32 + 46 + 20 + 7 + 0.5 + 0.2 + 0.1 + 0.05 = 105.85

11. Harry adds the two decimals, 80.51 and 43.97. He states that the sum cannot be greater than 125. Do you agree? Why or why not?
I agree; Sample answer: If you round each decimal to the nearest whole number, the sum is 125; which is greater than the actual sum because both estimations were rounded up.

12. **Error Analysis** Scott adds 54.37 + 19.28 by writing
50 + 10 + 4 + 9 + 0.3 + 0.2 + 0.07 + 0.03 + 0.05.
Is Scott's work correct? Why or why not?
Yes, his work is correct. Sample answer: Scott decomposed the addends by place value. He also decomposed 0.08 into the sum of 0.03 + 0.05 so that 0.03 could be added to 0.07 to make 0.1.

13. **Extend Your Thinking** How can you use addition properties to solve this equation efficiently?
$0.19 + 0.5 + 0.81 = x$
Sample answer: Rewrite the sum as 0.19 + 0.81 + 0.5. Add the first two numbers: 0.19 + 0.81 = 1. Then, add the third number: 1 + 0.5 = 1.5.

Reflect

Describe two ways to decompose decimals to find partial sums.
Answers may vary.

Math is... Mindset
How have you recognized and understood how others are feeling?

110 Lesson 4 • Strategies to Add Decimals

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 3–6 Students may use place value incorrectly when decomposing decimals. For example, students may decompose 8.4 as 8 + 0.04.

Item Analysis

Item	DOK	Rigor
1–6	2	Procedural Skill and Fluency
7–10	3	Application
11–13	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- Describe two ways to decompose decimals to find partial sums.

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you worked to recognize and respond to the emotions of others?

Students reflect on how they practiced social awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use strategies to add decimals.
- I can explain the strategy I use to add decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Add decimals using strategies	5.NBT.B.7
2	2	Add decimals using strategies	5.NBT.B.7
3	3	Add decimals using strategies	5.NBT.B.7
4	3	Add decimals using strategies	5.NBT.B.7
5	3	Add decimals using strategies	5.NBT.B.7

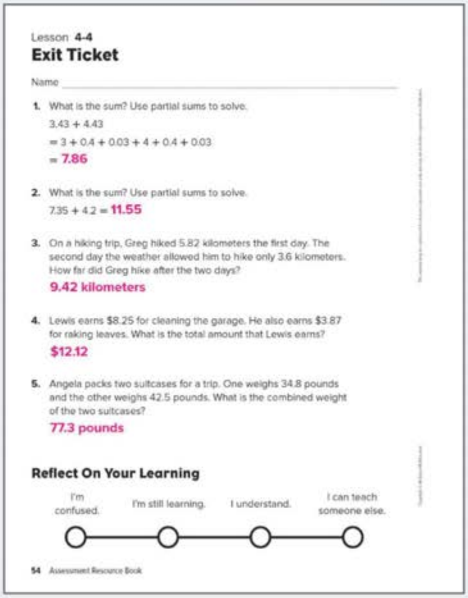
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
5 of 5	Additional Practice or any of the B or E activities
4 of 5	*Take Another Look* or any of the B activities
3 or fewer of 5	Small Group Intervention or any of the R activities

Key for Differentiation

R Reinforce Understanding
B Build Proficiency
E Extend Thinking



Lesson 4-4

Exit Ticket

Name ______________________

1. What is the sum? Use partial sums to solve.
   3.43 + 4.43
   = 3 + 0.4 + 0.03 + 4 + 0.4 + 0.03
   = 7.86
2. What is the sum? Use partial sums to solve.
   7.35 + 4.2 = 11.55
3. On a hiking trip, Greg hiked 5.82 kilometers the first day. The second day the weather allowed him to hike only 3.6 kilometers. How far did Greg hike after the two days?
   9.42 kilometers
4. Lewis earns $8.25 for cleaning the garage. He also earns $3.87 for raking leaves. What is the total amount that Lewis earns?
   $12.12
5. Angela packs two suitcases for a trip. One weighs 34.8 pounds and the other weighs 42.5 pounds. What is the combined weight of the two suitcases?
   77.3 pounds

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

54 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Adding Decimals

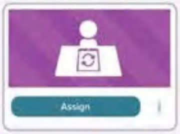
Work with students in pairs. Have the students write eight 3-digit numbers, each with a decimal point after the first digit, in sectors on paper that is placed below a transparent spinner. Then have each student spin the spinner once. Have one student add the two numbers using decomposition by place value and the other student add using decomposition into whole numbers and decimals. Make sure students understand that both strategies will always give the same sum. Then have students spin two more numbers and switch roles.

GO ONLINE

Take Another Look Lesson

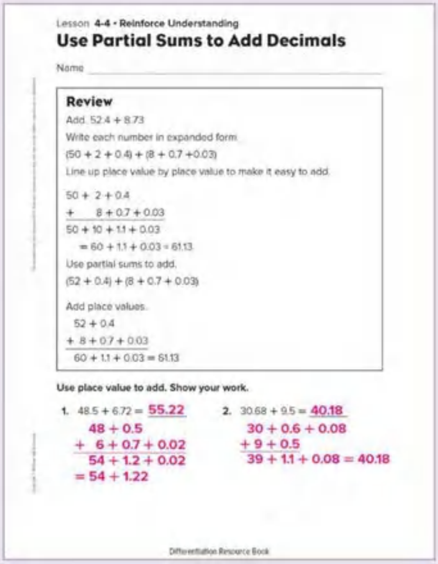
Assign the interactive lesson to reinforce targeted skills.

- Adding and Subtracting (Partial Sums and Differences)



INDEPENDENT WORK

Differentiation Resource Book, p. 27



Lesson **4-4 • Reinforce Understanding**

Use Partial Sums to Add Decimals

Name

Review

Add. $52.4 + 8.73$

Write each number in expanded form.

$(50 + 2 + 0.4) + (8 + 0.7 + 0.03)$

Line up place value by place value to make it easy to add.

$50 + 2 + 0.4$
$+ \quad 8 + 0.7 + 0.03$
$50 + 10 + 1.1 + 0.03$
$= 60 + 1.1 + 0.03 = 61.13$

Use partial sums to add.

$(52 + 0.4) + (8 + 0.7 + 0.03)$

Add place values.

$52 + 0.4$
$+ \ 8 + 0.7 + 0.03$
$60 + 1.1 + 0.03 = 61.13$

Use place value to add. Show your work.

1. $48.5 + 6.72 =$ 55.22
$48 + 0.5$
$+ \ 6 + 0.7 + 0.02$
$54 + 1.2 + 0.02$
$= 54 + 1.22$

2. $30.68 + 9.5 =$ 40.18
$30 + 0.6 + 0.08$
$+ 9 + 0.5$
$39 + 1.1 + 0.08 = 40.18$

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Decimal Addition Tic Tac Toe

Students practice adding decimals.

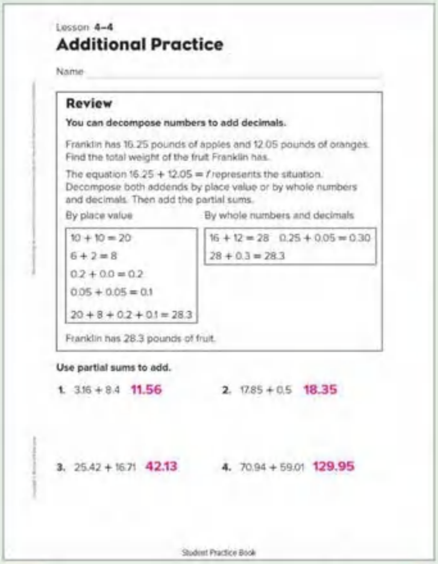
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 27–28



Lesson **4–4**

Additional Practice

Name

Review

You can decompose numbers to add decimals.

Franklin has 16.25 pounds of apples and 12.05 pounds of oranges. Find the total weight of the fruit Franklin has.

The equation $16.25 + 12.05 = f$ represents the situation. Decompose both addends by place value or by whole numbers and decimals. Then add the partial sums.

By place value

$10 + 10 = 20$
$6 + 2 = 8$
$0.2 + 0.0 = 0.2$
$0.05 + 0.05 = 0.1$
$20 + 8 + 0.2 + 0.1 = 28.3$

By whole numbers and decimals

$16 + 12 = 28$ $\quad 0.25 + 0.05 = 0.30$
$28 + 0.3 = 28.3$

Franklin has 28.3 pounds of fruit.

Use partial sums to add.

1. $3.16 + 8.4$ 11.56

2. $17.85 + 0.5$ 18.35

3. $25.42 + 16.71$ 42.13

4. $70.94 + 59.01$ 129.95

Student Practice Book

Own It! Digital Station

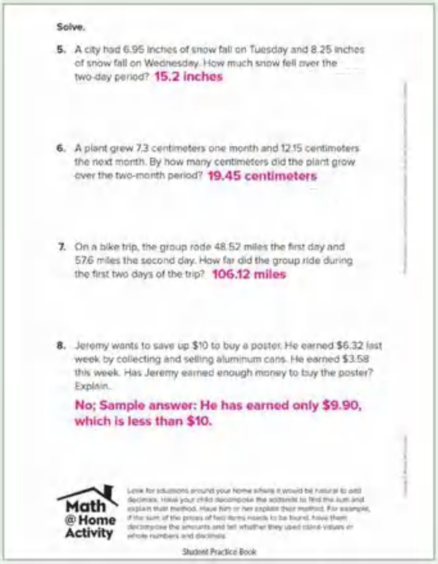
Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting decimals.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 27–28



Solve.

5. A city had 6.95 inches of snow fall on Tuesday and 8.25 inches of snow fall on Wednesday. How much snow fell over the two-day period? **15.2 inches**

6. A plant grew 7.3 centimeters one month and 12.15 centimeters the next month. By how many centimeters did the plant grow over the two-month period? **19.45 centimeters**

7. On a bike trip, the group rode 48.52 miles the first day and 57.6 miles the second day. How far did the group ride during the first two days of the trip? **106.12 miles**

8. Jeremy wants to save up $10 to buy a poster. He earned $6.32 last week by collecting and selling aluminum cans. He earned $3.58 this week. Has Jeremy earned enough money to buy the poster? Explain.

No; Sample answer: He has earned only $9.90, which is less than $10.

Math @Home Activity

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Cost of Living Depends on Where You Live

Students use equations to compare the cost of living in rural towns and urban cities. *The content of this card has concepts covered later in Lesson 4-8. You may want to assign this card to students ready to explore content covered later in this unit.*

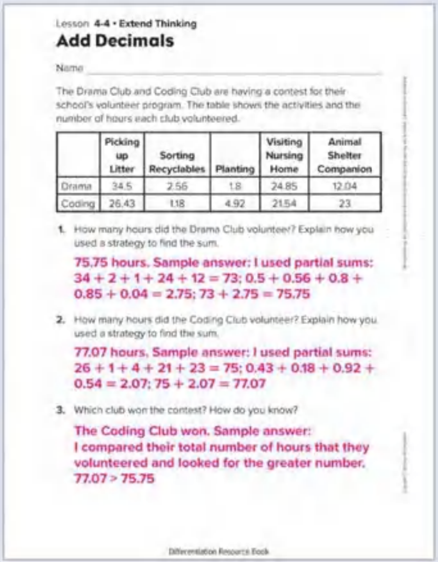
GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 28



Lesson **4-4 • Extend Thinking**

Add Decimals

Name ____________________

The Drama Club and Coding Club are having a contest for their school's volunteer program. The table shows the activities and the number of hours each club volunteered.

	Picking up Litter	Sorting Recyclables	Planting	Visiting Nursing Home	Animal Shelter Companion
Drama	34.5	2.56	1.8	24.85	12.04
Coding	26.43	1.18	4.92	21.54	23

1. How many hours did the Drama Club volunteer? Explain how you used a strategy to find the sum.

75.75 hours. Sample answer: I used partial sums: $34 + 2 + 1 + 24 + 12 = 73$; $0.5 + 0.56 + 0.8 + 0.85 + 0.04 = 2.75$; $73 + 2.75 = 75.75$

2. How many hours did the Coding Club volunteer? Explain how you used a strategy to find the sum.

77.07 hours. Sample answer: I used partial sums: $26 + 1 + 4 + 21 + 23 = 75$; $0.43 + 0.18 + 0.92 + 0.54 = 2.07$; $75 + 2.07 = 77.07$

3. Which club won the contest? How do you know?

The Coding Club won. Sample answer: I compared their total number of hours that they volunteered and looked for the greater number. $77.07 > 75.75$

Differentiation Resource Book

LESSON **4-5**

Represent Subtraction of Decimals

Learning Targets

- I can represent subtraction of decimals less than 1 containing tenths.
- I can represent subtraction of decimals less than 1 containing hundredths.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Model with mathematics.

MPP Use appropriate tools strategically.

Vocabulary

Math Term	**Academic Terms**
decimal grid	assert prove

Materials

The materials may be for any part of the lesson.

- *Blank Number Lines* Teaching Resource
- number cubes
- *Tenths and Hundredths* Teaching Resource

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students use decimal grids to represent subtraction of decimals with the same number of decimal places.	• Students explain how to use decimal grids to represent subtraction of decimals while answering *Wh-* and using *how much* as needed. • Support optimizing output, MLR4: Info Gap.	• Students collaborate with peers and contribute to group effort to achieve a collective mathematical goal.

Coherence

Previous	**Now**	**Next**
• Students fluently added and subtracted multi-digit whole numbers using the standard algorithm (Grade 4). • Students used addition strategies to add decimals (Unit 4).	• Students extend their understanding of decimals by representing subtraction of decimals.	• Students use decimal grids to subtract (Unit 4). • Students add, subtract, multiply, and divide decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students create and use representations to build their understanding of subtraction with decimals.	• Students build proficiency with place-value skills and start to develop skills for subtracting decimals through hundredths.	• Students use decimal grids to represent subtraction of decimals with the same number of decimal places. *Application is not a specific element of rigor for this standard.*

Number Routine

Which Benchmark Is It Closest To? 5–7 min

Build Fluency Students build fluency as they find the benchmark numbers nearest to a decimal.

These prompts encourage students to talk about their reasoning:

- What did you think about first when you observed one of the decimals?
- Once you know that a decimal is located between two benchmarks, how do you decide which benchmark it is closer to?
- Is there more than one possible benchmark for 0.5? Explain.
- How is this exercise similar to rounding? How is it different?

Launch 5–7 min

Sense-Making Routine

Purpose Students discuss real-world applications of showing decimals on a decimal grid.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may want to have students work in pairs as they brainstorm questions. This can help build a collaborative classroom culture. It also allows for greater participation among students as they share their thinking with their partners.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about representing subtraction of decimals and are based on possible comments and questions that students may make during the share out.

- How could you find how many more blue squares there are than orange squares?
- Explain when you have seen a grid like this before.
- What decimal could the yellow squares represent? Explain why.

Math is... Mindset

- How can you justify your thinking?

SEL Relationship Skills: Teamwork

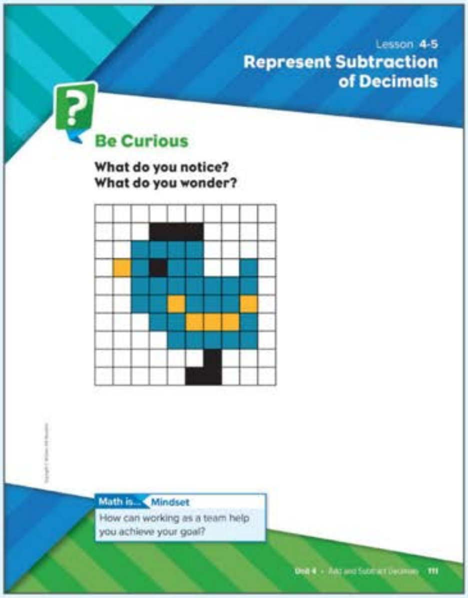
After students work through the Notice & Wonder routine independently, have them share their reasoning with a partner and advocate for their chosen representation. If students have used different representations to Notice & Wonder, or found different solutions, invite them to work together to understand one another's reasoning. Remind students that strong learners are willing to learn from not only their teachers but also their peers.

Transition to Explore & Develop

Ask questions that get students thinking about representing subtraction of decimals.

ETP Establish Mathematics Goals to Focus Learning

- Let's talk about ways we can represent subtraction of decimals.



Lesson 4-5

Represent Subtraction of Decimals

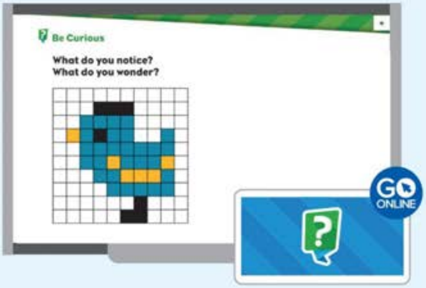
Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

How can working as a team help you achieve your goal?

Unit 4 • Add and Subtract Decimals 111

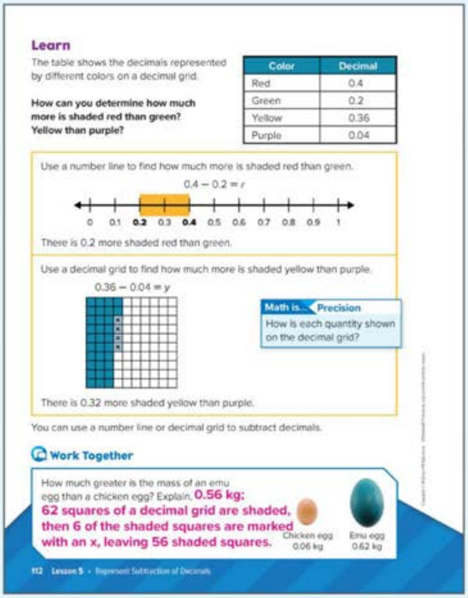


Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

The table shows the decimals represented by different colors on a decimal grid.

How can you determine how much more is shaded red than green? Yellow than purple?

Color	Decimal
Red	0.4
Green	0.2
Yellow	0.36
Purple	0.04

Use a number line to find how much more is shaded red than green.

$0.4 - 0.2 = r$

There is 0.2 more shaded red than green.

Use a decimal grid to find how much more is shaded yellow than purple.

$0.36 - 0.04 = y$

There is 0.32 more shaded yellow than purple.

Math is... Precision

How is each quantity shown on the decimal grid?

You can use a number line or decimal grid to subtract decimals.

Work Together

How much greater is the mass of an emu egg than a chicken egg? Explain. **0.56 kg; 62 squares of a decimal grid are shaded, then 6 of the shaded squares are marked with an x, leaving 56 shaded squares.**

112 Lesson 5 • Represent Subtraction of Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- What operation does this problem call for? Why do you think that?
- How do you think you might represent the information you have?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Info Gap

Pair students. Provide Partner A with a problem like the one on the Learn page. Provide Partner B with the information to carry out the problem. Instruct Partner B to ask A what information they need, and for A to respond, explaining why they need it. Have students continue until the problem is completed.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- What are some ways you can represent and solve decimal subtraction problems? Which way do you prefer? Why?
- How is using a representation to subtract decimals similar to using representations to add decimals? How is it different?

Key Takeaway

- Subtraction of decimals can be represented using concrete models or drawings, such as decimal grids.

Work Together

You may wish to provide copies of the *Tenths and Hundredths* Teaching Resource or *Blank Open Number Lines* Teaching Resource for students to use as they solve the Work Together problem.

Common Error Students may get distracted by the 6s in different places in the two masses. Remind them to be careful to consider not just the digit, but the place a digit is in, and the value a digit represents.

LOM Language of Math

Students need multiple opportunities to use key terms so they become part of their active vocabulary. Ask students questions that require the use of *tenths*, *hundredths*, and *variable*.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students will write subtraction expressions and then use models to subtract the decimals.

Materials: number cube (labeled 1–6), *Blank Number Lines* Teaching Resource, *Tenths and Hundredths* Teaching Resource

Directions: Have students roll the number cube to create a decimal number to the tenths with a 0 in the ones place. Roll again to make another decimal number to the tenths. Students write a subtraction expression using the two decimal numbers. Students use decimal grids or number lines to find the difference. Repeat by rolling two number cubes and using the digits to make a decimal number to the hundredths.

ETP Support Productive Struggle

- How did you determine which tool to use to represent the problem?
- Could you have used the hundredths grid to show subtraction of decimals in the tenths? Explain why or why not.
- Explain how you know what you found is the difference.
- How can you show that your calculated difference is reasonable?

Math is... Modeling

- How is each quantity shown on the decimal grid?

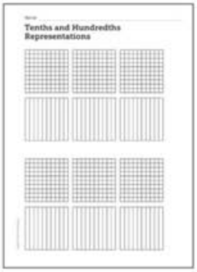
Students discuss how they use decimal grids to represent decimal numbers and decimal subtraction.

Activity Debrief: After students work through their solutions, encourage them to share their strategies and answers with others.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine how much more is shaded red than green? Yellow than purple?

The PDF of the Teaching Resource is available in the Digital Teacher Center.



Guided Exploration

Students use number lines or decimal grids to represent subtraction equations involving decimals to the tenths or hundredths.

ETP Use and Connect Mathematical Representations

- **Think About It:** What have you used to represent subtraction of whole numbers?

Provide copies of *Blank Number Lines* and *Tenths and Hundredths* to students. Ask:

- Which tool would you choose to solve the equation? Why?
- How could you use that tool?
- How will you label the number line? How do you know?
- Where will you place each known value on the number line?
- How can you find the difference between these two decimal numbers on the number line? Is there more than one way?

Discuss with students that there are two ways to show subtraction on a number line. One way is by plotting both known values and counting the difference between those points. Another way is starting at the greater known value and counting back the lesser known value. Ask:

- What are the similarities and differences of these methods?

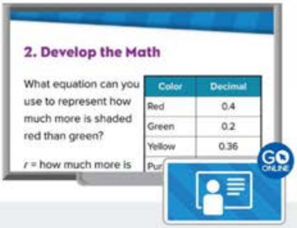
Have students use *Tenths and Hundredths* to solve 0.36 – 0.04.

- Why did you use the hundredths decimal grid? Could you have used the tenths decimal grid?

Math is... Modeling

- How is each quantity shown on the decimal grid?

Students discuss how they use decimal grids to represent decimal numbers and decimal subtraction.


2. Develop the Math

What equation can you use to represent how much more is shaded red than green?

r = how much more is

Color	Decimal
Red	0.4
Green	0.2
Yellow	0.36
Pur	

EL English Learner Scaffolds

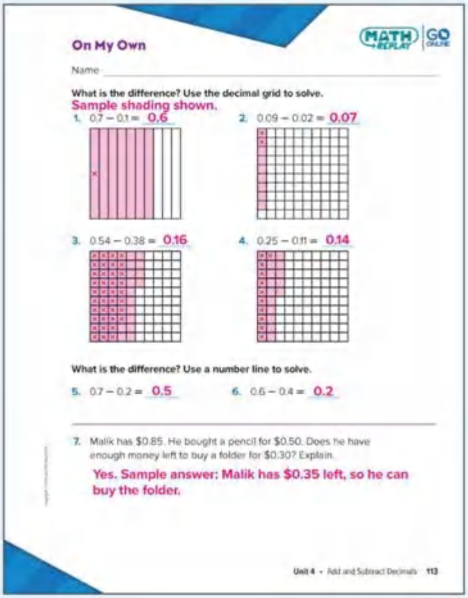
Entering/Emerging Ensure understanding of *How much more...* Cut two pieces of string, different sizes. Give the longer piece to a student. Ask *How much more do you have?* Measure both pieces and say *You have [10 more inches].* Repeat the task again and ask *How much more do you have?* Give two choices: the correct answer and a distractor that represents the full length of the longer piece.

Developing/Expanding Ensure understanding of *How much more...* Cut two pieces of yarn, different sizes. Give the longer piece to a student. Ask *How much more do you have?* Measure both strings and say *You have [10 more inches].* Repeat the task again with two new pieces and ask *How much more do you have?* Expect a full sentence response.

Bridging/Reaching Ask students to say what method they like to use to determine how much more of something there is: a number line or decimal grid. Ask them to explain why. Allow students to interject and make corrections as needed. For example: *I don't agree. I prefer to use...because....* or *I don't think using.... I think....*

Practice & Reflect

10 min



On My Own

Name

What is the difference? Use the decimal grid to solve.

Sample shading shown.

1. $0.7 - 0.1 =$ 0.6
2. $0.09 - 0.02 =$ 0.07
3. $0.54 - 0.38 =$ 0.16
4. $0.25 - 0.11 =$ 0.14

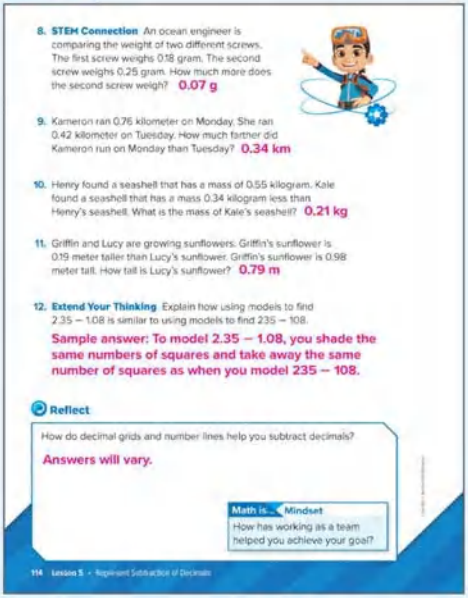
What is the difference? Use a number line to solve.

5. $0.7 - 0.2 =$ 0.5
6. $0.6 - 0.4 =$ 0.2

7. Malik has $0.85. He bought a pencil for $0.50. Does he have enough money left to buy a folder for $0.30? Explain.

Yes. Sample answer: Malik has $0.35 left, so he can buy the folder.

Unit 4 • Add and Subtract Decimals 113



8. **STEM Connection** An ocean engineer is comparing the weight of two different screws. The first screw weighs 0.18 gram. The second screw weighs 0.25 gram. How much more does the second screw weigh? 0.07 g

9. Kameron ran 0.76 kilometer on Monday. She ran 0.42 kilometer on Tuesday. How much farther did Kameron run on Monday than Tuesday? 0.34 km

10. Henry found a seashell that has a mass of 0.55 kilogram. Kale found a seashell that has a mass 0.34 kilogram less than Henry's seashell. What is the mass of Kale's seashell? 0.21 kg

11. Griffin and Lucy are growing sunflowers. Griffin's sunflower is 0.19 meter taller than Lucy's sunflower. Griffin's sunflower is 0.98 meter tall. How tall is Lucy's sunflower? 0.79 m

12. **Extend Your Thinking** Explain how using models to find $2.35 - 1.08$ is similar to using models to find $235 - 108$.

Sample answer: To model $2.35 - 1.08$, you shade the same numbers of squares and take away the same number of squares as when you model $235 - 108$.

Reflect

How do decimal grids and number lines help you subtract decimals?

Answers will vary.

Math is... Mindset

How has working as a team helped you achieve your goal?

114 Lesson 5 • Represent Subtraction of Decimals

Practice

Build Porcedural Fluency from Conceptual Understanding

Common Error: Exercise 8 Students may add instead of subtract because the word "more" is in the question. Remind students that "how much more than" indicates a subtraction problem.

Item Analysis

Item	DOK	Rigor
1–6	2	Procedural Skill and Fluency
7–11	3	Application
12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How do decimal grids and number lines help you subtract decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you worked to understand your partner's thinking?

Students reflect on how they developed stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can represent subtraction of decimals less than 1 containing tenths.
- I can represent subtraction of decimals less than 1 containing hundredths.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Subtract decimals with the same number of decimal places using decimal grids	5.NBT.B.7
2	2	Subtract decimals with the same number of decimal places using decimal grids	5.NBT.B.7
3	3	Subtract decimals with the same number of decimal places using decimal grids	5.NBT.B.7
4	3	Subtract decimals with the same number of decimal places using decimal grids	5.NBT.B.7

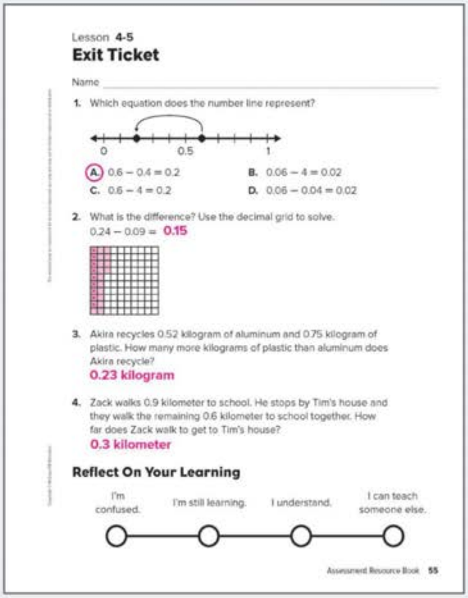
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 4-5

Exit Ticket

Name

1. Which equation does the number line represent?

[✓ A.] 0.6 − 0.4 = 0.2 B. 0.06 − 4 = 0.02

C. 0.6 − 4 = 0.2 D. 0.06 − 0.04 = 0.02

2. What is the difference? Use the decimal grid to solve.
0.24 − 0.09 = 0.15

3. Akira recycles 0.52 kilogram of aluminum and 0.75 kilogram of plastic. How many more kilograms of plastic than aluminum does Akira recycle?
0.23 kilogram

4. Zack walks 0.9 kilometer to school. He stops by Tim's house and they walk the remaining 0.6 kilometer to school together. How far does Zack walk to get to Tim's house?
0.3 kilometer

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 55

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Roll It, Subtract It!

Work with students in pairs. One student rolls a number cube and writes the digit rolled as a decimal in tenths. Both students subtract the decimal from 0.7. Help students to use a decimal grid or a number line as needed. Repeat with another roll. Once students are comfortable working with tenths, have them roll twice to create a decimal in hundredths, then subtract from 0.7.

GO ONLINE

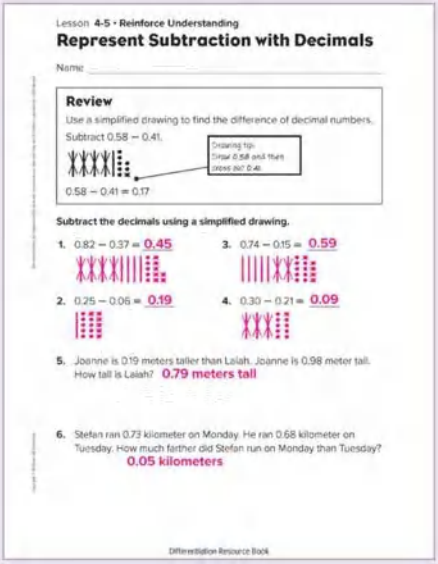
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Model Subtracting Decimal Numbers

INDEPENDENT WORK

Differentiation Resource Book, p. 29



Lesson **4-5 • Reinforce Understanding**

Represent Subtraction with Decimals

Name ______________________

Review

Use a simplified drawing to find the difference of decimal numbers.

Subtract $0.58 - 0.41$.

Drawing tip: Draw 0.58 and then cross out 0.41.

$0.58 - 0.41 = 0.17$

Subtract the decimals using a simplified drawing.

1. $0.82 - 0.37 =$ **0.45**
2. $0.25 - 0.06 =$ **0.19**
3. $0.74 - 0.15 =$ **0.59**
4. $0.30 - 0.21 =$ **0.09**
5. Joanne is 0.19 meters taller than Lalah. Joanne is 0.98 meter tall. How tall is Laiah? **0.79 meters tall**
6. Stefan ran 0.73 kilometer on Monday. He ran 0.68 kilometer on Tuesday. How much farther did Stefan run on Monday than Tuesday? **0.05 kilometers**

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Represent Subtraction of Decimals Task Cards

Students practice representing subtraction of decimals.

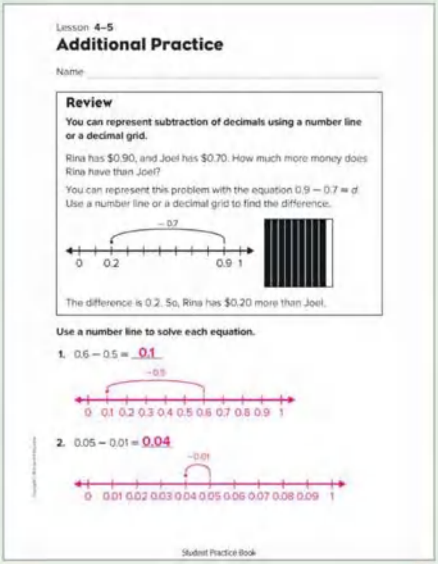
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 29–30



Lesson **4–5**

Additional Practice

Name ______________________

Review

You can represent subtraction of decimals using a number line or a decimal grid.

Rina has \$0.90, and Joel has \$0.70. How much more money does Rina have than Joel?

You can represent this problem with the equation $0.9 - 0.7 = d$. Use a number line or a decimal grid to find the difference.

The difference is 0.2. So, Rina has \$0.20 more than Joel.

Use a number line to solve each equation.

1. $0.6 - 0.5 =$ **0.1**

2. $0.05 - 0.01 =$ **0.04**

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting decimals.

Use It! Application Station

Balancing a Checkbook Students research checking accounts and practice balancing a checkbook. *The content of this card has concepts covered later in Lesson 4-7. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

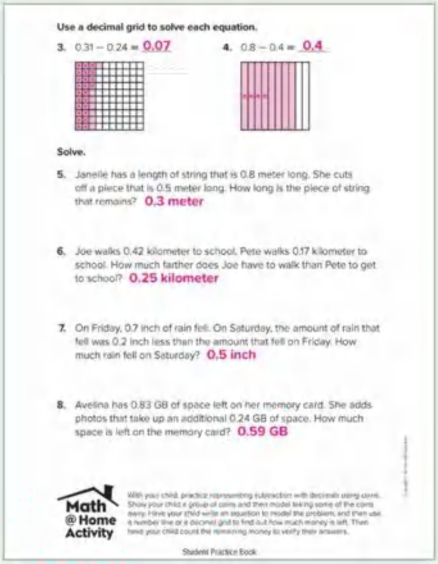
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 29–30



Use a decimal grid to solve each equation.

3. 0.31 − 0.24 = 0.07

4. 0.8 − 0.4 = 0.4

Solve.

5. Janelle has a length of string that is 0.8 meter long. She cuts off a piece that is 0.5 meter long. How long is the piece of string that remains? 0.3 meter

6. Joe walks 0.42 kilometer to school. Pete walks 0.17 kilometer to school. How much farther does Joe have to walk than Pete to get to school? 0.25 kilometer

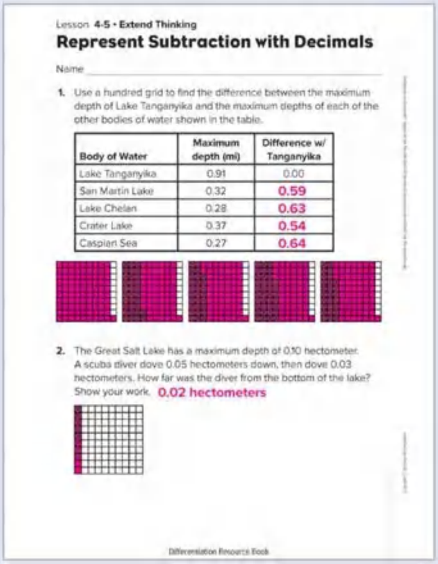
7. On Friday, 0.7 inch of rain fell. On Saturday, the amount of rain that fell was 0.2 inch less than the amount that fell on Friday. How much rain fell on Saturday? 0.5 inch

8. Avelina has 0.83 GB of space left on her memory card. She adds photos that take up an additional 0.24 GB of space. How much space is left on the memory card? 0.59 GB

Math @ Home Activity With your child, practice representing subtraction with decimals using coins. Show your child a group of coins and then model taking some of the coins away. Have your child write an equation to model the problem, and then use a number line or a decimal grid to find out how much money is left. Then have your child count the remaining money to verify their answers.

Student Practice Book

Differentiation Resource Book, p. 30



Lesson **4-5 • Extend Thinking**

Represent Subtraction with Decimals

Name ____________________

1. Use a hundred grid to find the difference between the maximum depth of Lake Tanganyika and the maximum depths of each of the other bodies of water shown in the table.

Body of Water	Maximum depth (mi)	Difference w/ Tanganyika
Lake Tanganyika	0.91	0.00
San Martin Lake	0.32	0.59
Lake Chelan	0.28	0.63
Crater Lake	0.37	0.54
Caspian Sea	0.27	0.64

2. The Great Salt Lake has a maximum depth of 0.10 hectometer. A scuba diver dove 0.05 hectometers down, then dove 0.03 hectometers. How far was the diver from the bottom of the lake? Show your work. 0.02 hectometers

Differentiation Resource Book

LESSON **4-6**

Represent Subtraction of Tenths and Hundredths

Learning Targets

- I can subtract tenths from hundredths.
- I can subtract hundredths from tenths.

Vocabulary

Math Term	**Academic Terms**
decimal grid	accurate
	evaluate

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Model with mathematics.

Materials

The materials may be for any part of the lesson.

- *Decimal Grids* Teaching Resource

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students use decimal grids to represent subtraction of decimals with different number of decimal places.	• Students discuss using patterns to solve problems while answering *Wh-* questions and using *longer than* and *more*. • Cultivate conversation, MLR3: Critique, Correct, and Clarify.	• Students break down a situation to identify the problem at hand.

Coherence

Previous	**Now**	**Next**
• Students added and subtracted whole numbers using the standard algorithm (Grade 4). • Students used representations to subtract decimals (Unit 4).	• Students extend their understanding of subtraction of decimals by using decimal grids to subtract tenths and hundredths.	• Students subtract decimals by decomposing the number being subtracted (Unit 4). • Students add, subtract, multiply, and divide decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build on their understanding of subtraction of decimals by using decimal grids to represent subtraction.	• Students build proficiency breaking down decimals into whole parts and decimal parts and writing equivalent names for decimals.	• Students represent subtraction of decimals to solve problems with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine

Which Benchmark Is It Closest To? 5–7 min

Build Fluency Students build fluency as they decide which benchmark each decimal is closest to.

These prompts encourage students to talk about their reasoning:

- How did you determine the nearest benchmark number for each decimal?
- Why did you choose the strategy that you used?
- Is there more than one possible benchmark for 1.5? Explain.
- Once you know that a decimal is located between two benchmarks, how do you decide to which benchmark it is closer?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about decimals used to represent the lengths of insects.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may want to have students work in pairs to discuss what they notice about the numbers.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of using decimal grids to represent subtraction of tenths and hundredths and are based on possible comments and questiuons that students may make during the share out.

- How are these numbers similar? How are they different?
- How could you represent these numbers?
- How could you represent each of these numbers using the same type of decimal grid?

Math is... Mindset

- How can you identify the information needed to solve a problem?

SEL Responsible Decision-Making: Identify Problems

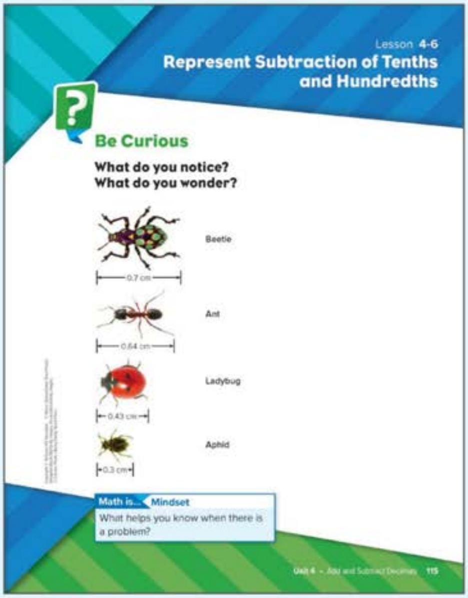
Help students develop strong learning habits by providing them opportunities to practice responsible decision-making skills. As students consider the Notice & Wonder routine, invite them to share what information is most useful to identify the mathematical task at hand.

Transition to Explore & Develop

Ask questions that get students thinking about subtracting decimals with different number of decimal places. Ask them to think about ways to subtract, without using the standard algorithm. Guide students to think about the different strategies they can use to subtract decimals.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we can use decimal grids and other representaions to represent subtraction of tenths and hundredths.



Lesson 4-6

Represent Subtraction of Tenths and Hundredths

Be Curious

What do you notice?
What do you wonder?

Beetle
0.7 cm

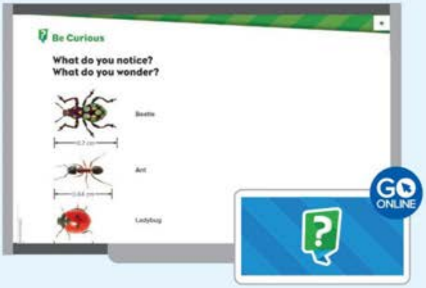
Ant
0.64 cm

Ladybug
0.43 cm

Aphid
0.3 cm

Math is... Mindset
What helps you know when there is a problem?

Unit 4 • Add and Subtract Decimals 115



Be Curious

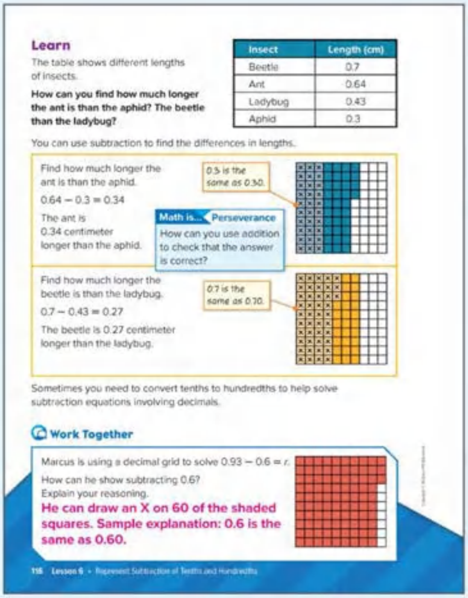
What do you notice?
What do you wonder?

Beetle
0.7 cm

Ant
0.64 cm

Ladybug

Explore & Develop 20 min



Learn

The table shows different lengths of insects.

How can you find how much longer the ant is than the aphid? The beetle than the ladybug?

Insect	Length (cm)
Beetle	0.7
Ant	0.64
Ladybug	0.43
Aphid	0.3

You can use subtraction to find the differences in lengths.

Find how much longer the ant is than the aphid.

0.64 − 0.3 = 0.34

The ant is 0.34 centimeter longer than the aphid.

0.3 is the same as 0.30.

Math is... Perseverance

How can you use addition to check that the answer is correct?

Find how much longer the beetle is than the ladybug.

0.7 − 0.43 = 0.27

The beetle is 0.27 centimeter longer than the ladybug.

0.7 is the same as 0.70.

Sometimes you need to convert tenths to hundredths to help solve subtraction equations involving decimals.

Work Together

Marcus is using a decimal grid to solve 0.93 − 0.6 = *r*.

How can he show subtracting 0.6?

Explain your reasoning.

He can draw an X on 60 of the shaded squares. Sample explanation: 0.6 is the same as 0.60.

116 Lesson 6 • Represent Subtraction of Tenths and Hundredths

❶ Pose the Problem

ETP Pose Purposeful Questions

- How did you represent subtraction of decimals in earlier problems?
- How is subtraction of these decimals different from decimal subtraction that you have performed in the past?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Critique, Correct, and Clarify

Make a false claim for students to critique. Write *0.04 — 0.01 = 0.03*. Point to the equation and say *This equation is correct. Yes* or *No?* Ask students to correct the statement. Revisit this routine throughout the lesson to provide reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How is the way you use decimal grids to subtract decimals having different numbers of decimal places similar to how you used them the subtract decimals having the same number of decimal places?
- How is it different?

Key Takeaway

- Subtraction of decimals with different number of decimal places can be represented using concrete models or drawings, such as decimal grids.

Work Together

You may wish to provide copies of the *Decimal Grids* Teaching Resource to have students represent the subtraction using a decimal grid.

Common Error Students may subtract 0.06 instead of 0.6. Have them pay close attention to decimal places and zeros.

LOM Language of Math

The term *difference* is a noun. Ask students to think of real-world situations where this word is used. Have students compare this meaning to the mathematical meaning of the word. Let students practice using the word correctly when subtracting decimals, using decimal grids.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using decimal grids to solve subtraction equations involving decimals with tenths and hundredths.

Materials: *10 × 10* Teaching Resource

Directions: Provide copies of the *10 × 10* Teaching Resource to each pair or small group. Have students solve the Pose the Problem.

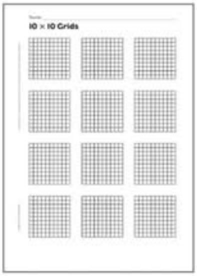
Support Productive Struggle

- How did you determine how to represent 0.3 on a decimal grid showing hundredths?
- Will your strategy for subtracting tenths and hundredths on a decimal grid always work?
- Is there another way to solve the problem?

Math is... Perseverance

- How can you use addition to check that the answer is correct?

Students verify that their plans work by checking their answer using another method.



Activity Debrief: After groups work through their solutions, encourage them to share their decimal grids and answers with others. Facilitate a discussion to ensure students understand that when using representations to subtract tenths and hundredths, it is necessary to represent the tenths as an equivalent hundredths.

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students extend their understanding of representing subtraction of decimals with different number of decimal places.

Use and Connect Mathematical Representations

Have the students create the equation.

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

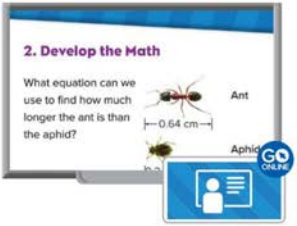
Have the students estimate the solution.

- Will you use rounding or compatible numbers to estimate the solution? Why?
- How does using a decimal grid to model subtraction of decimals with different numbers of decimal places help you understand the problem?
- **Think About It:** How can you use equivalent fractions to justify that 0.3 = 0.30?

Math is... Perseverance

- How can you use addition to check that the answer is correct?

Students verify that their plans work by checking their answer using another method.



2. Develop the Math

What equation can we use to find how much longer the ant is than the aphid?

English Learner Scaffolds

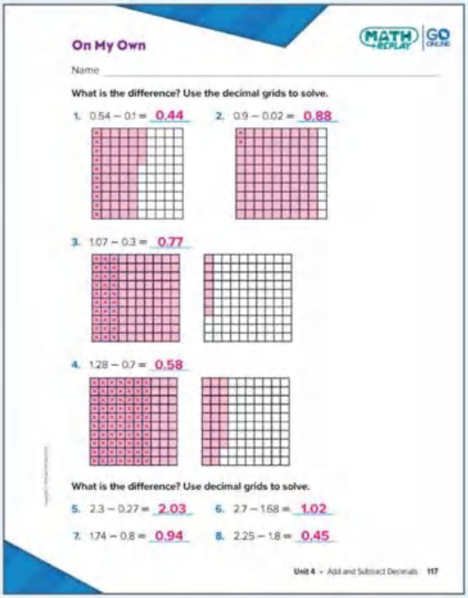
Entering/Emerging Support students in understanding *lengths*. Put three pencils on the desk, different sizes. Say *Let's find the lengths of the pencils*. Measure each pencil and say *The length is (5 inches)* for each. Repeat with new objects. Finally, show students three more objects and ask them *What are the lengths?* Prompt students to measure each object and say the lengths aloud.

Developing/Expanding Support students in understanding *lengths*. Put three pencils on the desk, different sizes. Say *Let's find the lengths of the pencils*. Measure each pencil and say *The length is (5 inches)* for each. Repeat with new objects. Then ask students to choose three more objects and to tell you their lengths.

Bridging/Reaching Ask students to talk about the different measurements for length that they know. For example, *miles, kilometers, inches,* etc. Then have them sort them into two groups: metric and standard. Discuss with students the abbreviations we use for each. Validate or correct student vocabulary and grammar as needed.

Practice & Reflect

10 min



On My Own

Name ________________________

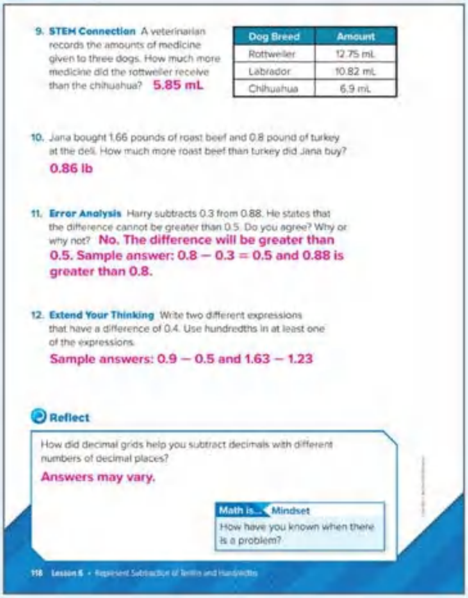
What is the difference? Use the decimal grids to solve.

1. 0.54 − 0.1 = 0.44
2. 0.9 − 0.02 = 0.88
3. 1.07 − 0.3 = 0.77
4. 1.28 − 0.7 = 0.58

What is the difference? Use decimal grids to solve.

5. 2.3 − 0.27 = 2.03
6. 2.7 − 1.68 = 1.02
7. 1.74 − 0.8 = 0.94
8. 2.25 − 1.8 = 0.45

Unit 4 • Add and Subtract Decimals 117



9. **STEM Connection** A veterinarian records the amounts of medicine given to three dogs. How much more medicine did the rottweiler receive than the chihuahua? 5.85 mL

Dog Breed	Amount
Rottweiler	12.75 mL
Labrador	10.82 mL
Chihuahua	6.9 mL

10. Jana bought 1.66 pounds of roast beef and 0.8 pound of turkey at the deli. How much more roast beef than turkey did Jana buy? 0.86 lb

11. **Error Analysis** Harry subtracts 0.3 from 0.88. He states that the difference cannot be greater than 0.5. Do you agree? Why or why not? No. The difference will be greater than 0.5. Sample answer: 0.8 − 0.3 = 0.5 and 0.88 is greater than 0.8.

12. **Extend Your Thinking** Write two different expressions that have a difference of 0.4. Use hundredths in at least one of the expressions. Sample answers: 0.9 − 0.5 and 1.63 − 1.23

Reflect

How did decimal grids help you subtract decimals with different numbers of decimal places?

Answers may vary.

Math is... Mindset

How have you known when there is a problem?

118 Lesson 6 • Represent Subtraction of Tenths and Hundredths

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 1 Students may represent the 0.1 as one colored square in the grid instead of ten because they do not equate 0.1 with ten hundredths. Remind students that the first place after the decimal represents tenths. For some students, using grids to make and compare representations for one one-hundredth and one-tenth may be helpful.

Practice Item Analysis

Item	DOK	Rigor
1–8	2	Procedural Skill and Fluency
9–10	3	Application
11–12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did decimal grids help you subtract decimals with different numbers of decimal places?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you practice responsible decision making?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can subtract tenths from hundredths.
- I can subtract hundredths from tenths.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Exit Ticket **Formative Assessment**

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Subtract decimals with different number of decimal places using decimal grids	5.NBT.B.7
2	2	Subtract decimals with different number of decimal places using decimal grids	5.NBT.B.7
3	3	Subtract decimals with different number of decimal places using decimal grids	5.NBT.B.7
4	3	Subtract decimals with different number of decimal places using decimal grids	5.NBT.B.7

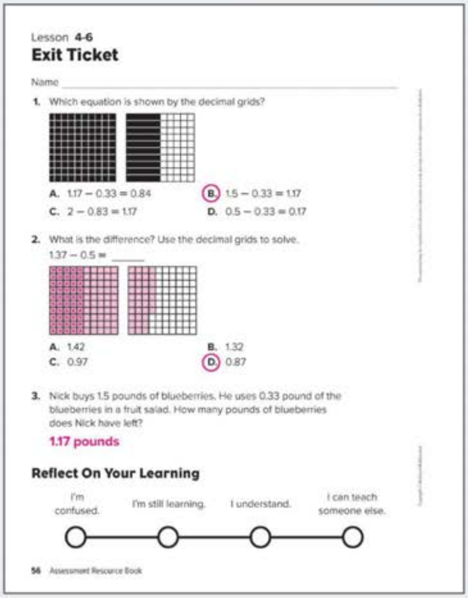
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson **4-6**

Exit Ticket

Name ______

1. Which equation is shown by the decimal grids?

A. 1.17 − 0.33 = 0.84 [✓ **B.**] 1.5 − 0.33 = 1.17
C. 2 − 0.83 = 1.17 **D.** 0.5 − 0.33 = 0.17

2. What is the difference? Use the decimal grids to solve.
1.37 − 0.5 = ______

A. 1.42 **B.** 1.32
C. 0.97 [✓ **D.**] 0.87

3. Nick buys 1.5 pounds of blueberries. He uses 0.33 pound of the blueberries in a fruit salad. How many pounds of blueberries does Nick have left?

1.17 pounds

Reflect On Your Learning

I'm confused. ○ — I'm still learning. ○ — I understand. ○ — I can teach someone else. ○

56 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

How Much More?

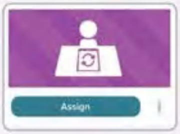
Have students use decimal grids to represent an amount of money between $1.00 and $2.00. Give them a price of an item that is less than $1.00. Have students then use the decimal grids to determine how much more money they have than the cost of the item. Remind students to place the decimal point correctly in their answers. Repeat for different item prices.

GO ONLINE

Take Another Look Lesson

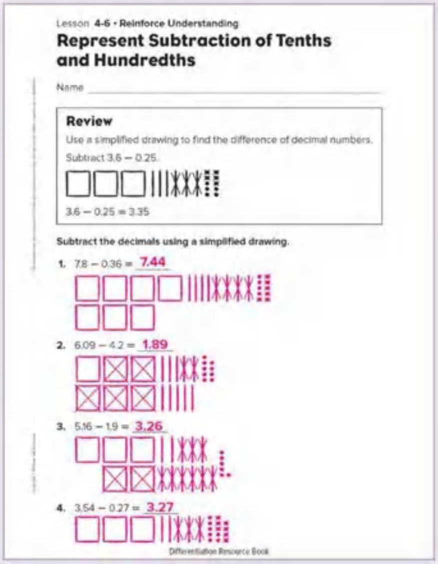
Assign the interactive lesson to reinforce targeted skills.

- Represent Adding and Subtracting (Tenths and Hundredths)



INDEPENDENT WORK

Differentiation Resource Book, p. 31



Lesson **4-6 • Reinforce Understanding**

Represent Subtraction of Tenths and Hundredths

Name ____________________

Review

Use a simplified drawing to find the difference of decimal numbers.

Subtract 3.6 − 0.25.

3.6 − 0.25 = 3.35

Subtract the decimals using a simplified drawing.

1. 7.8 − 0.36 = 7.44
2. 6.09 − 4.2 = 1.89
3. 5.16 − 1.9 = 3.26
4. 3.54 − 0.27 = 3.27

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Subtract Tens and Hundredths Race

Students practice subtracting decimals.

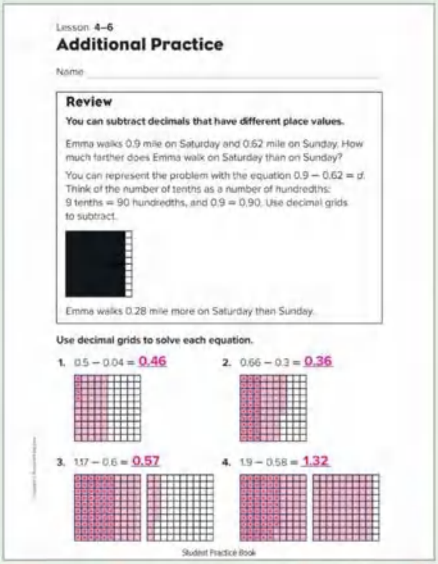
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 31–32



Lesson **4–6**

Additional Practice

Name ____________________

Review

You can subtract decimals that have different place values.

Emma walks 0.9 mile on Saturday and 0.62 mile on Sunday. How much farther does Emma walk on Saturday than on Sunday?

You can represent the problem with the equation 0.9 − 0.62 = d. Think of the number of tenths as a number of hundredths: 9 tenths = 90 hundredths, and 0.9 = 0.90. Use decimal grids to subtract.

Emma walks 0.28 mile more on Saturday than Sunday.

Use decimal grids to solve each equation.

1. 0.5 − 0.04 = 0.46
2. 0.66 − 0.3 = 0.36
3. 1.17 − 0.6 = 0.57
4. 1.9 − 0.58 = 1.32

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtractingdecimals.

Use It! Application Station

Cost of Living Depends on Where You Live

Students use equations to compare the cost of living in rural towns and urban cities. *The content of this card has concepts covered later in Lesson 4-8. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 31–32

Solve.

5. A basketball player brings 1.8 liters of water to practice. If she has 0.65 liter of water left after practice, how much water did the player drink during practice? **1.15 liters**

6. Suzie buys 1.4 pounds of Swiss cheese and 0.72 pound of cheddar cheese. How much more Swiss cheese did Suzie buy? **0.68 pound**

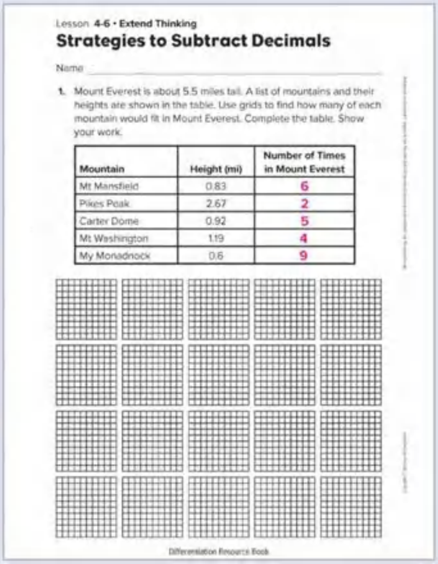
7. Yesterday, 0.63 inch of snow fell. Today, 0.2 inch of snow fell. How much more snow fell yesterday than today? **0.43 inch**

8. Charles bought 1.28 pounds of peanuts. He ate 0.4 pound of the peanuts at the game. What is the weight of the peanuts that Charles still has left? **0.88 pound**

Math @ Home Activity Use a group of dimes and a group of dimes, nickels, and pennies to represent subtracting tenths and hundredths. Have your child write the amounts for each group. Then have them use decimal grids to subtract the lesser amount from the greater amount. Have your child write the total amount of money. Then repeat with different numbers of coins in each group.

Student Practice Book

Differentiation Resource Book, p. 32



Lesson **4-6 • Extend Thinking**

Strategies to Subtract Decimals

Name ______________________

1. Mount Everest is about 5.5 miles tall. A list of mountains and their heights are shown in the table. Use grids to find how many of each mountain would fit in Mount Everest. Complete the table. Show your work.

Mountain	Height (mi)	Number of Times in Mount Everest
Mt Mansfield	0.83	6
Pikes Peak	2.67	2
Carter Dome	0.92	5
Mt Washington	1.19	4
My Monadnock	0.6	9

Differentiation Resource Book

LESSON **4-7**

Strategies to Subtract Decimals

Learning Targets

- I can use strategies to subtract decimals.
- I can explain the strategy I use to subtract decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Construct viable arguments and critique the reasoning of others.

MPP Use appropriate tools strategically.

Vocabulary

Math Term	**Academic Terms**
decompose	analyze
	prove

Materials

The materials may be for any part of the lesson.

- *Blank Open Number Lines* Teaching Resource
- *Decimal Cards* Teaching Resource

Focus

Content Objective

- Students can use subtraction strategies they know, such as partial differences and the relationship between addition and subtraction, to subtract decimals.

Language Objectives

- Students discuss subtraction strategies while answering *Wh-* and Yes/No questions and using adjectives such as *efficient* and *easier*.
- Support optimizing output, MLR7: Compare and Connect.

SEL Objective

- Students recognize personal strengths through thoughtful self-reflection.

Coherence

Previous

- Students added and subtracted whole numbers using the standard algorithm (Grade 3).
- Students used representations to subtract tenths and hundredths (Unit 4).

Now

- Students subtract decimals by decomposing the number being subtracted.
- Students connect subtraction to addition by counting up on a number line to find the difference.

Next

- Students use adding and subtracting decimals to solve real-world problems (Unit 4).
- Students add, subtract, multiply, and divide decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding

- Students build on their understanding of subtraction as they notice similarities between subtracting whole numbers and subtracting decimals.

Procedural Skill & Fluency

- Students build proficiency with subtraction facts and strategies for subtracting decimals.

Application

- Students use subtraction strategies, such as partial differences to subtract decimals.

Application is not a specific element of rigor for this standard.

Number Routine
Can You Make the Number? 5–7 min

Build Fluency Students build number sense and procedural fluency as they determine combinations of numbers using different operations to make the target number 10.

Remind students that each number can only be used once, but operations can be used as many times as they want.

Sample answers include $(4 \times 2 + 8 - 6) \div 1$, $(4 + 6 + 8) \div 2 + 1$, $(6 - 4) \div 2 + 1 + 8$, $6 \div (4 \div 2 + 1) + 8$, $4 - (6 \div 2) + 1 + 8$, and $(4 \div 2) \times 8 - (6 \times 1)$.

These prompts encourage students to talk about their reasoning:

- What is a different way to make the target number?
- How is order of operations used in making 10?
- How can we make the target number using all four operations?

Launch 5–7 min

Sense-Making Routine

Purpose Students look for connections among whole-number addition and subtraction equations.

Which Doesn't Belong?

- Which doesn't belong?

Teaching Tip You may want to have students write related addition and/or subtraction equations for each equation.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of what strategies could be used to subtract decimals and are based on possible comments and questions that students may make during the share out.

- How could you assess if the calculated sums and differences given are reasonable?
- Which of the equations are related? How do you know?
- What strategies would you have used to solve these addition and subtraction equations?

Math is... Mindset

- How can you stay focused on your math work?

SEL Self-Awareness: Recognize Strengths

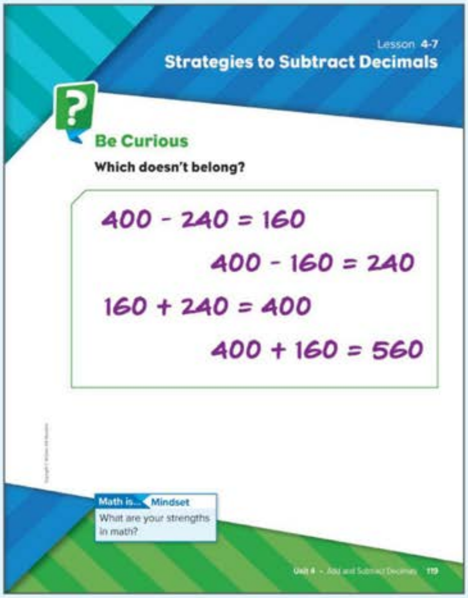
Before students begin the Which Doesn't Belong routine, invite them to think about their personal areas of strength in math. In addition to specific math skills, students may also acknowledge personal strengths that can help them with their learning, such as listening, staying focused, or explaining. As students work with strategies to subtract decimals throughout the lesson, model giving positive feedback to help them acknowledge their personal strengths. Encourage students to recognize and acknowledge the strengths of their peers.

Transition to Explore & Develop

Ask questions that get students thinking about the uses of estimates. Guide the discussion to have students think about how to subtract decimal numbers. If students bring up decomposing the number or representing the number with pictures organically, bring that into the discussion, but if students do not introduce the concept during this part of the lesson, they will be reminded of it in the Explore & Develop.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about strategies we can use to subtract decimals.



Lesson 4-7

Strategies to Subtract Decimals

Be Curious

Which doesn't belong?

400 - 240 = 160

400 - 160 = 240

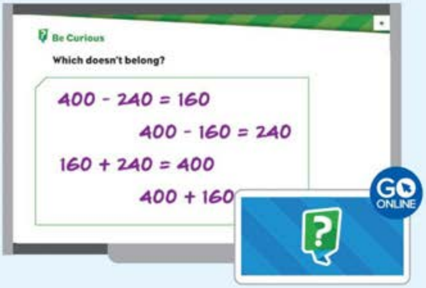
160 + 240 = 400

400 + 160 = 560

Math is... Mindset

What are your strengths in math?

Unit 4 • Add and Subtract Decimals 119



Be Curious

Which doesn't belong?

400 - 240 = 160

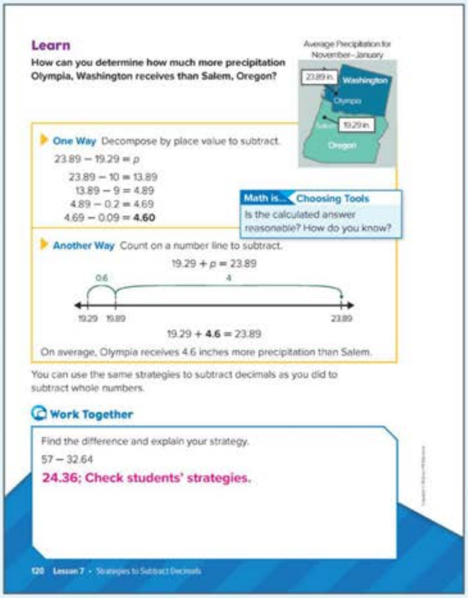
400 - 160 = 240

160 + 240 = 400

400 + 160

Explore & Develop

20 min



Learn

How can you determine how much more precipitation Olympia, Washington receives than Salem, Oregon?

One Way Decompose by place value to subtract.

$23.89 - 19.29 = p$

$23.89 - 10 = 13.89$
$13.89 - 9 = 4.89$
$4.89 - 0.2 = 4.69$
$4.69 - 0.09 = \mathbf{4.60}$

Math is... Choosing Tools
Is the calculated answer reasonable? How do you know?

Another Way Count on a number line to subtract.

$19.29 + p = 23.89$

$19.29 + \mathbf{4.6} = 23.89$

On average, Olympia receives 4.6 inches more precipitation than Salem.

You can use the same strategies to subtract decimals as you did to subtract whole numbers.

Work Together

Find the difference and explain your strategy.

$57 - 32.64$

24.36; Check students' strategies.

120 Lesson 7 • Strategies to Subtract Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- What representations did you use to understand subtraction of whole numbers?
- What strategies did you use to subtract whole numbers?
- How did you choose what strategy you used to subtract whole numbers?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students and give them an equation to solve similar to the one on the Learn page. Instruct one student to solve using partial differences and the other using counting. Then have them compare their strategies. Revisit this activity throughout the lesson to help students build proficiency.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How would you explain how to decompose number to subtract decimals to a friend?
- How does a related equation help you subtract decimals?
- How are the strategies used to subtract decimals the same as the strategies used to subtract whole numbers? How are they different?

Key Takeaways

- One subtraction strategy is to decompose one decimal by place value and then subtract the decomposed parts from the total.
- Rewriting a subtraction equation as a related addition equation is another strategy for finding the difference.
- Strategies used to subtract decimals are the same as those used to subtract whole numbers.

Work Together

You may wish to provide copies of *Blank Open Number Lines* Teaching Resource for students to use as they solve the Work Together problem.

Common Misconception Students may want to decompose both the decimal numbers to subtract, which can result in a negative partial difference that students are not yet prepared to handle. Remind students that, during problem solving, they should ask themselves "Do I need to try a different way to solve this?" and persevere with another plan when they encounter something they are not yet prepared to handle.

LOM Language of Math

Have students connect *related equations* to people who are *related* to them.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore different strategies to subtract decimal numbers.

Materials: *Blank Open Number Lines*, *Decimal Cards*

Directions: Ask students to write a subtraction problem involving two 3-digit whole numbers and solve the subtraction using as many strategies as they can. Invite students to share what they used.

- Do you think these strategies will work to subtract decimals?

Provide copies of *Decimal Cards* and *Blank Open Number Lines*. Have students select two decimals to write a subtraction expression. Students explore applying their strategies to subtract decimals.

ETP Support Productive Struggle

- How can you apply your method of decomposing whole numbers to decomposing decimals?
- How is decomposing to subtract decimals similar to decomposing to subtract whole numbers? How is it different?
- How is counting on to subtract decimals similar to counting on to subtract whole numbers? How is it different?

Math is... Choosing Tools

- Is your calculated answer reasonable? How do you know?

Students detect possible errors by strategically using estimation and other mathematical knowledge.

Activity Debrief: Discuss with students that decomposing and counting on are strategies they can use to solve subtraction problems involving decimals.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine how much more precipitation Olympia, Washington receives than Salem, Oregon?

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Decimal Cards

3.86	9.14
2.7	8.01
5.65	7.3
9.13	9.6
6.7	2.23

Guided Exploration

Students extend strategies they learned for subtracting whole numbers by decomposing the second number. They also connect subtraction to addition by counting up on a number line to find the difference between decimals.

ETP Facilitate Meaningful Mathematical Discourse

Have the students estimate the solution. Ask:

- Will you use rounding or compatible numbers to estimate? Why?
- **Think About It:** What strategies do you know for subtracting whole numbers?
- **Think About It:** Will you get the same answer if you decompose 19.29 into 19 and 0.29? Explain.

Have the students create the equation.

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

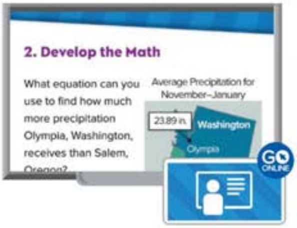
Have the students estimate the solution.

- Will you use rounding or compatible numbers to estimate? Why?
- **Think About It:** How did you use counting on to find the difference of whole numbers?
- Does one of the strategies seem more efficient than the other? Why?
- Describe a situation where it would be easier to use one of the strategies than the other.

Math is... Choosing Tools

- Is your calculated answer reasonable? How do you know?

Students detect possible errors by strategically using estimation and other mathematical knowledge.



2. Develop the Math

What equation can you use to find how much more precipitation Olympia, Washington, receives than Salem, Oregon?

EL English Learner Scaffolds

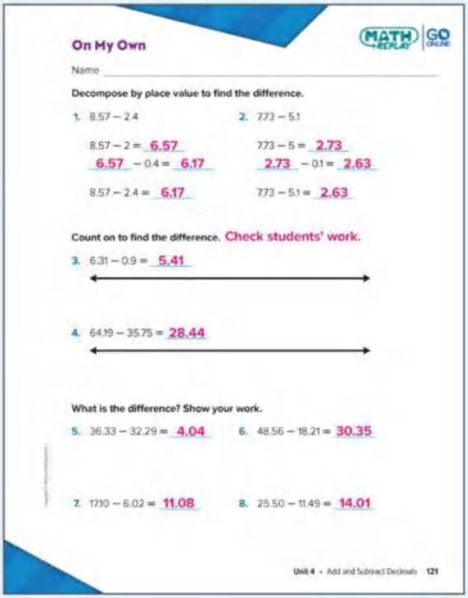
Entering/Emerging Support students' understanding of *the difference*. Put 30 counters on the desk. Say *I have 30 counters*. Then say *I'm going to take away 17. Remove 17*. Say *I'm going to find the difference*. Count the 13 counters left. Say *The difference is 13*. Repeat twice, and after the third time, instead of providing the difference, say *Find the difference*. Correct as needed.

Developing/Expanding Support students' understanding of *the difference*. Put 30 counters on the desk. Say *I have 30 counters*. Then say, *I'm going to take away 17*. Remove 17. Say *I'm going to find the difference*. Count the 13 counters left. Say *The difference is 13*. Repeat twice, and then ask students to repeat the task themselves. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to discuss the different meanings and uses of *difference*. For example, the difference between two quantities, the difference in appearance or use between two objects, differences of opinion or meaning, etc. Validate and correct student vocabulary and grammar as needed and allow students to use a dictionary if desired.

Practice & Reflect

10 min



On My Own

Name

Decompose by place value to find the difference.

1. 8.57 − 2.4

8.57 − 2 = 6.57
6.57 − 0.4 = 6.17

8.57 − 2.4 = 6.17

2. 7.73 − 5.1

7.73 − 5 = 2.73
2.73 − 0.1 = 2.63

7.73 − 5.1 = 2.63

Count on to find the difference. Check students' work.

3. 6.31 − 0.9 = 5.41

4. 64.19 − 35.75 = 28.44

What is the difference? Show your work.

5. 36.33 − 32.29 = 4.04

6. 48.56 − 18.21 = 30.35

7. 17.10 − 6.02 = 11.08

8. 25.50 − 11.49 = 14.01

Unit 4 • Add and Subtract Decimals 121

9. **STEM Connection** A veterinarian weighed a dog at a checkup. Its weight was 22.47 kilograms. When the dog came back for another checkup, it weighed 19.62 kilograms. How much weight did the dog lose? Show your work.
2.85 kg

10. Casey lives on the east side of town and is 25.9 kilometers from the hockey arena. Terry lives on the west side of town and is 18.75 kilometers from the hockey arena. How much farther away from the hockey arena does Casey live than Terry? 7.15 km

11. Find a pattern in this list of numbers. Then, list the next three numbers in the pattern.

0.73, 0.66, 0.59, 0.52, 0.45, 0.38

12. **Extend Your Thinking** Natalie said that the difference between 30.8 and 3.8 is 2.7. Explain to Natalie how you know that this statement is not reasonable and what a reasonable answer would be. **Sample answer: I rounded each number to the nearest whole number and subtracted. 31 − 4 = 27. Then, I knew the answer should be around 27, not 2.7.**

Reflect

How did you decide which strategy to use?
Answers may vary.

Math is... Mindset
How have you identified your strengths in math?

122 Lesson 7 • Strategies to Subtract Decimals

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 11 Students may need a hint that the pattern involves subtraction.

Practice Item Analysis

Item	DOK	Rigor
1–8	2	Procedural Skill and Fluency
9–10	3	Application
11–12	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did you decide which strategy to use?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you stayed focused on your math work?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use strategies to subtract decimals.
- I can explain the strategy I use to subtract decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	3	Subtracting decimals using strategies	5.NBT.B.7
2	3	Subtracting decimals using strategies	5.NBT.B.7
3	3	Subtracting decimals using strategies	5.NBT.B.7
4	3	Subtracting decimals using strategies	5.NBT.B.7
5	3	Subtracting decimals using strategies	5.NBT.B.7

Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

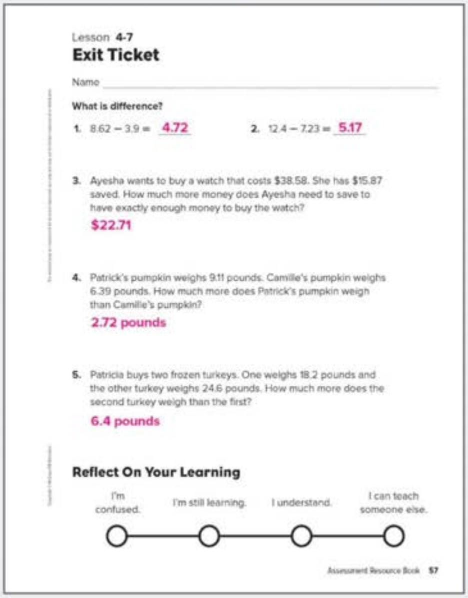
If students score	Then have students do
5 of 5	Additional Practice or any of the Ⓑ or Ⓔ activities
4 of 5	*Take Another Look* or any of the Ⓑ activities
3 or fewer of 5	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding

Ⓑ Build Proficiency

Ⓔ Extend Thinking



Lesson **4-7**

Exit Ticket

Name ______

What is difference?

1. 8.62 − 3.9 = 4.72

2. 12.4 − 7.23 = 5.17

3. Ayesha wants to buy a watch that costs $38.58. She has $15.87 saved. How much more money does Ayesha need to save to have exactly enough money to buy the watch?

$22.71

4. Patrick's pumpkin weighs 9.11 pounds. Camille's pumpkin weighs 6.39 pounds. How much more does Patrick's pumpkin weigh than Camille's pumpkin?

2.72 pounds

5. Patricia buys two frozen turkeys. One weighs 18.2 pounds and the other turkey weighs 24.6 pounds. How much more does the second turkey weigh than the first?

6.4 pounds

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 57

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Quality over Quantity

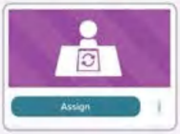
Give students a subtraction problem with decimals (decimal places to tenths). Encourage students to find the answer both quickly and correctly. Have students share the strategies they used to find the answer. If necessary, review how to find differences using number lines and partial differences.

GO ONLINE

Take Another Look Lesson

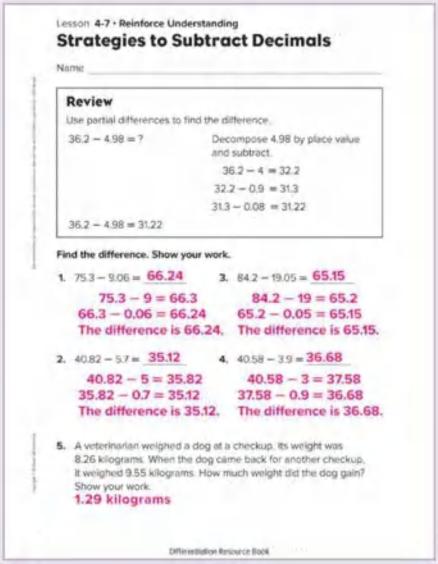
Assign the interactive lesson to reinforce targeted skills.

- Adding and Subtracting (Partial Sums and Differences)



INDEPENDENT WORK

Differentiation Resource Book, p. 33



Lesson **4-7 • Reinforce Understanding**

Strategies to Subtract Decimals

Name ____________________

Review

Use partial differences to find the difference.

36.2 − 4.98 = ?

Decompose 4.98 by place value and subtract.

36.2 − 4 = 32.2

32.2 − 0.9 = 31.3

31.3 − 0.08 = 31.22

36.2 − 4.98 = 31.22

Find the difference. Show your work.

1. 75.3 − 9.06 = 66.24

75.3 − 9 = 66.3

66.3 − 0.06 = 66.24

The difference is 66.24.

2. 40.82 − 5.7 = 35.12

40.82 − 5 = 35.82

35.82 − 0.7 = 35.12

The difference is 35.12.

3. 84.2 − 19.05 = 65.15

84.2 − 19 = 65.2

65.2 − 0.05 = 65.15

The difference is 65.15.

4. 40.58 − 3.9 = 36.68

40.58 − 3 = 37.58

37.58 − 0.9 = 36.68

The difference is 36.68.

5. A veterinarian weighed a dog at a checkup. Its weight was 8.26 kilograms. When the dog came back for another checkup, it weighed 9.55 kilograms. How much weight did the dog gain? Show your work.

1.29 kilograms

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

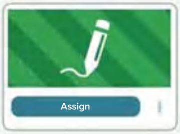
Decimal Subtraction Tic Tac Toe

Students practice subtracting decimals.

GO ONLINE

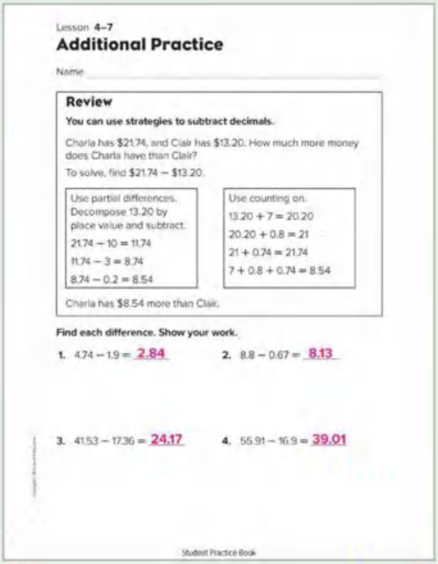
Interactive Additional Practice

Assign the digital version of the Student Practice Book.



INDEPENDENT WORK

Student Practice Book, pp. 33–34



Lesson **4–7**

Additional Practice

Name ____________________

Review

You can use strategies to subtract decimals.

Charla has $21.74, and Clair has $13.20. How much more money does Charla have than Clair?

To solve, find $21.74 − $13.20.

Use partial differences. Decompose 13.20 by place value and subtract.

21.74 − 10 = 11.74

11.74 − 3 = 8.74

8.74 − 0.2 = 8.54

Use counting on.

13.20 + 7 = 20.20

20.20 + 0.8 = 21

21 + 0.74 = 21.74

7 + 0.8 + 0.74 = 8.54

Charla has $8.54 more than Clair.

Find each difference. Show your work.

1. 4.74 − 1.9 = 2.84

2. 8.8 − 0.67 = 8.13

3. 41.53 − 17.36 = 24.17

4. 55.91 − 16.9 = 39.01

Student Practice Book

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtractingdecimals.

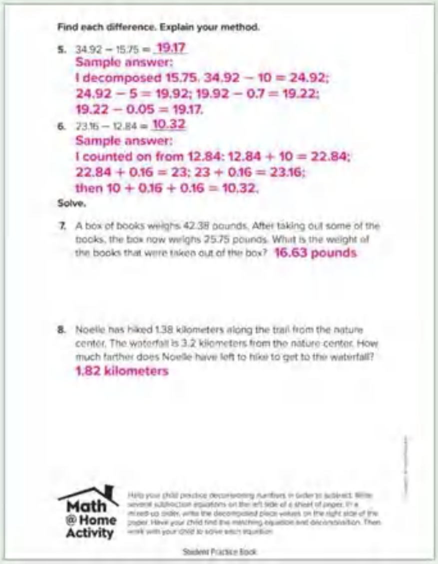
GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

INDEPENDENT WORK

Student Practice Book, pp. 33–34



Find each difference. Explain your method.

5. 34.92 − 15.75 = 19.17
Sample answer:
I decomposed 15.75. 34.92 − 10 = 24.92;
24.92 − 5 = 19.92; 19.92 − 0.7 = 19.22;
19.22 − 0.05 = 19.17.

6. 23.16 − 12.84 = 10.32
Sample answer:
I counted on from 12.84: 12.84 + 10 = 22.84;
22.84 + 0.16 = 23; 23 + 0.16 = 23.16;
then 10 + 0.16 + 0.16 = 10.32.

Solve.

7. A box of books weighs 42.38 pounds. After taking out some of the books, the box now weighs 25.75 pounds. What is the weight of the books that were taken out of the box? 16.63 pounds

8. Noelle has hiked 1.38 kilometers along the trail from the nature center. The waterfall is 3.2 kilometers from the nature center. How much farther does Noelle have left to hike to get to the waterfall? 1.82 kilometers

Math @ Home Activity Help your child practice decomposing numbers in order to subtract. Write several subtraction equations on the left side of a sheet of paper. In a mixed-up order, write the decomposed place values on the right side of the paper. Have your child find the matching equation and decomposition. Then work with your child to solve each equation.

Student Practice Book

E Extend Thinking

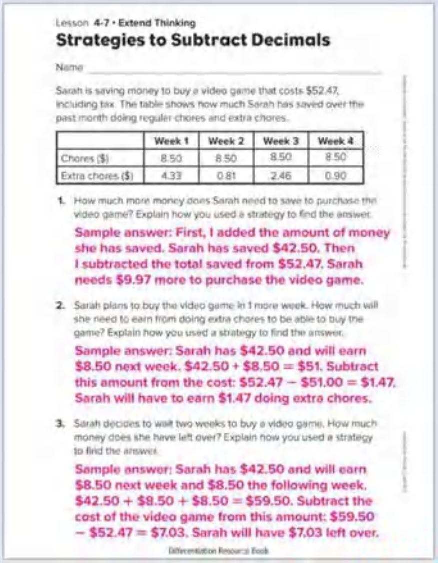
Use It! Application Station

Balancing a Checkbook Students research checking accounts and practice balancing a checkbook.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Differentiation Resource Book, p. 34



Lesson **4-7 • Extend Thinking**

Strategies to Subtract Decimals

Name ________________

Sarah is saving money to buy a video game that costs $52.47, including tax. The table shows how much Sarah has saved over the past month doing regular chores and extra chores.

	Week 1	Week 2	Week 3	Week 4
Chores ($)	8.50	8.50	8.50	8.50
Extra chores ($)	4.33	0.81	2.46	0.90

1. How much more money does Sarah need to save to purchase the video game? Explain how you used a strategy to find the answer.
Sample answer: First, I added the amount of money she has saved. Sarah has saved $42.50. Then I subtracted the total saved from $52.47. Sarah needs $9.97 more to purchase the video game.

2. Sarah plans to buy the video game in 1 more week. How much will she need to earn from doing extra chores to be able to buy the game? Explain how you used a strategy to find the answer.
Sample answer: Sarah has $42.50 and will earn $8.50 next week. $42.50 + $8.50 = $51. Subtract this amount from the cost: $52.47 − $51.00 = $1.47. Sarah will have to earn $1.47 doing extra chores.

3. Sarah decides to wait two weeks to buy a video game. How much money does she have left over? Explain how you used a strategy to find the answer.
Sample answer: Sarah has $42.50 and will earn $8.50 next week and $8.50 the following week. $42.50 + $8.50 + $8.50 = $59.50. Subtract the cost of the video game from this amount: $59.50 − $52.47 = $7.03. Sarah will have $7.03 left over.

Differentiation Resource Book

LESSON **4-8**

Explain Strategies to Add and Subtract Decimals

Learning Targets

- I can explain strategies for adding and subtracting decimals.
- I can add and subtract decimals to solve problems.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
decomposition	evaluate
partial sums	procedure

Materials

The materials may be for any part of the lesson.

- *Explain and Show Your Strategies* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students can explain their choice of strategy to solve.	• Students talk about their choice of strategy to solve a problem while answering *Wh-* questions and using the adjective *efficient*. • To support maximizing linguistic and cognitive meta-awareness, ELs participate in MLR5: Co-Craft Questions and Problems.	• Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing thoughtful and constructive feedback.

Coherence

Previous	Now	Next
• Students fluently added and subtracted multi-digit whole numbers using the standard algorithms (Grade 4). • Students subtracted decimals by decomposing the number being subtracted (Unit 4).	• Students extend their understanding of adding and subtracting decimals and solving real-world problems involving the sum and difference of decimals to explain the strategy used to solve.	• Students fluently multiply multi-digit whole numbers (Unit 5). • Students fluently add, subtract, multiply, and divide multi-digit decimals using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of adding and subtracting decimals as they use representations and models to explain the strategy used to find the sum or difference of decimals.	• Students build proficiency with strategies for adding and subtracting decimals.	• Students apply their understanding of addition and subtraction of decimals to solve problems with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine Can You Make the Number?

5–7 min

Build Fluency Students build number sense and procedural fluency as they determine combinations of the numbers using different operations to make the target number 16.

Remind students that there is more than one solution to the problem.

Remind students that each number can only be used once, but operations can be used as many times as they want.

Sample answers include

$(8 - 6) \times (4 \times 2) \times 1$,

$(6 + 8 + 4 - 2) \times 1$, and

$((4 + 2) \div 6 + 1) \times 8$.

These prompts encourage students to talk about their reasoning:

- What is a different way to get the target number?
- How can we make the target number using all four operations?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about a numberless word problem and the strategies they might use to solve it.

Numberless Word Problem

- What could you ask?
- What math do you use in this problem?

Teaching Tip You may want to have students work in pairs to discuss the numberless word problem.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about choosing and using strategies to add and subtract decimals and are based on possible comments and questions that students may make during the share out.

- What strategy would you use to solve this problem if it involved whole numbers only?
- How would your strategy change, if the problem involved decimals?

Math is... Mindset

- How can you show others you respect their ideas?

SEL Social Awareness: Respect Other

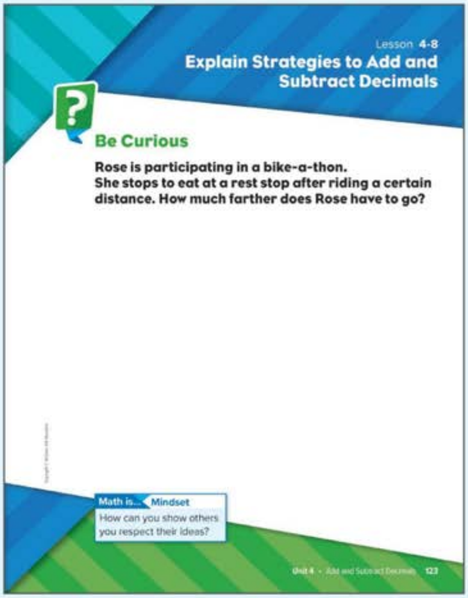
As students work with partners to complete the Numberless Word Problem routine, remind them to show respect by listening attentively when others are sharing their ideas. Provide models of constructive and respectful feedback to guide students. As students share what they know and do not know about the problem, encourage classmates to provide thoughtful feedback to one another. Remind students that respecting others is an important part of being a member of the class community.

Transition to Explore & Develop

Ask questions that get students thinking about strategies and models used to add and subtract decimals. Guide students to think about how they can explain strategies used to solve real-world problems involving decimal sums and differences.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about choosing and using strategies to add and subtract decimals.



Lesson 4-8

Explain Strategies to Add and Subtract Decimals

Be Curious

Rose is participating in a bike-a-thon. She stops to eat at a rest stop after riding a certain distance. How much farther does Rose have to go?

Math is... Mindset

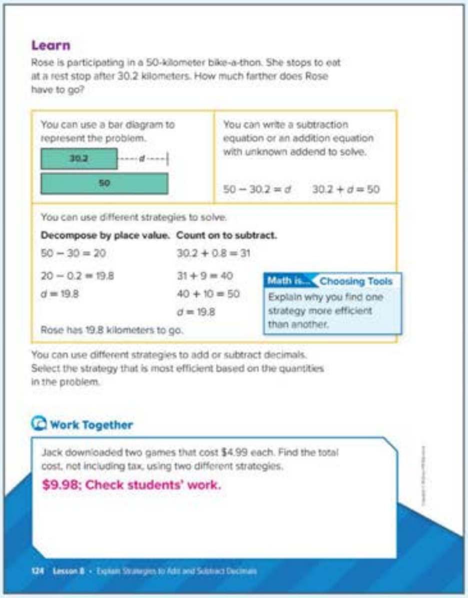
How can you show others you respect their ideas?

Unit 4 • Add and Subtract Decimals 123

Be Curious

Rose is participating in a bike-a-thon. She stops to eat at a rest stop after riding a certain distance. How much farther does Rose have to go?

Explore & Develop 20 min



Learn

Rose is participating in a 50-kilometer bike-a-thon. She stops to eat at a rest stop after 30.2 kilometers. How much farther does Rose have to go?

You can use a bar diagram to represent the problem.

You can write a subtraction equation or an addition equation with unknown addend to solve.

$50 - 30.2 = d$ $30.2 + d = 50$

You can use different strategies to solve.

Decompose by place value.	**Count on to subtract.**
$50 - 30 = 20$	$30.2 + 0.8 = 31$
$20 - 0.2 = 19.8$	$31 + 9 = 40$
$d = 19.8$	$40 + 10 = 50$
	$d = 19.8$

Rose has 19.8 kilometers to go.

Math is... Choosing Tools
Explain why you find one strategy more efficient than another.

You can use different strategies to add or subtract decimals. Select the strategy that is most efficient based on the quantities in the problem.

Work Together

Jack downloaded two games that cost $4.99 each. Find the total cost, not including tax, using two different strategies.

$9.98; Check students' work.

124 Lesson 8 • Explain Strategies to Add and Subtract Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- How do you know what operation is needed to solve the problem?
- In what ways can you represent this problem?
- What strategies have you learned? Which one would you use to solve this problem?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Co-Craft Questions and Problems

Pair students and have them co-create a problem similar to the one on the Learn page. Have them work together to solve their problem and then trade their problem with another pair. After each pair solves the other pair's problems, have them form a group of four to check solutions and correct any mistakes that may have been made. Revisit the routine throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How do you choose which strategy you use when solving a problem involving the addition or subtraction of decimals?

Key Takeaway

- Any of the addition or subtraction strategies can be used to determine a sum or difference.

Work Together

You may wish to provide copies of the *Show and Explain Your Strategies* Teaching Resource for students to use to solve the Work Together problem.

Common Misconception Students may assume the only strategies they can use are ones explicitly discussed in the lessons. Students could use the adjusting numbers strategy, by seeing that the cost of each game is $0.01 less than $5. So, the sum must be $0.02 less than $10.

LOM Language of Math

The term *representation* is a noun. Ask students to think of real-world situations where this word is used. Have students relate this meaning to a mathematical representation. Let students practice using the word correctly when explaining how to represent and solve problems involving decimal sums and differences.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore different strategies to solve real-world problems involving decimals.

Materials: *Explain and Show Your Strategies* Teaching Resource

Directions: Provide copies of the *Explain and Show Your Strategies* Teaching Resource. Have students solve the Pose the Problem using two different strategies.

Support Productive Struggle

- Which strategy did you use first? Why did you decide to start with that strategy?
- Was there a strategy that didn't work? Why do you think it didn't work?
- What is the same about your two strategies? What is different?

Math is... Choosing Tools

- Explain why you find one strategy more efficient than another.

Students make decisions about when tools might be helpful, recognizing both the knowledge to be gained and their limitations.

Activity Debrief: Discuss with students that problems can be solved using any known strategy. Some addition and subtraction strategies may be more efficient than others due to the quantities within the problem.

The PDF of the Teaching Resource is available in the Digital Teacher Center.

Show and Explain Your Strategies

Show

Explain

Check

Guided Exploration

Students extend their understanding of adding and subtracting decimals by using various strategies.

Use and Connect Mathematical Representations

- How does the bar diagram represent the problem?

Have students create the equations.

- How should the numbers appear in the equations? Why?
- How should the unknown appear in the equations? Why?

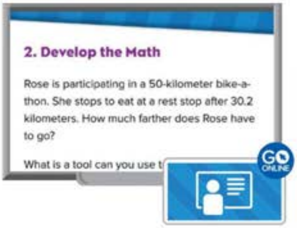
Offer different eTools that the students may use to aid and assist them in finding the solution. Have students work with a partner to discuss strategies for solving. Ask:

- Which tool would you use? Explain why.
- **Think About It:** Which strategies would not be efficient for solving $50 - 30.2 = d$?

Math is... Choosing Tools

- Explain why you find one strategy more efficient than another.

Students make decisions about when tools might be helpful, recognizing both the knowledge to be gained and their limitations.



2. Develop the Math

Rose is participating in a 50-kilometer bike-a-thon. She stops to eat at a rest stop after 30.2 kilometers. How much farther does Rose have to go?

What is a tool can you use t

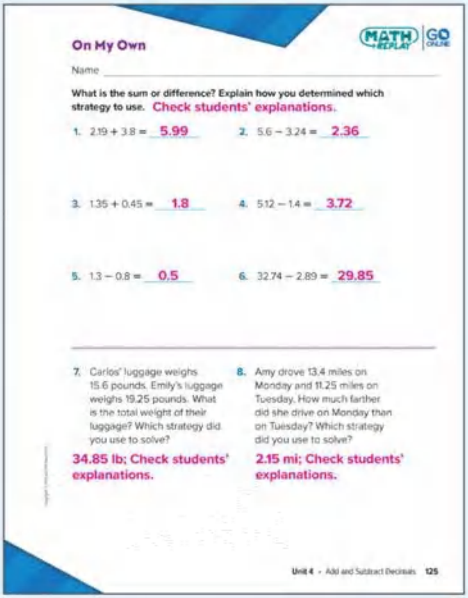
English Learner Scaffolds

Entering/Emerging Support students' understanding of *farther*. Place two objects such as two chairs across from your desk, with one chair being farther away than the other. Point to the chair that's farther away from you and say, *That chair is farther*. Repeat with two more pairs of objects. Then, choose two more pairs of objects, and ask students, *Which [book] is farther?*

Developing/Expanding Support students' understanding of *farther*. Place two objects across from your desk, with one being farther away than the other. Point to the object that's farther away and say *That (chair) is farther*. Repeat with two more pairs of objects. Then prompt students to choose two objects to compare and tell you which one is farther away from where they're standing.

Bridging/Reaching Have students compare and contrast the words *far* and *farther* and *close* and *closer*, and how they relate to distance. Allow students to interject, agreeing or disagreeing. For example, *Are you sure farther means...* or *I'm not sure about that. I think that if something is closer....*

Practice & Reflect 10 min



On My Own

Name ______

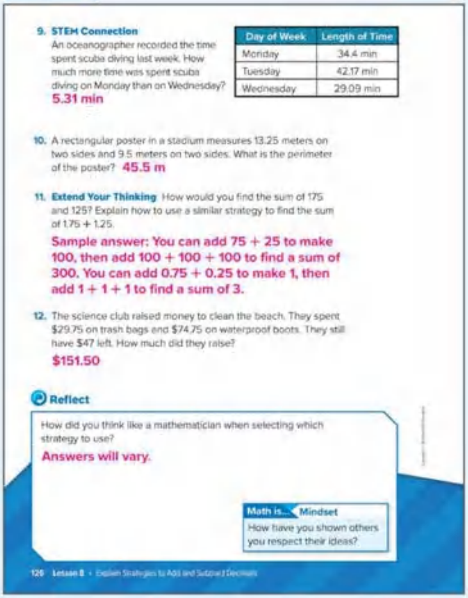
What is the sum or difference? Explain how you determined which strategy to use. Check students' explanations.

1. $2.19 + 3.8 =$ 5.99
2. $5.6 - 3.24 =$ 2.36
3. $1.35 + 0.45 =$ 1.8
4. $5.12 - 1.4 =$ 3.72
5. $1.3 - 0.8 =$ 0.5
6. $32.74 - 2.89 =$ 29.85

7. Carlos' luggage weighs 15.6 pounds. Emily's luggage weighs 19.25 pounds. What is the total weight of their luggage? Which strategy did you use to solve?
34.85 lb; Check students' explanations.

8. Amy drove 13.4 miles on Monday and 11.25 miles on Tuesday. How much farther did she drive on Monday than on Tuesday? Which strategy did you use to solve?
2.15 mi; Check students' explanations.

Unit 4 • Add and Subtract Decimals 125



9. **STEM Connection**
An oceanographer recorded the time spent scuba diving last week. How much more time was spent scuba diving on Monday than on Wednesday?
5.31 min

Day of Week	Length of Time
Monday	34.4 min
Tuesday	42.17 min
Wednesday	29.09 min

10. A rectangular poster in a stadium measures 13.25 meters on two sides and 9.5 meters on two sides. What is the perimeter of the poster? 45.5 m

11. **Extend Your Thinking** How would you find the sum of 175 and 125? Explain how to use a similar strategy to find the sum of $1.75 + 1.25$.
Sample answer: You can add $75 + 25$ to make 100, then add $100 + 100 + 100$ to find a sum of 300. You can add $0.75 + 0.25$ to make 1, then add $1 + 1 + 1$ to find a sum of 3.

12. The science club raised money to clean the beach. They spent $29.75 on trash bags and $74.75 on waterproof boots. They still have $47 left. How much did they raise?
$151.50

Reflect

How did you think like a mathematician when selecting which strategy to use?
Answers will vary.

Math is... Mindset
How have you shown others you respect their ideas?

126 Lesson 8 • Explain Strategies to Add and Subtract Decimals

Practice

ETP **Build Porcedural Fluency from Conceptual Understanding**

Common Error: Exercises 7–10 Students may use the wrong operation to solve. For example, for Exercise 8, students may solve $13.4 + 11.25$. Students may also incorrectly decompose a decimal. In Exercise 7, students may incorrectly break apart 15.6 as the sum of $15 + 0.06$.

Practice Item Analysis

Item	DOK	Rigor
1–6	2	Procedural Skill and Fluency
7–10	3	Application
11	4	Conceptual Understanding
12	3	Application

Reflect

Students complete the Reflect question.

- How did you think like a mathematician when selecting which strategy to use?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you shown others you respect their ideas?

Students reflect on how they practiced social awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain strategies for adding and subtracting decimals.
- I can add and subtract decimals to solve problems.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	3	Explain strategy to add decimals	5.NBT.B.7
2	3	Explain strategy to add decimals	5.NBT.B.7
3	3	Explain strategy to add decimals	5.NBT.B.7

Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking

Lesson **4-8**

Exit Ticket

Name ____________________

What is the sum or difference? Use a strategy to solve.

1. Mia's garden was 5.06 meters long. She made it 1.79 meters longer. What is the length of Mia's garden now?
   6.85 meters

2. Tailyn's class does a science experiment. They use 0.35 liter of saline solution and 0.07 liter of water. How much solution is there after mixing the two amounts?
   0.42 liter

3. Nawal makes 4.54 kilograms of salad for the family reunion. She has 1.29 kilograms of salad left after the reunion. How many kilograms of Nawal's salad was eaten at the reunion?
   3.25 kilograms

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

58 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Raise the Bar

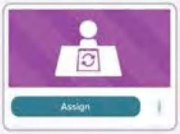
Provide students with a bar diagram that represents a decimal sum or difference such as 4.2 + 11.5 or 15.1 − 3.7. Each student writes the addition or subtraction expression that goes with the bar diagram and a real-world problem that may be represented by the model. If students have difficulty getting started, ask them what numbers are involved and whether they are combining the numbers (adding) or separating the numbers (subtracting). Have students share their expression and problem with the group. Have the group discuss strategies to use to solve each problem.

GO ONLINE

Take Another Look Lessons

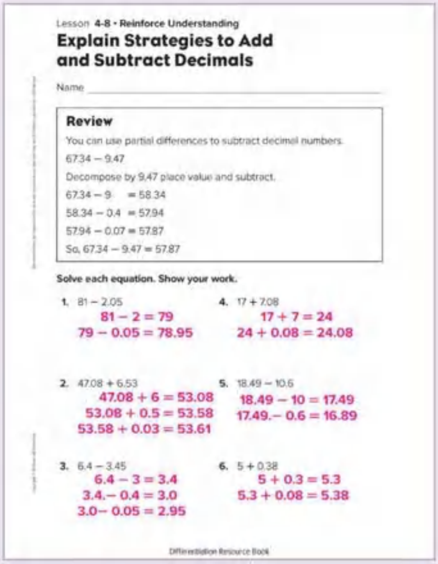
Assign the interactive lessons to reinforce targeted skills.

- Represent Adding and Subtracting (Tenths and Hundredths)
- Adding and Subtracting (Partial Sums and Differences)



INDEPENDENT WORK

Differentiation Resource Book, p. 35



Lesson **4-8 • Reinforce Understanding**

Explain Strategies to Add and Subtract Decimals

Name

Review

You can use partial differences to subtract decimal numbers.

67.34 − 9.47

Decompose by 9.47 place value and subtract.

67.34 − 9 = 58.34

58.34 − 0.4 = 57.94

57.94 − 0.07 = 57.87

So, 67.34 − 9.47 = 57.87

Solve each equation. Show your work.

1. 81 − 2.05
   81 − 2 = 79
   79 − 0.05 = 78.95

2. 47.08 + 6.53
   47.08 + 6 = 53.08
   53.08 + 0.5 = 53.58
   53.58 + 0.03 = 53.61

3. 6.4 − 3.45
   6.4 − 3 = 3.4
   3.4.− 0.4 = 3.0
   3.0− 0.05 = 2.95

4. 17 + 7.08
   17 + 7 = 24
   24 + 0.08 = 24.08

5. 18.49 − 10.6
   18.49 − 10 = 17.49
   17.49.− 0.6 = 16.89

6. 5 + 0.38
   5 + 0.3 = 5.3
   5.3 + 0.08 = 5.38

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Add or Subtract Decimal Word Problem Race

Students practice adding and subtracting decimals to solve word problems.

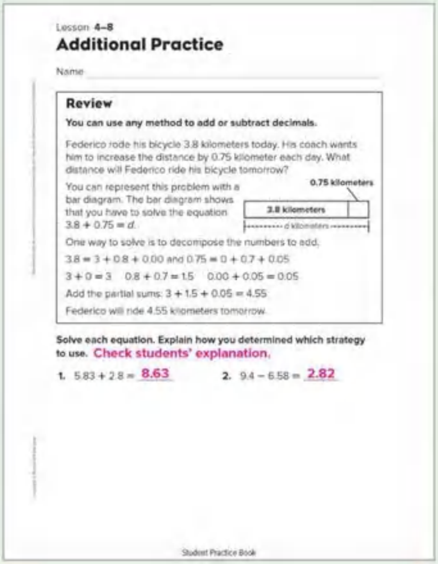
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 35–36



Lesson **4–8**

Additional Practice

Name

Review

You can use any method to add or subtract decimals.

Federico rode his bicycle 3.8 kilometers today. His coach wants him to increase the distance by 0.75 kilometer each day. What distance will Federico ride his bicycle tomorrow?

You can represent this problem with a bar diagram. The bar diagram shows that you have to solve the equation 3.8 + 0.75 = *d*.

One way to solve is to decompose the numbers to add.

3.8 = 3 + 0.8 + 0.00 and 0.75 = 0 + 0.7 + 0.05

3 + 0 = 3   0.8 + 0.7 = 1.5   0.00 + 0.05 = 0.05

Add the partial sums: 3 + 1.5 + 0.05 = 4.55

Federico will ride 4.55 kilometers tomorrow.

Solve each equation. Explain how you determined which strategy to use. Check students' explanation.

1. 5.83 + 2.8 = 8.63
2. 9.4 − 6.58 = 2.82

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with adding and subtracting decimals.

Use It! Application Station

Let's Get Organized! Students use decimals to measure and create organizers.

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking

INDEPENDENT WORK

Student Practice Book, pp. 35–36

Solve. Explain the strategy used to solve.
Check students' explanations.

3. A dog drinks 2.2 liters of water each day and a cat drinks 0.86 liter of water each day. How many liters of water do the dog and cat drink in all? 3.06 liters

4. The length of one earthworm is 6.7 centimeters. The length of a second earthworm is 5.47 centimeters. How much longer is the first earthworm than the second earthworm?
1.23 centimeters

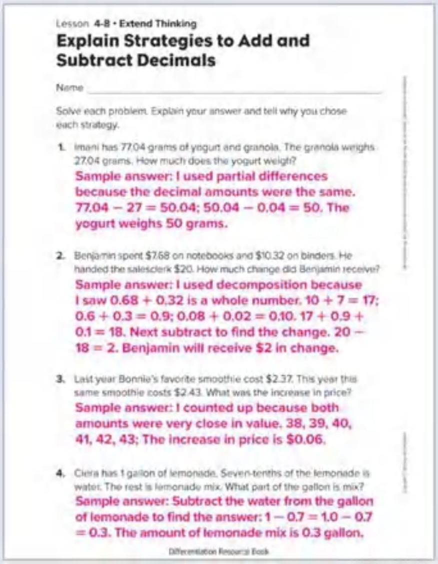
5. A gardener ordered 13.25 kilograms of gravel for a project. The gardener had to order an additional 11.9 kilograms of gravel to complete the project. How much gravel was needed?
25.15 kilograms

6. Truman buys 34.7 meters of fencing to enclose his pond. He uses only 29.56 meters of the fencing. How much fencing is left over?
5.14 meters

Math @ Home Activity Give your child a ruler and have them measure the lengths of two different objects in centimeters. Then have them create a bar diagram that represents finding the difference between the measurements, and then write and solve an equation. Then repeat the activity, this time having your child find the sum of the lengths of the two objects.

Student Practice Book

Differentiation Resource Book, p. 36



Lesson 4-8 • Extend Thinking

Explain Strategies to Add and Subtract Decimals

Name ______________________

Solve each problem. Explain your answer and tell why you chose each strategy.

1. Imani has 77.04 grams of yogurt and granola. The granola weighs 27.04 grams. How much does the yogurt weigh?
Sample answer: I used partial differences because the decimal amounts were the same. $77.04 - 27 = 50.04$; $50.04 - 0.04 = 50$. The yogurt weighs 50 grams.

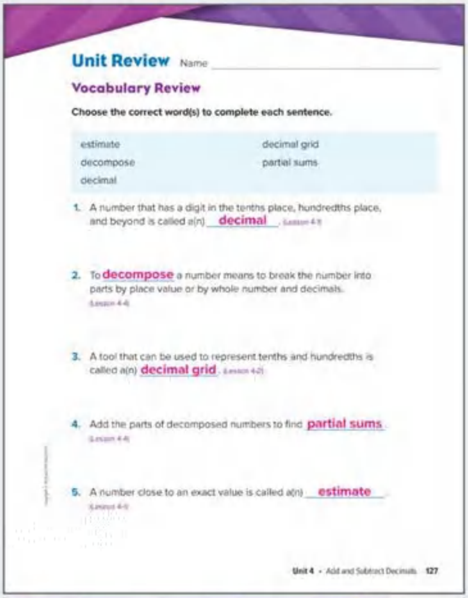
2. Benjamin spent $7.68 on notebooks and $10.32 on binders. He handed the salesclerk $20. How much change did Benjamin receive?
Sample answer: I used decomposition because I saw 0.68 + 0.32 is a whole number. $10 + 7 = 17$; $0.6 + 0.3 = 0.9$; $0.08 + 0.02 = 0.10$. $17 + 0.9 + 0.1 = 18$. Next subtract to find the change. $20 - 18 = 2$. Benjamin will receive $2 in change.

3. Last year Bonnie's favorite smoothie cost $2.37. This year this same smoothie costs $2.43. What was the increase in price?
Sample answer: I counted up because both amounts were very close in value. 38, 39, 40, 41, 42, 43; The increase in price is $0.06.

4. Ciera has 1 gallon of lemonade. Seven-tenths of the lemonade is water. The rest is lemonade mix. What part of the gallon is mix?
Sample answer: Subtract the water from the gallon of lemonade to find the answer: $1 - 0.7 = 1.0 - 0.7 = 0.3$. The amount of lemonade mix is 0.3 gallon.

Differentiation Resource Book

Unit Review



Unit Review

Name ____________

Vocabulary Review

Choose the correct word(s) to complete each sentence.

estimate	decimal grid
decompose	partial sums
decimal	

1. A number that has a digit in the tenths place, hundredths place, and beyond is called a(n) decimal. (Lesson 4-1)

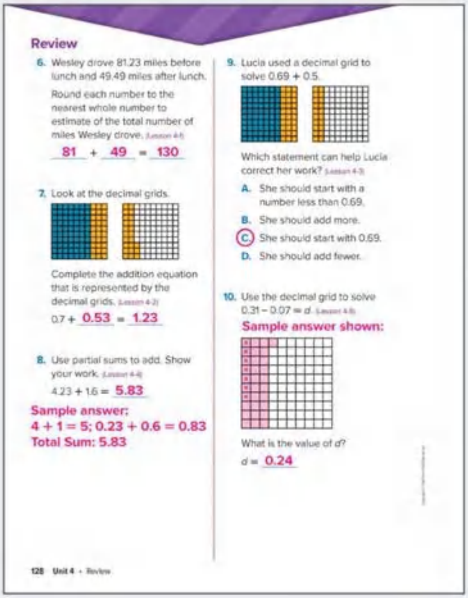
2. To decompose a number means to break the number into parts by place value or by whole number and decimals. (Lesson 4-4)

3. A tool that can be used to represent tenths and hundredths is called a(n) decimal grid. (Lesson 4-2)

4. Add the parts of decomposed numbers to find partial sums. (Lesson 4-4)

5. A number close to an exact value is called a(n) estimate. (Lesson 4-1)

Unit 4 • Add and Subtract Decimals 127



Review

6. Wesley drove 81.23 miles before lunch and 49.49 miles after lunch.

Round each number to the nearest whole number to estimate of the total number of miles Wesley drove. (Lesson 4-1)

81 + 49 = 130

7. Look at the decimal grids.

Complete the addition equation that is represented by the decimal grids. (Lesson 4-2)

0.7 + 0.53 = 1.23

8. Use partial sums to add. Show your work. (Lesson 4-4)

4.23 + 1.6 = 5.83

Sample answer:
4 + 1 = 5; 0.23 + 0.6 = 0.83
Total Sum: 5.83

9. Lucia used a decimal grid to solve 0.69 + 0.5.

Which statement can help Lucia correct her work? (Lesson 4-3)

A. She should start with a number less than 0.69.
B. She should add more.
[✓ C.] She should start with 0.69.
D. She should add fewer.

10. Use the decimal grid to solve 0.31 − 0.07 = *d*. (Lesson 4-5)

Sample answer shown:

What is the value of *d*?

d = 0.24

128 Unit 4 • Review

Students can complete the **Unit Review** to prepare for the **Unit Assessment**. Students may complete the Review in their Interactive eBook in the Digital Student Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	4-1
2	4-4
3	4-2
4	4-4
5	4-1

Review

Item Analysis

Item	DOK	Lesson	Standard
6	2	4-1	5.NBT.B.7
7	2	4-3	5.NBT.B.7
8	2	4-4	5.NBT.B.7
9	2	4-3	5.NBT.B.7
10	3	4-5	5.NBT.B.7

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

Item Analysis (continued)

Item	DOK	Lesson	Standard
11	2	4-6	5.NBT.B.7
12	2	4-5	5.NBT.B.7
13	2	4-7	5.NBT.B.7
14	2	4-8	5.NBT.B.7
15	2	4-8	5.NBT.B.7

Performance Task

Standard: 5.NBT.B.7

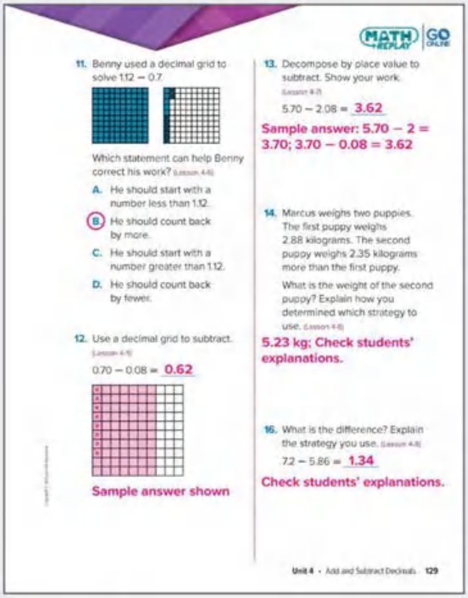
Rubric (4 points)

Part A – 2 points	
2 POINTS	Student's work reflects a proficiency in using a bar diagram to represent a word problem. The student can complete a bar diagram and use a variable to represent the unknown.
1 POINT	Student's work reflects developing proficiency in using a bar diagram to represent a word problem. The student partially completes the bar diagram.
0 POINTS	Student's work reflects a weak understanding of using a bar diagram to represent a word problem. The student cannot use a variable to represent the unknown.

Part B – 2 points	
2 POINTS	Student's work reflects a proficiency in using strategies to subtract decimals. The student's solution is accurate and the student is able to explain the strategy.
1 POINTS	Student's work reflects developing proficiency in using strategies to subtract decimals. The student's solution may be accurate, but they may not be able to explain the strategy.
0 POINTS	Student's work reflects a weak understanding of using strategies to subtract decimals. The student's solution is inaccurate, and they are not able to explain the strategy.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.



MATH REPLAY | GO ONLINE

11. Benny used a decimal grid to solve 1.12 − 0.7.

Which statement can help Benny correct his work? (Lesson 4-6)

A. He should start with a number less than 1.12.

[✓ B.] He should count back by more.

C. He should start with a number greater than 1.12.

D. He should count back by fewer.

12. Use a decimal grid to subtract. (Lesson 4-5)

0.70 − 0.08 = 0.62

Sample answer shown

13. Decompose by place value to subtract. Show your work. (Lesson 4-7)

5.70 − 2.08 = 3.62

Sample answer: 5.70 − 2 = 3.70; 3.70 − 0.08 = 3.62

14. Marcus weighs two puppies. The first puppy weighs 2.88 kilograms. The second puppy weighs 2.35 kilograms more than the first puppy.

What is the weight of the second puppy? Explain how you determined which strategy to use. (Lesson 4-8)

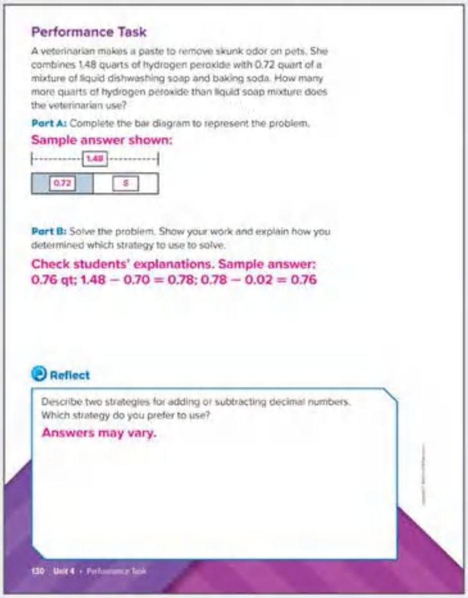
5.23 kg; Check students' explanations.

16. What is the difference? Explain the strategy you use. (Lesson 4-8)

7.2 − 5.86 = 1.34

Check students' explanations.

Unit 4 • Add and Subtract Decimals 129



Performance Task

A veterinarian makes a paste to remove skunk odor on pets. She combines 1.48 quarts of hydrogen peroxide with 0.72 quart of a mixture of liquid dishwashing soap and baking soda. How many more quarts of hydrogen peroxide than liquid soap mixture does the veterinarian use?

Part A: Complete the bar diagram to represent the problem.

Sample answer shown:

Part B: Solve the problem. Show your work and explain how you determined which strategy to use to solve.

Check students' explanations. Sample answer: 0.76 qt; 1.48 − 0.70 = 0.78; 0.78 − 0.02 = 0.76

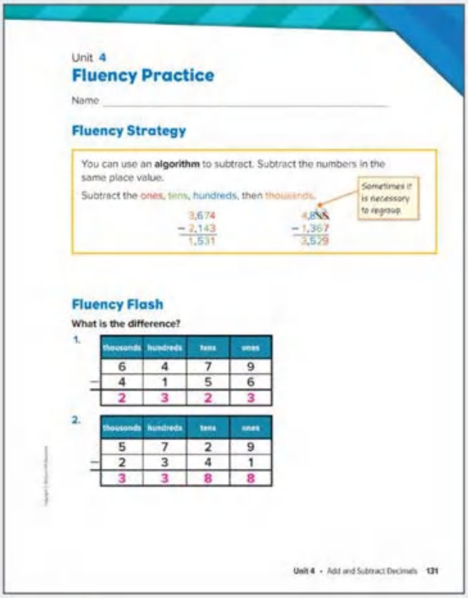
Reflect

Describe two strategies for adding or subtracting decimal numbers. Which strategy do you prefer to use?

Answers may vary.

130 Unit 4 • Performance Task

Fluency Practice



Unit 4

Fluency Practice

Name ____________________

Fluency Strategy

You can use an **algorithm** to subtract. Subtract the numbers in the same place value.

Subtract the ones, tens, hundreds, then thousands.

3,674
− 2,143
1,531

4,8[illegible]
− 1,367
3,529

Sometimes it is necessary to regroup.

Fluency Flash

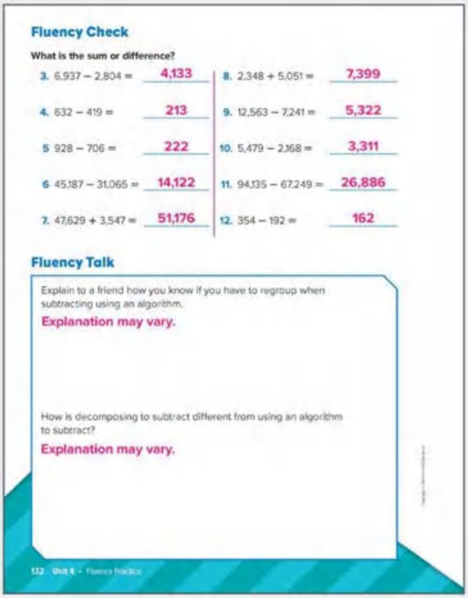
What is the difference?

1.

	thousands	hundreds	tens	ones
	6	4	7	9
−	4	1	5	6
	2	3	2	3

2.

	thousands	hundreds	tens	ones
	5	7	2	9
−	2	3	4	1
	3	3	8	8



Fluency Check

What is the sum or difference?

3. 6,937 − 2,804 = 4,133
4. 632 − 419 = 213
5 928 − 706 = 222
6 45,187 − 31,065 = 14,122
7. 47,629 + 3,547 = 51,176
8. 2,348 + 5,051 = 7,399
9. 12,563 − 7,241 = 5,322
10. 5,479 − 2,168 = 3,311
11. 94,135 − 67,249 = 26,886
12. 354 − 192 = 162

Fluency Talk

Explain to a friend how you know if you have to regroup when subtracting using an algorithm.

Explanation may vary.

How is decomposing to subtract different from using an algorithm to subtract?

Explanation may vary.

Fluency practice helps students develop procedural fluency, that is, the “ability to apply procedures accurately, efficiently, and flexibly.” Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students practice using an algorithm to subtract.

Fluency Progression

Unit	Skill	Standard
1	Use Partial Sums to Add	4.NBT.B.4
2	Decompose by Place Value to Subtract	4.NBT.B.4
3	Use an Algorithm to Add	4.NBT.B.4
4	**Use an Algorithm to Subtract**	**4.NBT.B.4**
5	Choose a Strategy to Add	4.NBT.B.4
6	Choose a Strategy to Subtract	4.NBT.B.4
7	Multiply by Multiples of 10	5.NBT.B.5
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4

- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Performance Task

Cell Phone Shopping

Student draw on their understanding of using strategies to add and subtract decimals. Use the rubric shown to evaluate students' work.

Standard: 5.NBT.B.7

Rubric (8 points)

Part A (DOK 3) – 2 points

2 POINTS	Student's explanation reflects a proficiency with estimating with decimals in context.
1 POINTS	Student's explanation reflects developing proficiency with estimating with decimals in context.
0 POINTS	Student's explanation reflects a poor understanding with estimating with decimals in context.

Part B (DOK 2) – 2 points

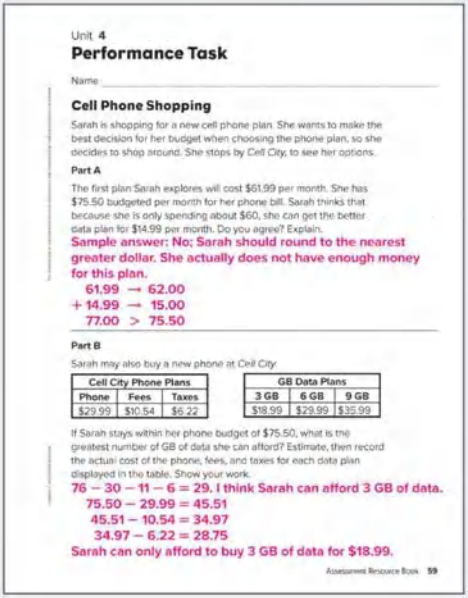
2 POINTS	Student's work reflects a proficiency with decimal addition and subtraction. Student's work reflects a proficiency with estimation.
1 POINTS	Student's work either reflects a developing proficiency with decimal addition and subtraction or a developing proficiency with estimation.
0 POINTS	Student's work shows a weak proficiency with decimal addition and subtraction. Student's work shows a weak proficiency with estimation.

Part C (DOK 3) – 2 points

2 POINTS	Student's work reflects a proficiency with decimal addition and subtraction. Student's conclusion is reasonable.
1 POINTS	Student's work either shows developing proficiency with decimal addition and subtraction or has a reasonable conclusion.
0 POINTS	Student's work shows weak proficiency with decimal addition and subtraction. The student's conclusion is not reasonable.

Part D (DOK 2) – 2 points

2 POINTS	Student's work reflects 2 reasonable strategies to find the correct answer.
1 POINTS	Student's work reflects 1 reasonable strategy to find the correct answer.
0 POINTS	Student's work reflects weak proficiency with decimal operations.



Unit 4

Performance Task

Name ____________________

Cell Phone Shopping

Sarah is shopping for a new cell phone plan. She wants to make the best decision for her budget when choosing the phone plan, so she decides to shop around. She stops by *Cell City*, to see her options.

Part A

The first plan Sarah explores will cost $61.99 per month. She has $75.50 budgeted per month for her phone bill. Sarah thinks that because she is only spending about $60, she can get the better data plan for $14.99 per month. Do you agree? Explain.

Sample answer: No; Sarah should round to the nearest greater dollar. She actually does not have enough money for this plan.

$$\begin{array}{rcr} 61.99 & \rightarrow & 62.00 \\ +\,14.99 & \rightarrow & 15.00 \\ 77.00 & > & 75.50 \end{array}$$

Part B

Sarah may also buy a new phone at *Cell City*.

Cell City Phone Plans		
Phone	Fees	Taxes
$29.99	$10.54	$6.22

GB Data Plans		
3 GB	6 GB	9 GB
$18.99	$29.99	$35.99

If Sarah stays within her phone budget of $75.50, what is the greatest number of GB of data she can afford? Estimate, then record the actual cost of the phone, fees, and taxes for each data plan displayed in the table. Show your work.

$76 - 30 - 11 - 6 = 29$. I think Sarah can afford 3 GB of data.

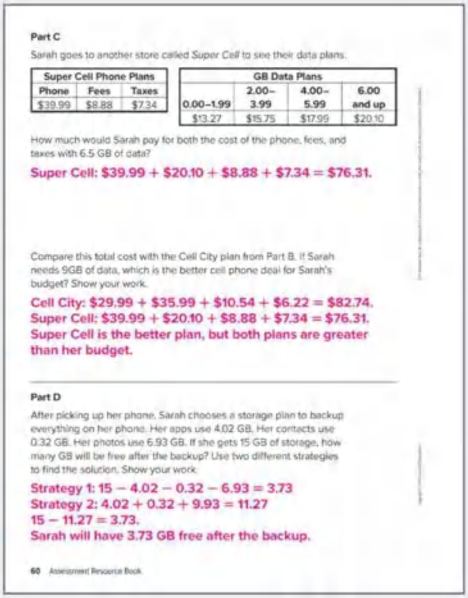
$75.50 - 29.99 = 45.51$

$45.51 - 10.54 = 34.97$

$34.97 - 6.22 = 28.75$

Sarah can only afford to buy 3 GB of data for $18.99.

Assessment Resource Book 59



Part C

Sarah goes to another store called *Super Cell* to see their data plans.

Super Cell Phone Plans		
Phone	Fees	Taxes
$39.99	$8.88	$7.34

GB Data Plans			
0.00–1.99	2.00–3.99	4.00–5.99	6.00 and up
$13.27	$15.75	$17.99	$20.10

How much would Sarah pay for both the cost of the phone, fees, and taxes with 6.5 GB of data?

Super Cell: $39.99 + $20.10 + $8.88 + $7.34 = $76.31.

Compare this total cost with the Cell City plan from Part B. If Sarah needs 9GB of data, which is the better cell phone deal for Sarah's budget? Show your work.

Cell City: $29.99 + $35.99 + $10.54 + $6.22 = $82.74.

Super Cell: $39.99 + $20.10 + $8.88 + $7.34 = $76.31.

Super Cell is the better plan, but both plans are greater than her budget.

Part D

After picking up her phone, Sarah chooses a storage plan to backup everything on her phone. Her apps use 4.02 GB. Her contacts use 0.32 GB. Her photos use 6.93 GB. If she gets 15 GB of storage, how many GB will be free after the backup? Use two different strategies to find the solution. Show your work.

Strategy 1: $15 - 4.02 - 0.32 - 6.93 = 3.73$

Strategy 2: $4.02 + 0.32 + 9.93 = 11.27$

$15 - 11.27 = 3.73$.

Sarah will have 3.73 GB free after the backup.

60 Assessment Resource Book

Unit Assessments

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

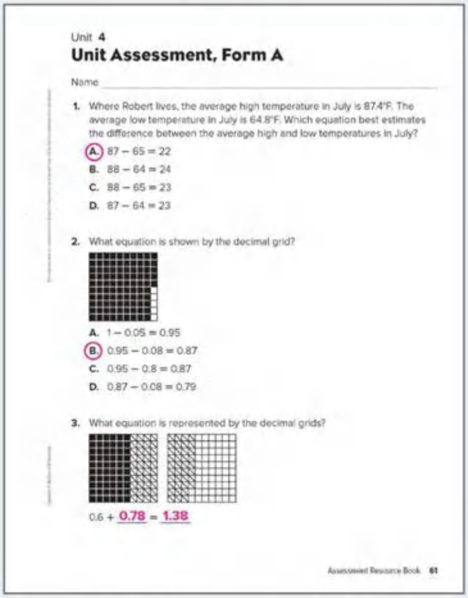
Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	2	4-1	Estimate Sums and Differences of Decimals	5.NBT.B.7
2	2	4-5	Model Subtracting Decimal Numbers	5.NBT.B.7
3	2	4-3	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7
4	1	4-2	Model Adding Decimals	5.NBT.B.7
5	2	4-6	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7
6	2	4-4	Adding and Subtracting (Partial Sums and Differences)	5.NBT.B.7
7	2	4-3	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7
8	2	4-5	Model Subtracting Decimal Numbers	5.NBT.B.7
9	2	4-1	Estimate Sums and Differences of Decimals	5.NBT.B.7
10	2	4-1	Estimate Sums and Differences of Decimals	5.NBT.B.7
11	2	4-7	Adding and Subtracting (Partial Sums and Differences)	5.NBT.B.7
12	3	4-4, 4-7	Adding and Subtracting (Partial Sums and Differences)	5.NBT.B.7
13	3	4-8	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7
14	3	4-8	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7
15	3	4-8	Represent Adding and Subtracting (Tenths and Hundredths)	5.NBT.B.7

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.

GO ONLINE



Unit 4

Unit Assessment, Form A

Name ______________________

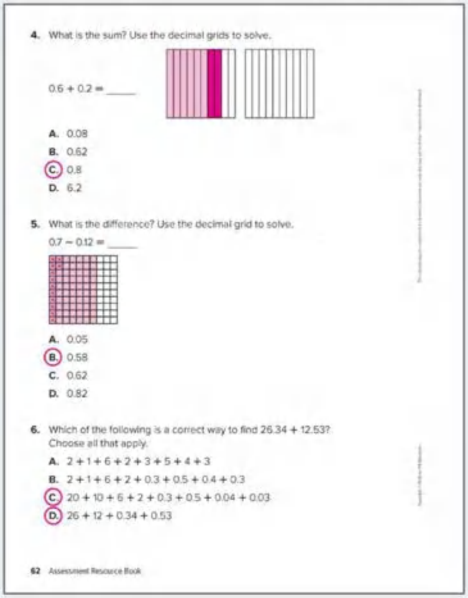
1. Where Robert lives, the average high temperature in July is 87.4°F. The average low temperature in July is 64.8°F. Which equation best estimates the difference between the average high and low temperatures in July?
   - [✓ A.] 87 − 65 = 22
   - B. 88 − 64 = 24
   - C. 88 − 65 = 23
   - D. 87 − 64 = 23

2. What equation is shown by the decimal grid?
   - A. 1 − 0.05 = 0.95
   - [✓ B.] 0.95 − 0.08 = 0.87
   - C. 0.95 − 0.8 = 0.87
   - D. 0.87 − 0.08 = 0.79

3. What equation is represented by the decimal grids?

   0.6 + 0.78 = 1.38

Assessment Resource Book 61



4. What is the sum? Use the decimal grids to solve.

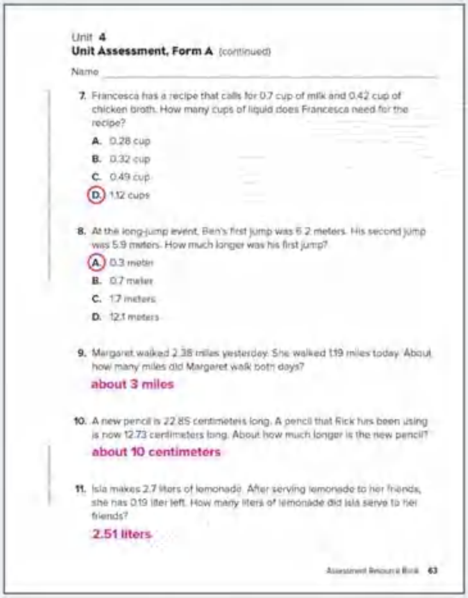
   0.6 + 0.2 = _____
   - A. 0.08
   - B. 0.62
   - [✓ C.] 0.8
   - D. 6.2

5. What is the difference? Use the decimal grid to solve.

   0.7 − 0.12 = _____
   - A. 0.05
   - [✓ B.] 0.58
   - C. 0.62
   - D. 0.82

6. Which of the following is a correct way to find 26.34 + 12.53? Choose all that apply.
   - A. 2 + 1 + 6 + 2 + 3 + 5 + 4 + 3
   - B. 2 + 1 + 6 + 2 + 0.3 + 0.5 + 0.4 + 0.3
   - [✓ C.] 20 + 10 + 6 + 2 + 0.3 + 0.5 + 0.04 + 0.03
   - [✓ D.] 26 + 12 + 0.34 + 0.53

62 Assessment Resource Book



Unit 4

Unit Assessment, Form A (continued)

Name ______________________

7. Francesca has a recipe that calls for 0.7 cup of milk and 0.42 cup of chicken broth. How many cups of liquid does Francesca need for the recipe?
   A. 0.28 cup
   B. 0.32 cup
   C. 0.49 cup
   [✓ D.] 1.12 cups

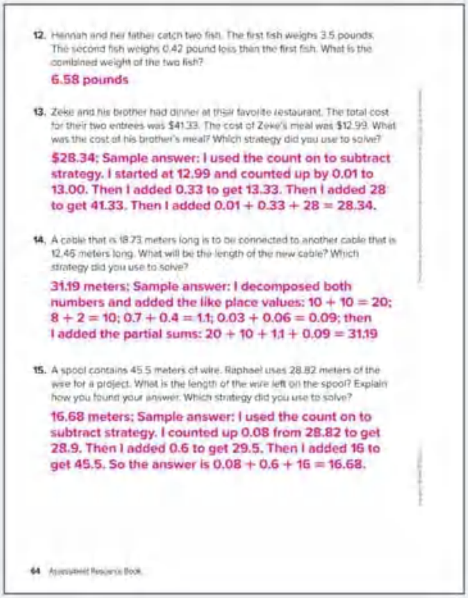
8. At the long-jump event, Ben's first jump was 6.2 meters. His second jump was 5.9 meters. How much longer was his first jump?
   [✓ A.] 0.3 meter
   B. 0.7 meter
   C. 1.7 meters
   D. 12.1 meters

9. Margaret walked 2.38 miles yesterday. She walked 1.19 miles today. About how many miles did Margaret walk both days?
   about 3 miles

10. A new pencil is 22.85 centimeters long. A pencil that Rick has been using is now 12.73 centimeters long. About how much longer is the new pencil?
    about 10 centimeters

11. Isla makes 2.7 liters of lemonade. After serving lemonade to her friends, she has 0.19 liter left. How many liters of lemonade did Isla serve to her friends?
    2.51 liters

Assessment Resource Book 63



12. Hannah and her father catch two fish. The first fish weighs 3.5 pounds. The second fish weighs 0.42 pound less than the first fish. What is the combined weight of the two fish?
    6.58 pounds

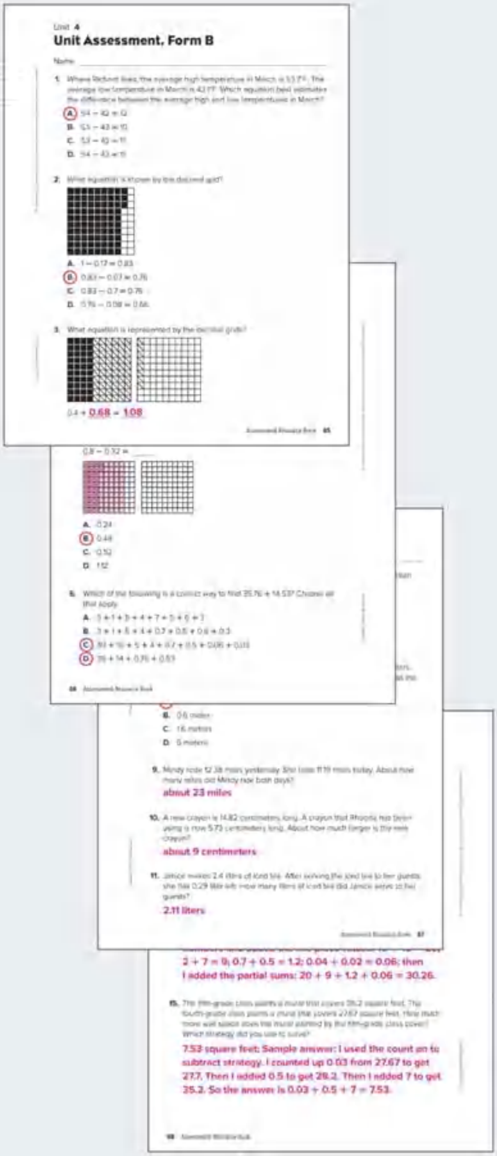
13. Zeke and his brother had dinner at their favorite restaurant. The total cost for their two entrees was $41.33. The cost of Zeke's meal was $12.99. What was the cost of his brother's meal? Which strategy did you use to solve?
    $28.34; Sample answer: I used the count on to subtract strategy. I started at 12.99 and counted up by 0.01 to 13.00. Then I added 0.33 to get 13.33. Then I added 28 to get 41.33. Then I added 0.01 + 0.33 + 28 = 28.34.

14. A cable that is 18.73 meters long is to be connected to another cable that is 12.46 meters long. What will be the length of the new cable? Which strategy did you use to solve?
    31.19 meters; Sample answer: I decomposed both numbers and added the like place values: 10 + 10 = 20; 8 + 2 = 10; 0.7 + 0.4 = 1.1; 0.03 + 0.06 = 0.09; then I added the partial sums: 20 + 10 + 1.1 + 0.09 = 31.19

15. A spool contains 45.5 meters of wire. Raphael uses 28.82 meters of the wire for a project. What is the length of the wire left on the spool? Explain how you found your answer. Which strategy did you use to solve?
    16.68 meters; Sample answer: I used the count on to subtract strategy. I counted up 0.08 from 28.82 to get 28.9. Then I added 0.6 to get 29.5. Then I added 16 to get 45.5. So the answer is 0.08 + 0.6 + 16 = 16.68.

64 Assessment Resource Book

Form B



Unit 4

Unit Assessment, Form B

Name

0.4 + **0.68** = **1.08**

about 23 miles

about 9 centimeters

2.11 liters

2 + 7 = 9; 0.7 + 0.5 = 1.2; 0.04 + 0.02 = 0.06; then I added the partial sums: 20 + 9 + 1.2 + 0.06 = 30.26.

7.53 square feet; Sample answer: I used the count on to subtract strategy. I counted up 0.03 from 27.67 to get 27.7. Then I added 0.5 to get 28.2. Then I added 7 to get 35.2. So the answer is 0.03 + 0.5 + 7 = 7.53.

Benchmark Assessment 1

The Benchmark Assessment 1 is available in both print and digital.

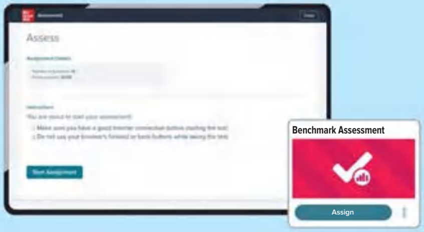
Data When students complete the Benchmark Assessment in the Digital Student Center, their responses are auto-scored.

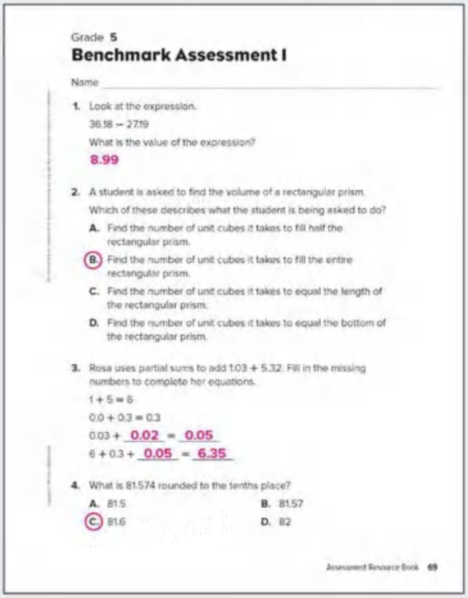
Item Analysis

Item	DOK	Skill	Standard
1	2	Subtract decimals	5.NBT.B.7
2	3	Understand volume	5.MD.C.3
3	2	Add decimals	5.NBT.B.7
4	2	Round decimals	5.NBT.A.4
5	2	Add decimals	5.NBT.B.7
6	1	Understand decimal place value	5.NBT.A.1
7	3	Describe how to find volume	5.MD.C.5
8	2	Compare decimals	5.NBT.A.3.b
9	2	Determine the volume of composite figures	5.MD.C.5
10	2	Compare decimals	5.NBT.A.3.b
11	3	Represent decimals in different ways	5.NBT.A.3.a
12	2	Determine the volume of composite figures	5.MD.C.5
13	1	Relate addition and subtraction of decimals	5.NBT.B.7
14	2	Count unit cubes to determine volume	5.MD.C.3, 5.MD.C.4
15	2	Understand decimal place value	5.NBT.A.1
16	2	Solve volume word problems	5.MD.C.5
17	1	Read and write decimals	5.NBT.A.3.a
18	2	Represent subtraction of decimals	5.NBT.B.7
19	2	Estimate sums and differences of decimals	5.NBT.B.7
20	1	Understand volume	5.MD.C.3
21	2	Represent subtraction of decimals	5.NBT.B.7

GO ONLINE

Assign the digital Benchmark Assessment to students or download and print PDFs from the Digital Teacher Center.





Grade 5

Benchmark Assessment I

Name ______

1. Look at the expression.

36.18 − 27.19

What is the value of the expression?

8.99

2. A student is asked to find the volume of a rectangular prism.

Which of these describes what the student is being asked to do?

A. Find the number of unit cubes it takes to fill half the rectangular prism.

[✓ B.] Find the number of unit cubes it takes to fill the entire rectangular prism.

C. Find the number of unit cubes it takes to equal the length of the rectangular prism.

D. Find the number of unit cubes it takes to equal the bottom of the rectangular prism.

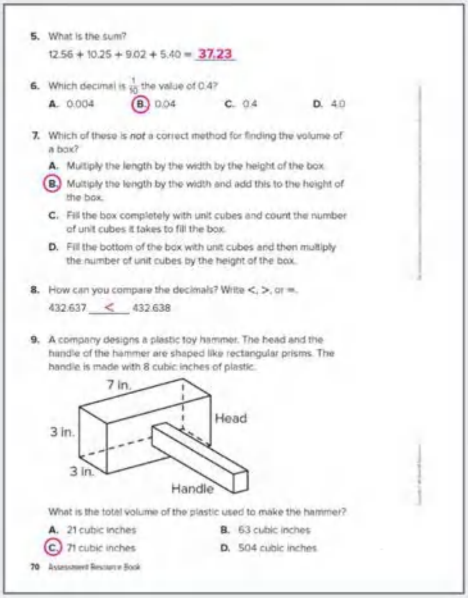
3. Rosa uses partial sums to add 1.03 + 5.32. Fill in the missing numbers to complete her equations.

1 + 5 = 6
0.0 + 0.3 = 0.3
0.03 + 0.02 = 0.05
6 + 0.3 + 0.05 = 6.35

4. What is 81.574 rounded to the tenths place?

A. 81.5 B. 81.57
[✓ C.] 81.6 D. 82

Assessment Resource Book 69



5. What is the sum?

12.56 + 10.25 + 9.02 + 5.40 = 37.23

6. Which decimal is $\frac{1}{10}$ the value of 0.4?

A. 0.004 [✓ B.] 0.04 C. 0.4 D. 4.0

7. Which of these is *not* a correct method for finding the volume of a box?

A. Multiply the length by the width by the height of the box.

[✓ B.] Multiply the length by the width and add this to the height of the box.

C. Fill the box completely with unit cubes and count the number of unit cubes it takes to fill the box.

D. Fill the bottom of the box with unit cubes and then multiply the number of unit cubes by the height of the box.

8. How can you compare the decimals? Write <, >, or =.

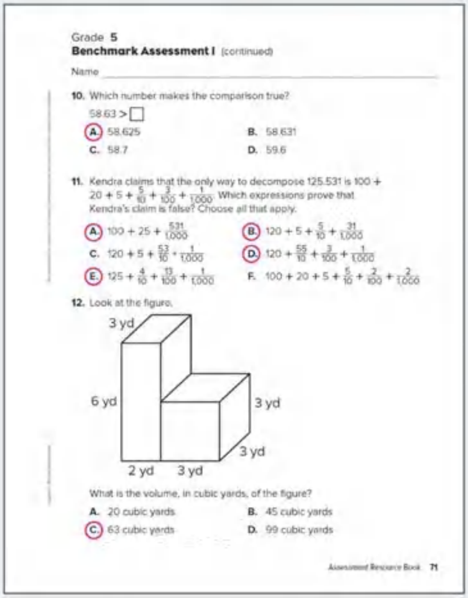
432.637 < 432.638

9. A company designs a plastic toy hammer. The head and the handle of the hammer are shaped like rectangular prisms. The handle is made with 8 cubic inches of plastic.

What is the total volume of the plastic used to make the hammer?

A. 21 cubic inches B. 63 cubic inches
[✓ C.] 71 cubic inches D. 504 cubic inches

70 Assessment Resource Book



Grade **5**

Benchmark Assessment I (continued)

Name ____________________

10. Which number makes the comparison true?

58.63 > ☐

[✓ A.] 58.625

B. 58.631

C. 58.7

D. 59.6

11. Kendra claims that the only way to decompose 125.531 is $100 + 20 + 5 + \frac{5}{10} + \frac{3}{100} + \frac{1}{1{,}000}$. Which expressions prove that Kendra's claim is false? Choose all that apply.

[✓ A.] $100 + 25 + \frac{531}{1{,}000}$

[✓ B.] $120 + 5 + \frac{5}{10} + \frac{31}{1{,}000}$

C. $120 + 5 + \frac{53}{10} + \frac{1}{1{,}000}$

[✓ D.] $120 + \frac{55}{10} + \frac{3}{100} + \frac{1}{1{,}000}$

[✓ E.] $125 + \frac{4}{10} + \frac{13}{100} + \frac{1}{1{,}000}$

F. $100 + 20 + 5 + \frac{5}{10} + \frac{2}{100} + \frac{2}{1{,}000}$

12. Look at the figure.

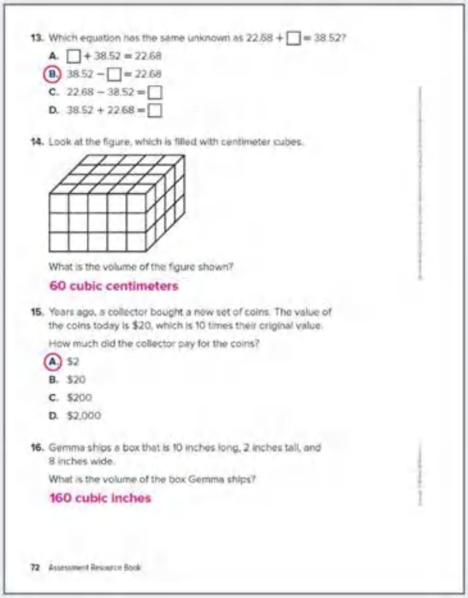
What is the volume, in cubic yards, of the figure?

A. 20 cubic yards

B. 45 cubic yards

[✓ C.] 63 cubic yards

D. 99 cubic yards



13. Which equation has the same unknown as 22.68 + ☐ = 38.52?

A. ☐ + 38.52 = 22.68

[✓ B.] 38.52 − ☐ = 22.68

C. 22.68 − 38.52 = ☐

D. 38.52 + 22.68 = ☐

14. Look at the figure, which is filled with centimeter cubes.

What is the volume of the figure shown?

60 cubic centimeters

15. Years ago, a collector bought a new set of coins. The value of the coins today is $20, which is 10 times their original value.

How much did the collector pay for the coins?

[✓ A.] $2

B. $20

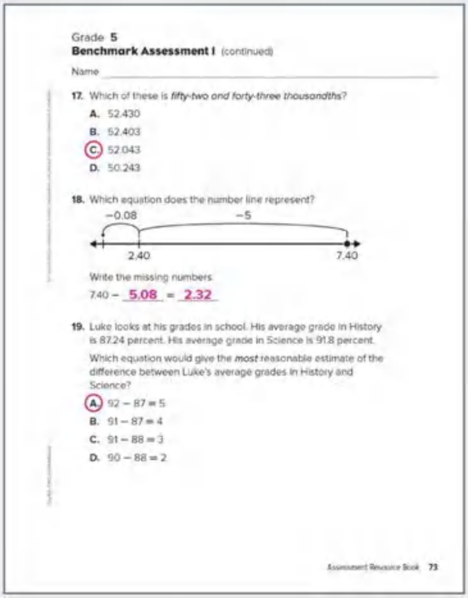
C. $200

D. $2,000

16. Gemma ships a box that is 10 inches long, 2 inches tall, and 8 inches wide.

What is the volume of the box Gemma ships?

160 cubic inches



Grade **5**

Benchmark Assessment I (continued)

Name ____________________

17. Which of these is *fifty-two and forty-three thousandths*?

A. 52.430

B. 52.403

[✓ C.] 52.043

D. 50.243

18. Which equation does the number line represent?

Write the missing numbers.

7.40 − **5.08** = **2.32**

19. Luke looks at his grades in school. His average grade in History is 87.24 percent. His average grade in Science is 91.8 percent.

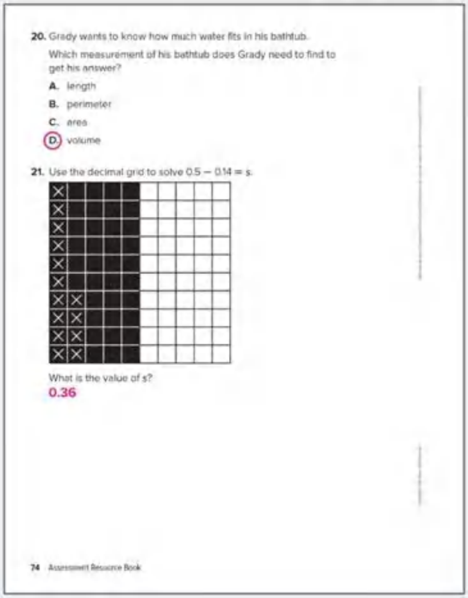
Which equation would give the *most* reasonable estimate of the difference between Luke's average grades in History and Science?

[✓ A.] 92 − 87 = 5

B. 91 − 87 = 4

C. 91 − 88 = 3

D. 90 − 88 = 2



20. Grady wants to know how much water fits in his bathtub.

Which measurement of his bathtub does Grady need to find to get his answer?

A. length

B. perimeter

C. area

[✓ D.] volume

21. Use the decimal grid to solve 0.5 − 0.14 = s.

What is the value of s?

0.36

UNIT 5 PLANNER
Multiply Multi-Digit Whole Numbers

PACING: 12 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! Mile-High Pennies Review estimation and multiplication skills using stacks of pennies.			
5-1 Understand Powers and Exponents	Students write a power of 10 as a multiplication expression with factors of 10. Students write a power of 10 using a base of 10 and exponents.	Students explain the steps to take to write a power of 10 as a multiplication expression while using the passive voice.	Students demonstrate self-awareness of personal strengths and areas of challenge in mathematics.
5-2 Patterns When Multiplying a Whole Number by Powers of 10	Students use patterns to determine products when multiplying whole numbers by powers of 10. Students explain patterns in the products when multiplying whole numbers by powers of 10.	Students talk about the patterns they see in products while answering *Wh-* questions.	Students employ techniques that can be used to help maintain focus and manage reactions to potentially frustrating situations.
5-3 Estimate Products of Multi-Digit Factors	Students estimate products of multi-digit factors using the same strategies used to estimate products of lesser factors. Students use estimated products to make predictions about a calculated solution. Students use estimated product to assess the reasonableness of a calculated solution.	Students discuss estimating products while answering *Wh-* questions.	Students determine the strategies and analyses necessary to make informed decisions when engaging in mathematical practices.
5-4 Use Area Models to Multiply Multi-Digit Factors	Students use an area model to determine partial products and add partial products to calculate the product.	Students explain how to use an area model to multiply while answering *Wh-* questions.	Students explore taking different perspectives on approaches to problem solving.
5-5 Use Partial Products to Multiply Multi-Digit Factors	Students determine partial products by decomposing the factors and add partial products to calculate the product.	Students discuss how to solve multiplication equations using partial products while answering *Wh-* and Yes/No questions.	Students practice strategies for persisting at a mathematical task, such as setting a small goal or setting timers for remaining focused.
5-6 Relate Partial Products to an Algorithm	Students use an algorithm to multiply multi-digit factors by a one-digit factor. Students understand and explain a multiplication algorithm.	Students discuss strategies to multiply while using *as…as*.	Students collaborate with peers to complete a mathematical task and offer constructive feedback to the mathematical ideas posed by others.
Math Probe Multiplication of 2-Digit Numbers Determine if a given strategy is a correct approach to find the product of two 2-digit numbers.			
5-7 Multiply Multi-Digit Factors Fluently	Students use an algorithm to multiply two multi-digit factors.	Students explain how to use an algorithm to multiply while answering *Wh-* and Yes/No questions.	Students identify and discuss the emotions experienced during math learning.
Unit Review **Fluency Practice**			
Unit Assessment **Performance Task**			

FOCUS QUESTION:
How can I multiply multi-digit numbers?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	**Academic Terms**			
5-1	base exponent exponential form power of 10	accurate prove	• number cubes	Conceptual Understanding Procedural Skill & Fluency	5.NBT.A.2
5-2	base exponent factor power of 10	cite establish	• calculators • index cards	Conceptual Understanding Procedural Skill & Fluency	5.NBT.A.2
5-3	estimate round	accurate relevant	• calculators • index cards • number cubes	Procedural Skill & Fluency	5.NBT.B.5
5-4	area model decompose partial products	debate speculate	• none	Procedural Skill & Fluency	5.NBT.B.5
5-5	area model partial products	analyze suggest	• number cubes	Procedural Skill & Fluency	5.NBT.B.5
5-6	algorithm partial products regroup	procedure prove	• base-ten blocks • number cubes	Procedural Skill & Fluency	5.NBT.B.5
5-7	algorithm	analyze note transition	• *Multiplication Algorithm* Teaching Resource • number cubes • spinners	Procedural Skill & Fluency	5.NBT.B.5

Unit Overview

Focus

Multiply Multi-Digit Whole Numbers

In this unit, students are guided gradually from their previous understanding of place-value relationships to a concrete understanding of multi-digit multiplication. They begin by writing powers of 10 in exponential form and then work to identify patterns when multiplying by powers of 10.

Students then begin to estimate products, using compatible numbers and rounding. Estimation gives students a way to think about computation with larger numbers. For example, the magnitude of the product 5,136 × 13 may not be as easy for students to comprehend as 5,000 × 10. That may be because students may lose sense of the magnitude of the product when they work through the steps of finding 5,136 × 13. After they estimate products, students begin finding exact products by using area models and partial products.

Students then relate their understanding of partial products to an algorithm. Multiplying multi-digit numbers using an algorithm can be an abstract process. Even when students multiply the digits in the correct order and regroup accurately, they may not be fully aware of the actual quantities with which they are working.

Coherence

What Students Have Learned

- Students multiplied up to 4-digit whole numbers by 1-digit whole numbers using place value and properties of operations.
- Students multiplied two 2-digit whole numbers using place value and properties of operations.
- Students understood the relationship between values of digits within the base-ten system.

What Students Are Learning

- Students use whole-number exponents to denote powers of 10.
- Students explain patterns when multiplying a number by powers of 10.
- Students use patterns to multiply a number by powers of 10.
- Students use area models to determine partial products and relate the partial products to the standard algorithm.
- Students multiply multi-digit whole numbers using an algorithm.

What Students Will Learn

- Students extend the algorithm for multiplication to multiply decimals.

Rigor

Conceptual Understanding

Students develop understanding of:

- exponential form of powers of 10.
- patterns when multiplying whole numbers by powers of 10.

Procedural Skill and Fluency

Students build proficiency with:

- solving and evaluating expressions with powers of 10.
- multiplying by a power of 10.
- estimating the product of multi-digit factors.
- using area models to multiply multi-digit factors.
- using partial products and an algorithm to multiply multi-digit numbers.

Application

Students apply their knowledge of:

- estimating products to solve real-world applications involving the products of multi-digit numbers.
- area models and partial products to solve real-world applications involving the products of multi-digit numbers.

Application is not a targeted element of rigor for the standards in this unit.

Effective Teaching Practices

Use and Connect Mathematical Representations

Throughout this unit, students use a variety of representations as they develop skills with multi-digit multiplication.

- They use partial products represented both numerically and with area models. This reinforces place value and also provides a visual means for understanding why the partial products are added to determine the final product.
- Students write equations using variables to represent the products, and they write the steps for multiplying with the algorithm.

Each connection that students make among these representations helps them visualize the math.

Encourage students to use more than one representation and to articulate the connections among them.

For example, as students make the transition from partial products to the algorithm, ask them to explain how each partial product is represented in the steps of the algorithm. Have students pay special attention to what the regrouped digits represent and how they are composed with subsequent products.

Ask open-ended questions that encourage students to discuss which representations they find most meaningful and effective.

Guide students to maintain fluency with varied tools and strategies.

When students get stuck using one strategy, guide them to try another one with which they might be more comfortable.

For example, as students progress to using the algorithm to multiply factors with greater numbers of digits, remind them of how they have used partial products and how they related the two strategies.

Math Practices and Processes

Look for and Express Regularity in Repeated Reasoning

This unit's progression of multiplication strategies and size of factors provides consistent opportunities for students to look for and express regularity.

- When students identify patterns when multiplying by powers of 10, they should describe ways to use the pattern to find other products.
- When students estimate a product, use partial products to calculate the product, and then compare the estimate with the calculation, they should observe and describe the connections they see.
- When students progress from multiplying a multi-digit number by a 1-digit number to multiplying multi-digit numbers by a 2-digit number, the reasoning that they have applied in one instance should guide their understanding of the next.

Provide frequent opportunities for students to articulate their strategies and reasoning.

Some suggestions include:

- Students are given different multiplication problems. Each student shows the same problem using partial products and the algorithm. Then, students share their work with partners. Pairs describe to each other how the partial products and algorithm steps show the same multiplication, including regrouping.
- Students are given the same multiplication problem and are asked to find different ways to represent it. Each student then describes how he or she chose the representation and how each step or element is part of finding the product.
- Students are given a multiplication problem and are asked to estimate the product using both compatible numbers and rounding, find the actual product using a calculator, and then explain the differences among the two estimates and the calculated product.

Social and Emotional Learning

What Skills Will We Develop?

- **Self-Awareness – Accurate Self-Perception** (Lesson 5-1): Having accurate self-perception allows students to determine areas of strength as well as areas in which they need to focus and practice.
- **Self-Management – Control Impulses** (Lesson 5-2): Students who can regulate their impulses and reactions are better able to navigate and solve problems.
- **Responsible Decision Making – Analyze Situations** (Lesson 5-3): Students make sense through analysis, which helps them make informed decisions.
- **Social Awareness – Develop Perspective** (Lesson 5-4): Developing perspective can help students understand different ways of thinking.
- **Self-Management – Self-Discipline** (Lesson 5-5): Self-disciplined students can manage their impulses to focus on a mathematical task.
- **Relationship Skills – Social Engagement** (Lesson 5-6): Engaging with others allows students to develop relationships and establish a sense of security and belonging in the classroom community.
- **Self-Awareness – Identify Emotions** (Lesson 5-7): Students who can identify and understand their own feelings and emotions can better manage the reactions to those feelings and emotions.

Unit Overview

Language of Math

Vocabulary

Students will be using these key terms in this unit:

- **algorithm** (Lesson 5-6, 5-7) Students may have been introduced to this term in Grade 3 when using the addition and subtraction algorithm. Now this term will be applied to multi-digit multiplication.
- **base*** (Lesson 5-1, Lesson 5-2) The base is the number that is repeatedly multiplied when written in exponential form.
- **estimate** (Lesson 5-3) Students were introduced to estimating in Grade 3. Have students discuss estimation techniques such as rounding as a way of determining the magnitude of a solution or checking the reasonableness of a calculated solution.
- **exponent*** (Lesson 5-1, 5-2) The exponent is the superscript after the number and notes the number of times the number is multiplied times itself.
- **exponential form*** (Lesson 5-1) Exponential form involves a number, called the base, and an exponent. Exponential form is a way of simplifying the notation for repeated multiplication.
- **partial products** (Lesson 5-4, 5-5, 5-6, 5-7) Students were introduced to partial products in Grade 3. Relate this term to the area models used to find products as well as the Distributive property.
- **power of 10*** (Lesson 5-1, 5-2) A power of ten is the exponential form using a base of 10. The exponent is also called the power.
- **round** (Lesson 5-3) Students were introduced to rounding in Grade 2. Have students review when to round up and when to round down. Discuss the importance of place value when rounding.

*This is a new term.

Math Language Development

A Focus on Speaking

When students learn a new language, speaking that language is of paramount importance.

Learning the grammar and vocabulary will not be enough for the language student to build fluency; instead, a certain reading and writing fluency may be gained while the student is never comfortable enough with the rhythm and sound of the language to understand or participate in its spoken form.

The language of mathematics is a subset of the language of where it is being taught and discussed. In the United States, it is part of English, in Germany, it is part of German, and so on. As such, the linguistic aspects of math may not receive pedagogical focus.

But the specific vocabulary, usage, and phrasing of math is its own subset of the language, one that can be difficult to learn for students who are learning it in their first languages but even more so for second-language students.

And just like students of new languages, students of math will not gain real fluency in its language without speaking the words and sentences that make up, describe and explain it.

For this reason, give students ample opportunities to speak about the math that they are learning. As they learn about multi-digit multiplication, model precise oral usage of correct vocabulary and guide students to integrate it into their own speech.

Students should hear the words *base, exponent, factor, product, estimate, partial product,* and *algorithm* in your discourse and then become fluent with these terms in their own explanations.

Help students analyze terminology, breaking down words' meanings to make them more accessible. For example, discuss that when we use partial products, each product is a part of the whole product.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to multiplying multi-digit whole numbers. Because many of the words (*distance, feet (ft.), vertical*), phrases (*as...as, make money*), and grammar structures (*can be..., to* + verb) used in this unit could prove challenging to ELs, they are supported in understanding and using them so that the instruction is more accessible.

Lesson 5-1 – *can be (connected)*

Lesson 5-2 – *distance*

Lesson 5-3 – *to* + verb to say why

Lesson 5-4 – abbreviation ft.

Lesson 5-5 – *vertical*

Lesson 5-6 – *as...as...* to compare

Lesson 5-7 – *make money*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

About How Much?

Purpose: Build estimating skills.

Overview: Students estimate the value of expressions (with operations) shown, explaining their strategies and thinking. The teacher records students' estimates, then reveals the value of the expression. Students analyze the estimates and discuss which are closest to the actual value of the expression.

Find the Pattern, Make a Pattern

Purpose: Build efficiency with recognizing and building patterns.

Overview: Students determine the rule(s) for a given pattern, then use the rule(s) to create a new pattern. The teacher records students' new patterns and faciliates a discussion to validate the pattern and its rules.

Greater Than or Less Than

Purpose: Build proficiency with number and place vlaue sense; estimating and comparing skills.

Overview: Students use mental math to esitmate or evaluate the value of given expressions and then compare the value of the expressions to a target benchmark number. Students share their solutions and thinking.

What's Another Way to Write It?

Purpose: Build flexibility with number sense and mental math operations.

Overview: Given a number, students generate expressions using operations that, when evaluated, have the same value as the number. The teacher records expressions as students share. Students then look for relationships amongst the expressions.

Sense-Making Routines

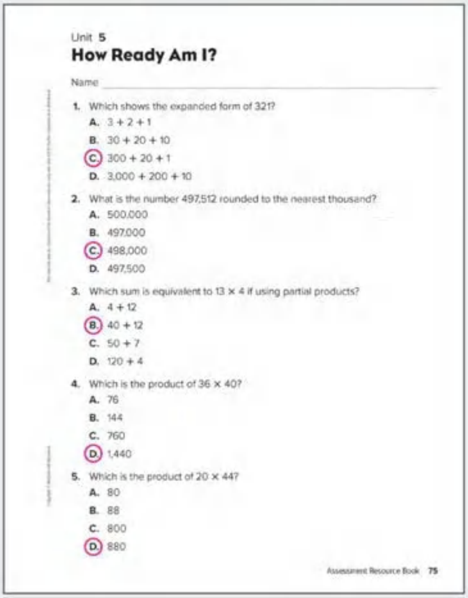
- **Which Doesn't Belong?** (Lesson 5-1) Students analyze four multiplication expressions, looking for similarities and differences that get them to think about multiplication with the repeated factors.
- **Notice & Wonder: How are they the same? How are they different?** (Lesson 5-2, 5-7) Students consider the similarities and differences between different representations involving multiplication by powers of 10. In lesson 7, students compare two ways to solve a multiplication problem.
- **Notice & Wonder: What do you notice? What do you wonder?** (Lesson 5-3, 5-5, 5-6) In Lesson 5-3, students prepare to think about how an estimate compares to a calculated solution. In the following lessons, students think about how a multiplication equation relates to an area model and then how a multiplication equation with partial products relates to the standard algorithm.
- **Notice & Wonder: What do you see?** (Lesson 5-4) In lesson 5-4, students consider an image where the area is decomposed into smaller rectangles and how they add to the total.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable, format for amplifying and developing students' social and academic language. For more information on the Math Language Routines, see the Appendix.

- Lesson 5-1 – Students participate in MLR6: Three Reads.
- Lesson 5-2 – Students participate in MLR1: Stronger and Clearer Each Time.
- Lesson 5-3 – Students participate in MLR7: Compare and Connect.
- Lesson 5-4 – Students participate in MLR4: Information Gap.
- Lesson 5-5 – Students participate in MLR8: Discussion Supports and MLR3: Critique, Correct, and Clarify.
- Lesson 5-6 – Students participate in MLR1: Stronger and Clearer Each Time.
- Lesson 5-7 – Students participate in MLR5: Co-Craft Questions and Problems.

Readiness Diagnostic



Unit 5

How Ready Am I?

Name ______________________________

1. Which shows the expanded form of 321?
   A. 3 + 2 + 1
   B. 30 + 20 + 10
   [✓ C.] 300 + 20 + 1
   D. 3,000 + 200 + 10

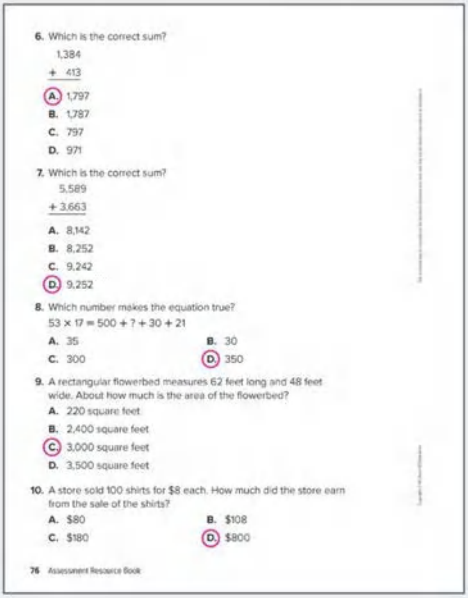
2. What is the number 497,512 rounded to the nearest thousand?
   A. 500,000
   B. 497,000
   [✓ C.] 498,000
   D. 497,500

3. Which sum is equivalent to 13 × 4 if using partial products?
   A. 4 + 12
   [✓ B.] 40 + 12
   C. 50 + 7
   D. 120 + 4

4. Which is the product of 36 × 40?
   A. 76
   B. 144
   C. 760
   [✓ D.] 1,440

5. Which is the product of 20 × 44?
   A. 80
   B. 88
   C. 800
   [✓ D.] 880

Assessment Resource Book 75



6. Which is the correct sum?
   1,384
   + 413
   [✓ A.] 1,797
   B. 1,787
   C. 797
   D. 971

7. Which is the correct sum?
   5,589
   + 3,663
   A. 8,142
   B. 8,252
   C. 9,242
   [✓ D.] 9,252

8. Which number makes the equation true?
   53 × 17 = 500 + ? + 30 + 21
   A. 35 B. 30
   C. 300 [✓ D.] 350

9. A rectangular flowerbed measures 62 feet long and 48 feet wide. About how much is the area of the flowerbed?
   A. 220 square feet
   B. 2,400 square feet
   [✓ C.] 3,000 square feet
   D. 3,500 square feet

10. A store sold 100 shirts for $8 each. How much did the store earn from the sale of the shirts?
   A. $80 B. $108
   C. $180 [✓ D.] $800

76 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

Targeted Intervention

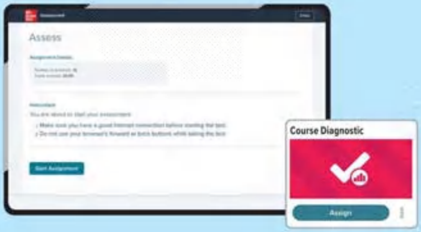
Use Guided Support intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	1	Identify expanded form of a number	Expanded Form through 999,999	4.NBT.A.2
2	2	Round to the nearest thousand	Round to Nearest 10, 100, or 1,000	4.NBT.A.3
3	2	Use partial products to multiply	Multiply 2- by 1-Digit Numbers	4.NBT.B.5
4	2	Multiply two 2-digit numbers	Partial Products (2- by 2-Digit Numbers)	4.NBT.B.5
5	2	Multiply two 2-digit numbers	Partial Products (2- by 2-Digit Numbers)	4.NBT.B.5
6	2	Add multi-digit numbers	Add Multi-Digit Numbers	4.NBT.B.4
7	2	Add multi-digit numbers	Add Multi-Digit Numbers	4.NBT.B.4
8	1	Identify partial products	Partial Products (2- by 2-Digit Numbers)	4.NBT.B.5
9	1	Estimate multiplying two 2-digit numbers	Estimate Products (Whole Number Factors)	4.NBT.B.5
10	2	Multiply a whole number by a power of 10	Multiply 2-Digit Multiples of 10	4.NBT.B.5

GO ONLINE

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.



Unit Opener

Focus Question

Introduce the Focus Question: *How can I multiply multi-digit numbers?* Ask students to think about what they know about multiplying multi-digit numbers.

- What does multi-digit mean? What are whole numbers?
- What do you know about multiplying multi-digit numbers?
- What do you think you will be doing in the unit?

Remind students that at the end of the unit, they will reflect back on what they learned in this unit.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.

Unit 5

Multiply Multi-Digit Whole Numbers

Focus Question

How can I multiply multi-digit whole numbers?

Hi, I'm Owen.

I want to be an entomologist, and I'm studying a large population of ladybugs. Suppose I count thirty-two ladybugs on one plant, and there are ten plants in all. I will need to be able to multiply thirty-two times ten to do my job.

STEM in Action

Videos

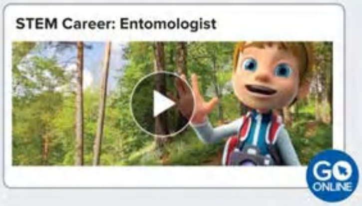
Students can watch the two STEM videos.

STEM Career: Entomologist: Owen discusses his aspirations to be an entomologist.

Counting Ladybugs: Owen and entomologists use multi-digit multiplication to help them do their work, including estimating a population.

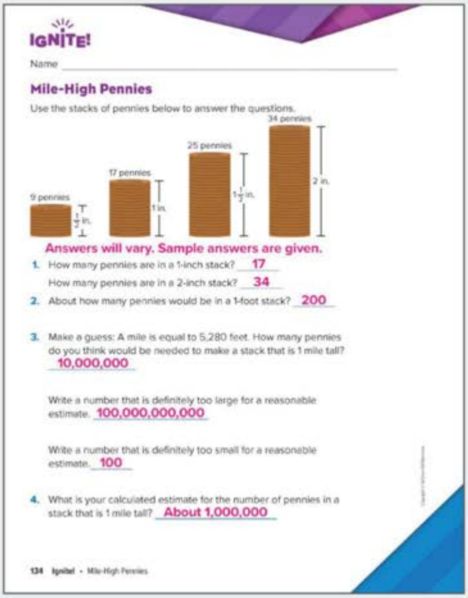
STEM Project Card

Students can complete the STEM Project Card during their workstation time.



STEM Career: Entomologist

Counting Ladybugs



IGNITE!

Name

Mile-High Pennies

Use the stacks of pennies below to answer the questions.

9 pennies
$\frac{1}{2}$ in.
17 pennies
1 in.
25 pennies
$1\frac{1}{2}$ in.
34 pennies
2 in.

Answers will vary. Sample answers are given.

1. How many pennies are in a 1-inch stack? 17

   How many pennies are in a 2-inch stack? 34

2. About how many pennies would be in a 1-foot stack? 200

3. Make a guess: A mile is equal to 5,280 feet. How many pennies do you think would be needed to make a stack that is 1 mile tall? 10,000,000

   Write a number that is definitely too large for a reasonable estimate. 100,000,000,000

   Write a number that is definitely too small for a reasonable estimate. 100

4. What is your calculated estimate for the number of pennies in a stack that is 1 mile tall? About 1,000,000

134 Ignite! • Mile-High Pennies

Ignite!

Mile-High Pennies

Students review estimation and multiplication skills in preparation for work in Unit 5.

1. Direct attention to the stacks of pennies.
   - What do you notice about the stacks of pennies?
   - Which stack appears to be about 1 inch tall? How many pennies are in that stack?
   - Which stack appears to be about 2 inches tall? How many pennies are in that stack?
2. Provide students with a ruler to confirm the above results. Have them record the results with Question 1.
3. Have students think about a stack of pennies that is 1 foot tall.
   - About how many pennies do you think would be in that stack? Explain.

Have students record their estimated number of pennies in a 1-foot stack with Question 2

4. Now have students think about a stack of pennies that is 1 mile tall.
   - How many pennies do you think would be needed to make a stack that is 1 mile tall? Write your guess with Question 3.
   - Also write a number of pennies that you think is definitely too large for a reasonable estimate. Then write a number of pennies that you think is definitely too small.

5. Challenge students to use the above results, along with the images of the pennies and a ruler, to make a calculated estimate of the number of pennies needed to reach a height of 1 mile. You may want to provide the following conversions as needed:

   12 inches = 1 foot
   3 feet = 1 yard
   5,280 feet = 1 mile
   1,760 yards = 1 mile

6. Have students record their calculated estimate with Question 4. Discuss the various strategies that emerge.
   - How did you solve the problem?
   - How does your estimate compare with the guess you made with Question 3?

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

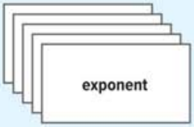
	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with multiplying multi-digit whole numbers.	
		• **Powers of 10 Concentration**	5-1
		• **Multiplying by 10 Tic Tac Toe**	5-2
		• **Estimating Products Bingo**	5-3
		• **Area Model Task Cards**	5-4
		• **Partial Products Concentration**	5-5
		• **Multiplication Standard Algorithm Task Cards**	5-6
		• **Multiplication Showdown**	5-7
Digital Station	Digital Game	**Dino Dig** Student multiply with area models.	5-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**Make a Pulley System** Students use measurements to create a pulley system.	5-7
	Connection Card	**Washington Color School Movement—Color Field Painting** Students create art to represent a base number with an exponent.	5-1
	Real World Card	**Let's Celebrate** Students use charts to create a budget for a graduation celebration.	5-3

Additional Resources

Use the resources below to provide additional support for this unit.

Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the new terms on the front side of the card.



Foldables

Use the unit foldables with Lessons 5-5 and 5-6.

Spiral Review

Students can complete the Spiral Review at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
5-1	5.MD.C.3
5-2	5.NBT.A.1
5-3	5.MD.C.5
5-4	5.NBT.A.3
5-5	5.NBT.A.2
5-6	5.NBT.A.4
5-7	5.NBT.B.5

LESSON **5-1**

Understand Powers and Exponents

Learning Targets

- I can write a power of 10 as a multiplication expression with factors of 10.
- I can write a power of 10 using a base of 10 and exponents.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Math Practices and Processes

MPP Look for and make use of structure.

Vocabulary

Math Terms	Academic Terms
base	accurate
exponent	prove
exponential form	
power of 10	

Materials

The materials may be for any part of the lesson.

- number cubes

Focus

Content Objectives	Language Objectives	SEL Objective
• Students write a power of 10 as a multiplication expression with factors of 10. • Students write a power of 10 using a base of 10 and exponents.	• Students explain the steps to take to write a power of 10 as a multiplication expression while using the passive voice. • To support maximizing linguistic and cognitive meta-awareness, ELs participate in MLR6: Three Reads.	• Students demonstrate self-awareness of personal strengths and areas of challenge in mathematics.

Coherence

Previous	Now	Next
• Students recognized that a digit represents 10 times as much as it represents in the place to its right and $\frac{1}{10}$ of what it represents in the place to its left (Unit 3).	• Students extend their understanding of place value to write powers of 10 using exponents.	• Students examine patterns based on place value when a whole number is multiplied by a power of 10 (Unit 5). • Students write and evaluate numerical expressions involving whole-number exponents (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students develop conceptual understanding by connecting the ideas of powers and exponents.	• Students solve and evaluate expressions with powers of 10.	• Students apply their understanding of powers and exponents to solve problems based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Find the Pattern, Make the Pattern 5–7 min

Build Fluency Students build number sense as they determine a pattern in a sequence of numbers and find the missing terms. Then they create a new sequence with the same pattern but different numbers.

These prompts encourage students to talk about their reasoning:

- How did you determine the pattern in the sequence of numbers?
- How can you explain to someone what steps to take to find a pattern?
- How did you determine the missing numbers?
- How did you determine the starting point of your sequence?

Launch 5–7 min

Sense-Making Routine

Purpose Students analyze four multiplication expressions and identify any similarities and/or differences.

Which Doesn't Belong?

- Which doesn't belong?

Teaching Tip You may wish to have students work in small groups to discuss what they notice about the multiplication problems. Invite them to share what they are wondering and how they decide how to compare and contrast the expressions. Remind students that there are multiple ways to answer the question and stress the importance of their justification using correct mathematical terminology.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' awareness of multiplication expressions whose factors are the same number and are based on possible comments and questions that students may make during the share out.

- What do you notice about the factors in each expression?
- What do you notice about the product of each expression?

Math is... Mindset

- What do you want your classmates to know about your math story?

SEL Self-Awareness: Accurate Self-Perception

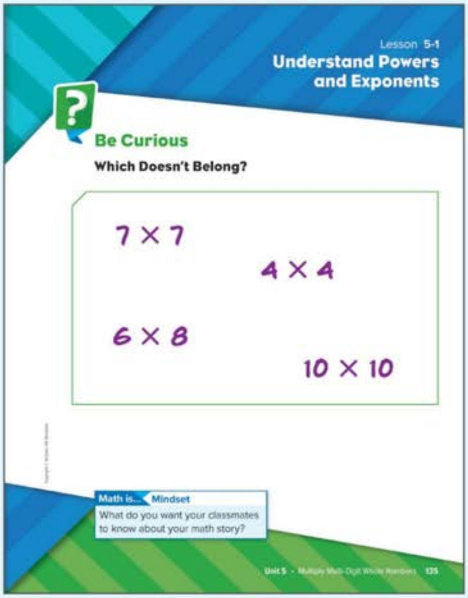
As students begin to think about identifying similarities and differences in the Which Doesn't Belong routine, encourage them to make connections to strategies/concepts they are more familiar or comfortable with, such as the similarities and differences in each factor. They can also use more familiar strategies to check their answers. As students continue to understand powers and exponents, differentiate instruction to provide opportunities for students to experience success and gratification as well encounter appropriate amounts of productive struggle.

Transition to Explore & Develop

Ask questions that get students thinking about multiplication expressions whose factors are the same number.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about multiplication expressions whose factors are the same number and other ways to write those types of expressions.



Lesson 5-1

Understand Powers and Exponents

Be Curious

Which Doesn't Belong?

7 × 7

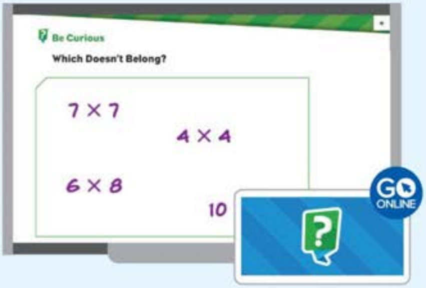
4 × 4

6 × 8

10 × 10

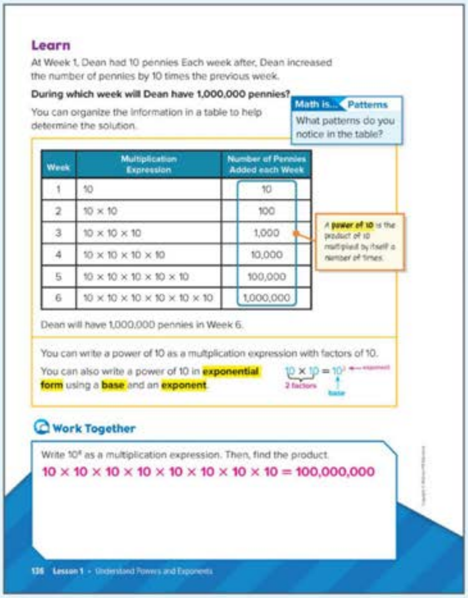
Math is... Mindset

What do you want your classmates to know about your math story?



Explore & Develop

20 min



Learn

At Week 1, Dean had 10 pennies Each week after, Dean increased the number of pennies by 10 times the previous week.

During which week will Dean have 1,000,000 pennies?

You can organize the information in a table to help determine the solution.

Math is... Patterns
What patterns do you notice in the table?

Week	Multiplication Expression	Number of Pennies Added each Week
1	10	10
2	10 × 10	100
3	10 × 10 × 10	1,000
4	10 × 10 × 10 × 10	10,000
5	10 × 10 × 10 × 10 × 10	100,000
6	10 × 10 × 10 × 10 × 10 × 10	1,000,000

A **power of 10** is the product of 10 multiplied by itself a number of times.

Dean will have 1,000,000 pennies in Week 6.

You can write a power of 10 as a multiplication expression with factors of 10.

You can also write a power of 10 in **exponential form** using a **base** and an **exponent**.

$$\underbrace{10 \times 10}_{\text{2 factors}} = \underset{\uparrow \text{ base}}{10}^{2} \leftarrow \text{exponent}$$

Work Together

Write 10^8 as a multiplication expression. Then, find the product.

10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 = 100,000,000

136 Lesson 1 • Understand Powers and Exponents

❶ Pose the Problem

MLR **Collect and Display**

As students discuss the questions, make a list of key words and phrases you hear, such as *power of 10, exponential form, base*, and *exponent*. Display the list and use these expressions to help students connect words they already know and math vocabulary.

ETP **Pose Purposeful Questions**

- How can you describe the problem in your own words?
- How could you organize the information in the problem?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR **Three Reads**

1st Read: Have students underline the key numbers that will be used to solve the problem.

2nd Read: Have students write the meaning of each number in context.

3rd Read: Have students work in pairs to create mathematical expressions until they get to 1,000,000 pennies.

❸ Bring It Together

ETP **Elicit and Use Evidence of Student Thinking**

- How can you write a product where all the factors are 10 using exponential form?

Key Takeaways

- A power of 10 is the product of 10 multiplied by itself a number of times.
- A power of 10 can be written in exponential form.

Work Together

Students write a power of 10 as a multiplication problem and then as a product.

Common Error Students may often write the product as 10 followed by 8 zeros, Make sure they understand the pattern that $10^8$is 1 followed by 8 zeros.

LOM **Language of Math**

An *exponent* is also a person who believes strongly in an idea, as in, “She is an exponent of the teachings of Euclid,” or a person who is highly skilled, as in “He is the world’s leading exponent of classical trombone.”

CHOOSE YOUR OPTION

Activity-Based Exploration

Students represent powers of 10 using small objects and compare what 10, 100, and 1,000 of the objects look like. They use these findings to predict what 1,000,000 objects will look like.

Materials: small objects, such as centimeter blocks, paper clips, cereal, beans, and toothpicks

Directions: Partners choose an object and determine what 10, 100, 1,000 of the object looks like. They use these findings to describe and predict what 1,000,000 objects would look like. Have students determine a way to represent their findings for others to see.

Implement Tasks That Promote Reasoning and Problem Solving

- About how big will 1,000 of your objects be?
- How will 1,000 of your objects compare to 1,000 of a smaller object?
- What did you discover when representing 10, 100, and 1,000?
- How did you use multiplication to help you think about what 1,000,000 objects would look like?
- How did your estimate compare with your findings?
- How did the size of your object affect what the values looked like?

Activity Debrief: Have students share their representations of 10, 100, and 1,000 and their prediction of what 1,000,000 looks like. Tell students that these numbers are called *powers of 10* and that they are created by starting with 1 and repeatedly multiplying by 10. Explain that powers of 10 can be written in *exponential form*, using a *base* and an *exponent*. Have students add to their representations to show each number written in exponential form.

Math is... Patterns

- What patterns do you notice when representing powers of 10?

Students look for and use mathematical patterns to understand and solve the problem.

Have students revisit the Pose the Problem question and discuss answers.

- During which week will Dean add 1,000,000 pennies?

Guided Exploration

Students use the relationship between repeated multiplication and the product to develop an understanding of powers and exponents.

Facilitate Meaningful Mathematical Discourse

- **Think About It:** How can the table help you understand the problem?
- How can you use place value to help you determine 10 × 10 × 10?

Have the students fill in the row for Week 4 on their own. Ask:

- What multiplication expression can you use to represent the number of pennies in Week 4?
- How can you use place value to help you determine 10 × 10 × 10 × 10?

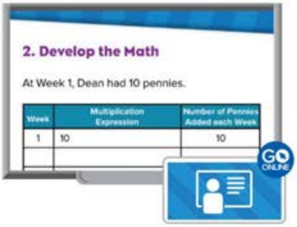
Have the students write the exponential forms for each row. Ask:

- What is the base for each exponential form? How do you know?
- What is the exponent for each exponential form? How do you know?
- How is writing 1,000 in exponential form the same as writing 10 × 10 × 10? How is it different?
- What happens to the value of the digit 1 for each power of 10?
- **Think About It:** How can you use place value to justify the pattern in the number of zeros?

Math is... Patterns

- What patterns do you notice in the table?

Students look for and use mathematical patterns to understand and solve the problem.



2. Develop the Math

At Week 1, Dean had 10 pennies.

Week	Multiplication Expression	Number of Pennies Added each Week
1	10	10

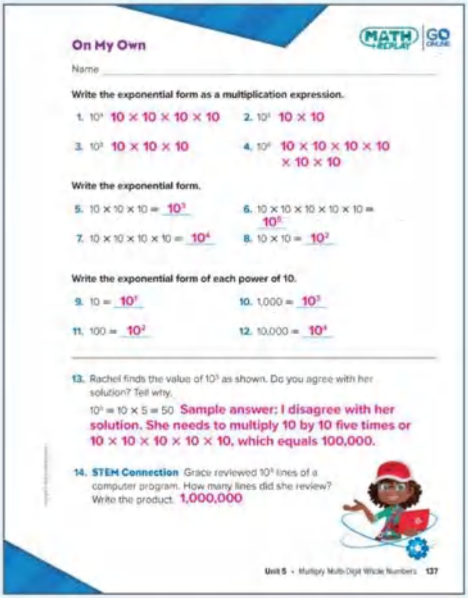
English Learner Scaffolds

Entering/Emerging Support students in understanding the passive by demonstrating. Show students two tens rods. Connect the two tens rods. Say *These tens rods can be connected.* Repeat the task twice with new objects, using the passive with *can*. Finally, put a group of chips on the table, and demonstrate counting them. *Say Complete the sentence: These chips can [be counted].*

Developing/Expanding Support students in understanding the passive *can* by demonstrating. Show students two tens rods then connect them. Say *These tens rods can be connected*. Next, put a group of chips on the table, and demonstrate counting them. *Say Complete the sentence: These chips can [be counted]*. Finally, ask students to make their own sentence using the passive with *can*.

Bridging/Reaching Ask students to explain how a power of 10 can be written in exponential form. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, it can't be written.... or No, that's incorrect because....*

Practice & Reflect 10 min



On My Own

Name ______

Write the exponential form as a multiplication expression.

1. 10^4 $10 \times 10 \times 10 \times 10$
2. 10^2 10×10
3. 10^3 $10 \times 10 \times 10$
4. 10^6 $10 \times 10 \times 10 \times 10 \times 10 \times 10$

Write the exponential form.

5. $10 \times 10 \times 10 =$ 10^3
6. $10 \times 10 \times 10 \times 10 \times 10 =$ 10^5
7. $10 \times 10 \times 10 \times 10 =$ 10^4
8. $10 \times 10 =$ 10^2

Write the exponential form of each power of 10.

9. $10 =$ 10^1
10. $1{,}000 =$ 10^3
11. $100 =$ 10^2
12. $10{,}000 =$ 10^4

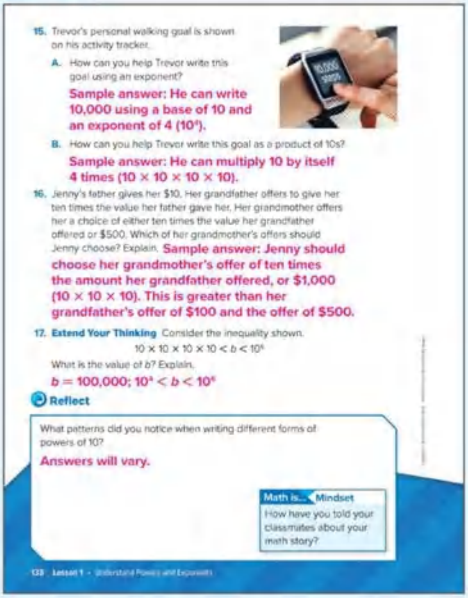
---

13. Rachel finds the value of 10^5 as shown. Do you agree with her solution? Tell why.

$10^5 = 10 \times 5 = 50$ **Sample answer: I disagree with her solution. She needs to multiply 10 by 10 five times or $10 \times 10 \times 10 \times 10 \times 10$, which equals 100,000.**

14. **STEM Connection** Grace reviewed 10^6 lines of a computer program. How many lines did she review? Write the product. **1,000,000**

Unit 5 • Multiply Multi-Digit Whole Numbers 137



15. Trevor's personal walking goal is shown on his activity tracker.

A. How can you help Trevor write this goal using an exponent?

Sample answer: He can write 10,000 using a base of 10 and an exponent of 4 (10^4).

B. How can you help Trevor write this goal as a product of 10s?

Sample answer: He can multiply 10 by itself 4 times ($10 \times 10 \times 10 \times 10$).

16. Jenny's father gives her $10. Her grandfather offers to give her ten times the value her father gave her. Her grandmother offers her a choice of either ten times the value her grandfather offered or $500. Which of her grandmother's offers should Jenny choose? Explain. **Sample answer: Jenny should choose her grandmother's offer of ten times the amount her grandfather offered, or $1,000 ($10 \times 10 \times 10$). This is greater than her grandfather's offer of $100 and the offer of $500.**

17. **Extend Your Thinking** Consider the inequality shown.

$$10 \times 10 \times 10 \times 10 < b < 10^6$$

What is the value of *b*? Explain.

$b = 100{,}000$; $10^4 < b < 10^6$

Reflect

What patterns did you notice when writing different forms of powers of 10?

Answers will vary.

Math is... Mindset

How have you told your classmates about your math story?

138 Lesson 1 • Understand Powers and Exponents

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 14 In evaluating 10^6, students may write 10 followed by 6 zeros. Remind them that the exponent in a power of 10 shows the number of zeros after a 1, not a 10.

Item Analysis

Item	DOK	Rigor
1–12	1	Procedural Skill and Fluency
13	2	Conceptual Understanding
14–16	1	Application
17	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- What patterns did you notice when writing different forms of powers of 10?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have your strengths in math helped you with your work today?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can write a power of 10 as a multiplication expression with factors of 10.
- I can write a power of 10 using a base of 10 and exponents.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Understand powers of 10	5.NBT.A.2
2	2	Understand powers of 10	5.NBT.A.2
3	2	Understand powers of 10	5.NBT.A.2

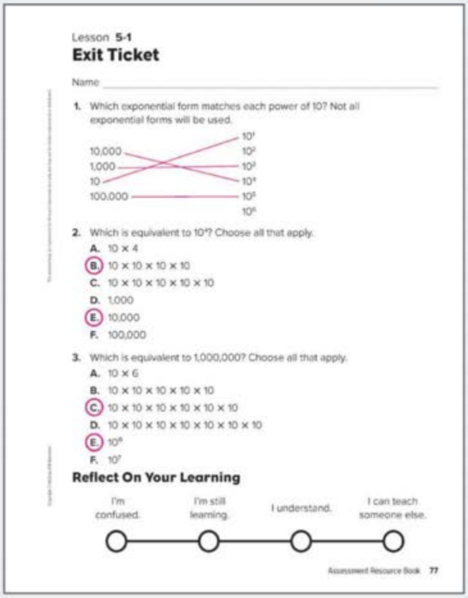
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson **5-1**

Exit Ticket

Name ______________________

1. Which exponential form matches each power of 10? Not all exponential forms will be used.

10,000 — 10^4
1,000 — 10^3
10 — 10^1
100,000 — 10^5

10^1
10^2
10^3
10^4
10^5
10^6

2. Which is equivalent to 10^4? Choose all that apply.
   A. 10 × 4
   [✓ B.] 10 × 10 × 10 × 10
   C. 10 × 10 × 10 × 10 × 10
   D. 1,000
   [✓ E.] 10,000
   F. 100,000

3. Which is equivalent to 1,000,000? Choose all that apply.
   A. 10 × 6
   B. 10 × 10 × 10 × 10 × 10
   [✓ C.] 10 × 10 × 10 × 10 × 10 × 10
   D. 10 × 10 × 10 × 10 × 10 × 10 × 10
   [✓ E.] 10^6
   F. 10^7

Reflect On Your Learning

○ I'm confused.
○ I'm still learning.
○ I understand.
○ I can teach someone else.

Assessment Resource Book 77

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Roll It and Write It!

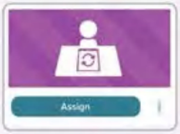
Work with students in small groups. Provide students with a number cube. Have students write a base of 10 and then roll the number cube to obtain an exponent. Students write the expression using an exponent and as a multiplication expression and find the product. Make sure students recognize how the expressions are related.

GO ONLINE

Take Another Look Lessons

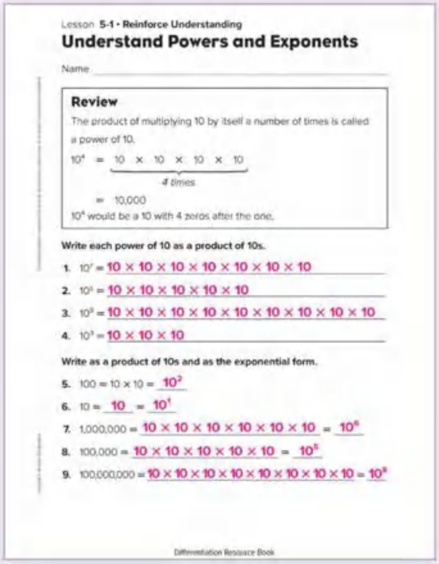
Assign the interactive lessons to reinforce targeted skills.

- Introduction to Powers of 10
- Powers of 10 (Exponents)



INDEPENDENT WORK

Differentiation Resource Book, p. 37



Lesson **5-1 • Reinforce Understanding**

Understand Powers and Exponents

Name ______________________

Review

The product of multiplying 10 by itself a number of times is called a power of 10.

$$10^4 = \underbrace{10 \times 10 \times 10 \times 10}_{4\ times}$$

$$= 10{,}000$$

10^4 would be a 10 with 4 zeros after the one.

Write each power of 10 as a product of 10s.

1. $10^7 =$ 10 × 10 × 10 × 10 × 10 × 10 × 10
2. $10^5 =$ 10 × 10 × 10 × 10 × 10
3. $10^9 =$ 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10
4. $10^3 =$ 10 × 10 × 10

Write as a product of 10s and as the exponential form.

5. 100 = 10 × 10 = 10^2
6. 10 = 10 = 10^1
7. 1,000,000 = 10 × 10 × 10 × 10 × 10 × 10 = 10^6
8. 100,000 = 10 × 10 × 10 × 10 × 10 = 10^5
9. 100,000,000 = 10 × 10 × 10 × 10 × 10 × 10 × 10 × 10 = 10^8

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Powers of 10 Concentration

Students practice powers of 10 in standard form, as expressions, and with exponents.

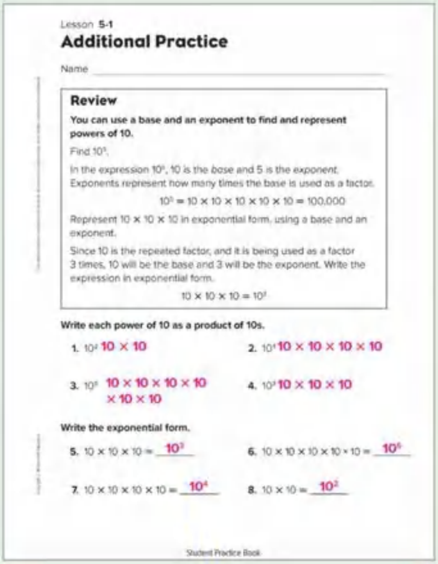
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 37–38



Lesson **5-1**

Additional Practice

Name ______________________

Review

You can use a base and an exponent to find and represent powers of 10.

Find 10^5.

In the expression 10^5, 10 is the *base* and 5 is the *exponent*. Exponents represent how many times the base is used as a factor.

$$10^5 = 10 \times 10 \times 10 \times 10 \times 10 = 100{,}000$$

Represent 10 × 10 × 10 in exponential form, using a base and an exponent.

Since 10 is the repeated factor, and it is being used as a factor 3 times, 10 will be the base and 3 will be the exponent. Write the expression in exponential form.

$$10 \times 10 \times 10 = 10^3$$

Write each power of 10 as a product of 10s.

1. 10^2 10 × 10
2. 10^4 10 × 10 × 10 × 10
3. 10^6 10 × 10 × 10 × 10 × 10 × 10
4. 10^3 10 × 10 × 10

Write the exponential form.

5. 10 × 10 × 10 = 10^3
6. 10 × 10 × 10 × 10 × 10 = 10^5
7. 10 × 10 × 10 × 10 = 10^4
8. 10 × 10 = 10^2

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Use it! Application Station

Washington Color School Movement—Color Field Painting Students create art to represent a base number with an exponent.

GO ONLINE

Spiral Review

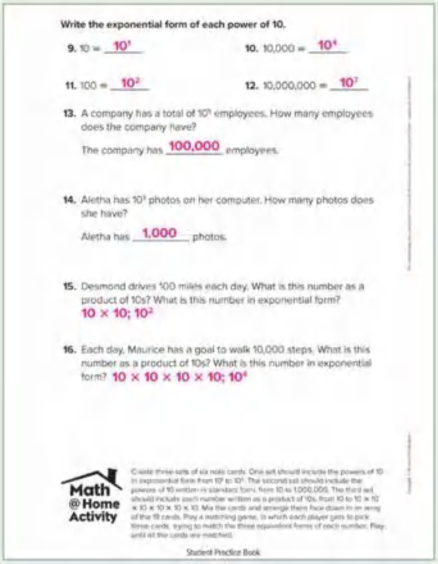
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 37–38



Write the exponential form of each power of 10.

9. 10 = 10^1

10. 10,000 = 10^4

11. 100 = 10^2

12. 10,000,000 = 10^7

13. A company has a total of 10^5 employees. How many employees does the company have?

The company has 100,000 employees.

14. Aletha has 10^3 photos on her computer. How many photos does she have?

Aletha has 1,000 photos.

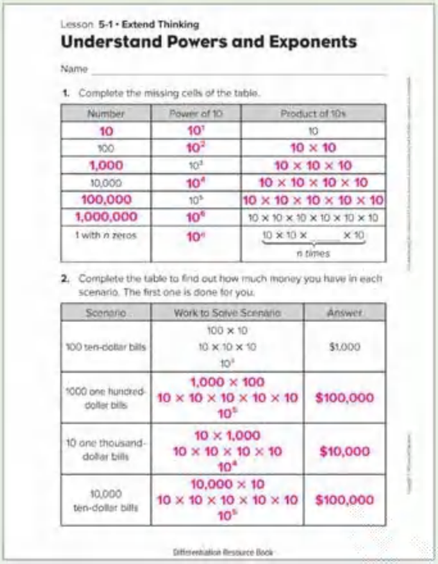
15. Desmond drives 100 miles each day. What is this number as a product of 10s? What is this number in exponential form?
10 × 10; 10^2

16. Each day, Maurice has a goal to walk 10,000 steps. What is this number as a product of 10s? What is this number in exponential form? 10 × 10 × 10 × 10; 10^4

Math @Home Activity Create three sets of six note cards. One set should include the powers of 10 in exponential form from 10^1 to 10^6. The second set should include the powers of 10 written in standard form, from 10 to 1,000,000. The third set should include each number written as a product of 10s, from 10 to 10 × 10 × 10 × 10 × 10 × 10. Mix the cards and arrange them face down in an array of the 18 cards. Play a matching game, in which each player gets to pick three cards, trying to match the three equivalent forms of each number. Play until all the cards are matched.

Student Practice Book

Differentiation Resource Book, p. 38



Lesson **5-1 • Extend Thinking**

Understand Powers and Exponents

Name ______________________

1. Complete the missing cells of the table.

Number	Power of 10	Product of 10s
10	10^1	10
100	10^2	10 × 10
1,000	10^3	10 × 10 × 10
10,000	10^4	10 × 10 × 10 × 10
100,000	10^5	10 × 10 × 10 × 10 × 10
1,000,000	10^6	10 × 10 × 10 × 10 × 10 × 10
1 with *n* zeros	10^n	$\underbrace{10 \times 10 \times \_\_\_\_ \times 10}_{n \text{ times}}$

2. Complete the table to find out how much money you have in each scenario. The first one is done for you.

Scenario	Work to Solve Scenario	Answer
100 ten-dollar bills	100 × 10 10 × 10 × 10 10^3	$1,000
1000 one hundred-dollar bills	1,000 × 100 10 × 10 × 10 × 10 × 10 10^5	$100,000
10 one thousand-dollar bills	10 × 1,000 10 × 10 × 10 × 10 10^4	$10,000
10,000 ten-dollar bills	10,000 × 10 10 × 10 × 10 × 10 × 10 10^5	$100,000

Differentiation Resource Book

LESSON **5-2**

Patterns When Multiplying a Whole Number by Powers of 10

Learning Targets

- I can determine the products of numbers multiplied by powers of 10 written with exponents.
- I can describe the pattern for multiplying by powers of 10.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Math Practices and Processes

MPP Construct viable arguments and critique the reasoning of others.

Vocabulary

Math Terms	**Academic Terms**
base	cite
exponent	establish
factor	
power of 10	

Materials

The materials may be for any part of the lesson.

- calculators
- index cards

Focus

Content Objectives	**Language Objectives**	**SEL Objective**
• Students use patterns to determine products when multiplying whole numbers by powers of 10. • Students explain patterns in the products when multiplying whole numbers by powers of 10.	• Students talk about the patterns they see in products while answering *Wh-* questions. • To support optimizing output, ELs participate in MLR1: Stronger and Clearer Each Time.	• Students employ techniques that can be used to help maintain focus and manage reactions to potentially frustrating situations.

Coherence

Previous	**Now**	**Next**
• Students recognized that in a multi-digit whole number, a digit in one place represents ten times what it represents in the place to its right (Grade 4). • Students extended their understanding of place value to write powers of 10 using exponents (Unit 5).	• Students examine patterns based on place value when a whole number is multiplied by a power of 10.	• Students estimate products of multi-digit factors to determine if calculations are reasonable (Unit 5). • Students write and evaluate numerical expressions involving whole-number exponents. (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students develop conceptual understanding by multiplying by powers of 10 and looking for patterns and understand the effect multiplying by a power of 10 has on a number.	• Students build upon the conceptual foundation for the effect of multiplying by a power of 10, which gives students some early experience developing proficiency.	• Students apply their understanding of powers and exponents to solve problems based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Find the Pattern, Make a Pattern

5–7 min

Build Fluency Students build number sense as they determine the pattern and find the missing terms, and then create a new sequence with the same pattern but different numbers.

These prompts encourage students to talk about their reasoning:

- What strategy did you use to determine the pattern and missing numbers?
- How can you tell if your sequence follows the same rule?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about differences and similarities between four representations of the same number using powers of 10.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip You may wish to divide the class in half and assign one question to each half of the class. Ask students to independently analyze the expressions and answer their question. Then invite students to share their findings and discuss any points of interest that the different perspectives may provide.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of patterns that arise when multiplying a number by powers of 10 and are based on possible comments and questions that students may make during the share out.

- What do you notice about the factors in the expressions?
- What do you notice about he exponents in the expressions?
- What do you notice about the zeros in the expressions?

Math is... Mindset

- What do you do to avoid getting distracted?

SEL Self-Management: Control Impulses

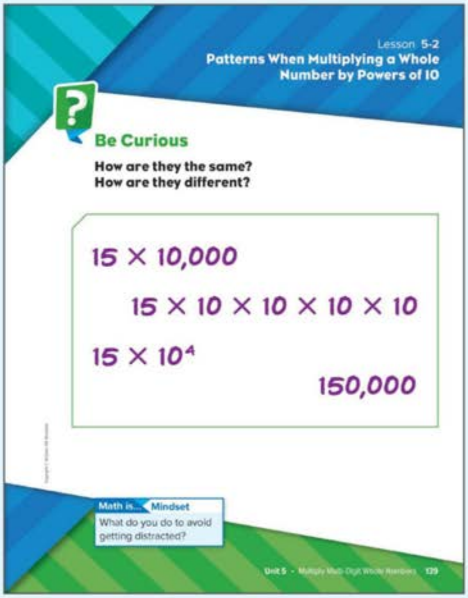
Invite students to set a class Focus Goal for the Notice & Wonder routine by agreeing on a set time that they will independently focus on noticing and wondering. As students work through this time, remind them to be mindful of their collective goal. Model constructive strategies and language for helping others stay on task, as well as for maintaining one's own focus. If students lose focus, allow them to take independent breaks to help them regain their focus.

Transition to Explore & Develop

Guide the discussion to have students analyze the similarities and differences in terms of powers of 10. Ask questions to get students thinking about ways to determine how to relate how the digits of the whole number shift based on the exponent on the power of 10.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we can use patterns to multiply a number by powers of 10.



Lesson 5-2

Patterns When Multiplying a Whole Number by Powers of 10

Be Curious

How are they the same?
How are they different?

$15 \times 10{,}000$

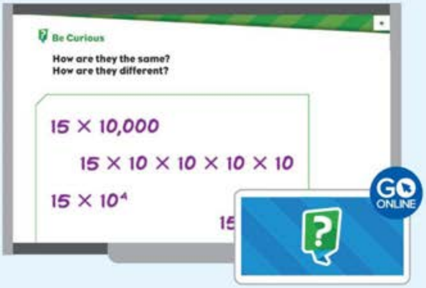
$15 \times 10 \times 10 \times 10 \times 10$

15×10^4

150,000

Math is... Mindset

What do you do to avoid getting distracted?



Be Curious

How are they the same?
How are they different?

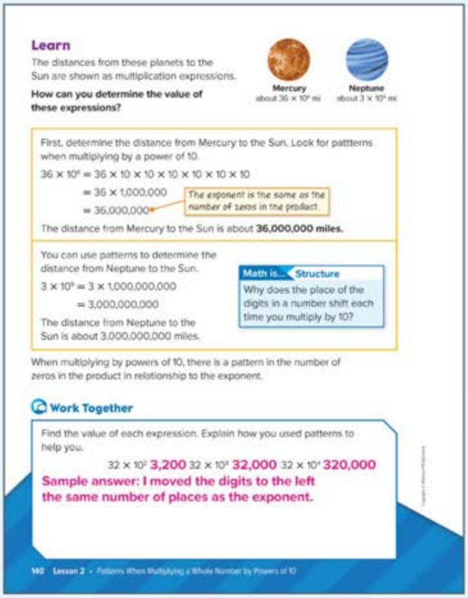
$15 \times 10{,}000$

$15 \times 10 \times 10 \times 10 \times 10$

15×10^4

Explore & Develop

20 min



Learn

The distances from these planets to the Sun are shown as multiplication expressions.

How can you determine the value of these expressions?

First, determine the distance from Mercury to the Sun. Look for patterns when multiplying by a power of 10.

$$\begin{aligned} 36 \times 10^6 &= 36 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \\ &= 36 \times 1{,}000{,}000 \\ &= 36{,}000{,}000 \end{aligned}$$

The exponent is the same as the number of zeros in the product.

The distance from Mercury to the Sun is about **36,000,000 miles.**

You can use patterns to determine the distance from Neptune to the Sun.

$$\begin{aligned} 3 \times 10^9 &= 3 \times 1{,}000{,}000{,}000 \\ &= 3{,}000{,}000{,}000 \end{aligned}$$

The distance from Neptune to the Sun is about 3,000,000,000 miles.

Math is... Structure

Why does the place of the digits in a number shift each time you multiply by 10?

When multiplying by powers of 10, there is a pattern in the number of zeros in the product in relationship to the exponent.

Work Together

Find the value of each expression. Explain how you used patterns to help you.

32×10^2 **3,200** 32×10^3 **32,000** 32×10^4 **320,000**

Sample answer: I moved the digits to the left the same number of places as the exponent.

140 Lesson 2 • Patterns When Multiplying a Whole Number by Powers of 10

❶ Pose the Problem

ETP Pose Purposeful Questions

- What do you notice about the multiplication expressions?
- What is the problem asking you to do?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and have them work together to find the values of two expressions. Have them individually write sentences explaining the patterns they used. Then have them share their writing with their partner and, if needed, refine their writing. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How could you explain to a friend how to use place-value patterns to multiply a number by a power of 10?

Key Takeaways

- Multiplying a whole number by a power of 10 results in a discernable pattern – the number of zeros following the whole number is the same as the power.
- The exponent of a power of 10 indicates the number of times 10 is multiplied by itself and is represented by the number of zeros after the whole number.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of how to use patterns to simplify expressions involving a whole number times a power of 10. Have students work on the activity in pairs before asking them to explain how they found their answers.

Common Misconception Students may see and use the "adding zeros" pattern and feel it is incorrect. It is not, but remind them that the digits in a number shifting when it is multiplied by a power of 10 is what establishes that pattern, and they should always understand how and why a shortcut works.

LOM Language of Math

Make sure that students understand the difference between a *multiple* of 10 and a *power* of 10. Encourage students to cite numbers that are powers of 10, then others that are multiples of 10.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore place-value patterns when multiplying by powers of 10 and use their patterns to multiply whole numbers by powers of 10.

Materials: calculator

Directions: Students enter any 2-digit whole number on the calculator (e.g. 57), then multiply their number by 10. Have them predict the product before they press the equal key. Students continue to multiply by 10 mentally, challenging themselves to predict the product before they press the equal key.

Depending on the calculator being used, students may notice that they reach a point that an “E” is shown followed by some digits. Ask students to use their patterns to make a conjecture about what the “E” represents.

ETP Implement Tasks That Support Reasoning and Problem Solving

- How did you use mental math to predict the product?
- What happens to the digits each time the number is multiplied by 10?
- What are some ways to record your work to look for patterns?
- How could you summarize the results to predict how multiplying a number by a power of 10 affects the values of the digits?

Math is... Structure

- How can you use place value to explain why the place of the digits in a number shift each time you multiply by 10?

Students use structure to connect place value and multiplying by powers of 10.

Activity Debrief: Have students share their findings when repeatedly multiplying by 10. Encourage students to write their multiplication expressions by writing the powers of 10 in exponential form. Discuss the relationship between the exponent and the number of places the digits shifted.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine the value of these expressions?

Guided Exploration

Students examine the patterns that arise when multiplying a whole number by a power of 10.

ETP Use and Connect Mathematical Representations

Have the students write the expression 36×10^6 as a product without exponents on their own. Ask:

- What is the base of 10^6?
- What is the exponent of 10^6?
- How can you write 10^6 as a product? How do you know?
- How do you know that 10 × 10 × 10 × 10 × 10 × 10 equals 1,000,000?
- How do you know that 36 × 1,000,000 equals 36,000,000?

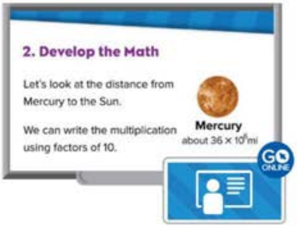
Have the students find the other representations of 3×10^9 on their own. Ask:

- What is the exponent of 10^9?
- How many zeros should be in the product? How do you know?

Math is... Structure

- How can you use place value to explain why the place of the digits in a number shift each time you multiply by 10?

Students use structure to connect place value and multiplying by powers of 10.



2. Develop the Math

Let's look at the distance from Mercury to the Sun.

We can write the multiplication using factors of 10.

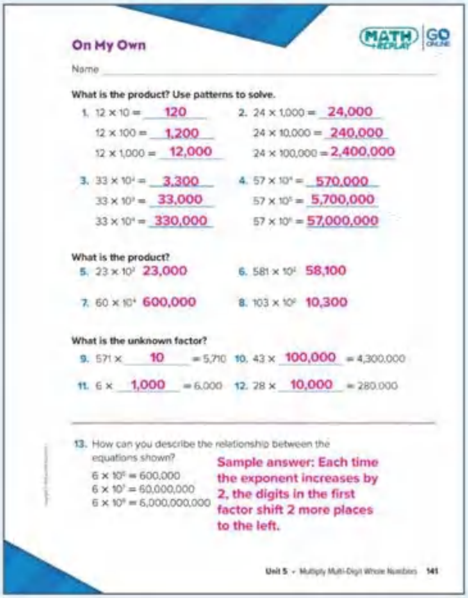
EL English Learner Scaffolds

Entering/Emerging Support students in understanding the term *distance* by demonstrating. Measure the distance between two objects in your classroom; for example, a desk and the door. Say *The [desk] is [three feet] away from the door*. Pause and then say *The distance is [three feet]. Repeat twice with new objects*. Finally, ask students to measure distance, and complete the following sentence, saying it aloud: *The distance is* ____.

Developing/Expanding Support students in understanding the term *distance* by demonstrating. Measure the distance between two objects in your classroom; for example, a desk and the door. Say *The [desk] is [three feet] away from the door*. Pause and then say *The distance is [three feet]*. Repeat twice with new objects. Finally, ask students to measure the distance between two objects, and say it aloud in a sentence using *distance*.

Bridging/Reaching Ask students to discuss how they can find the distance between two objects in the classroom. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, I disagree because... or No, that isn't the distance...*

Practice & Reflect
10 min



On My Own

Name ______

What is the product? Use patterns to solve.

1. $12 \times 10 =$ 120
   $12 \times 100 =$ 1,200
   $12 \times 1{,}000 =$ 12,000
2. $24 \times 1{,}000 =$ 24,000
   $24 \times 10{,}000 =$ 240,000
   $24 \times 100{,}000 =$ 2,400,000
3. $33 \times 10^2 =$ 3,300
   $33 \times 10^3 =$ 33,000
   $33 \times 10^4 =$ 330,000
4. $57 \times 10^4 =$ 570,000
   $57 \times 10^5 =$ 5,700,000
   $57 \times 10^6 =$ 57,000,000

What is the product?

5. 23×10^3 23,000
6. 581×10^2 58,100
7. 60×10^4 600,000
8. 103×10^2 10,300

What is the unknown factor?

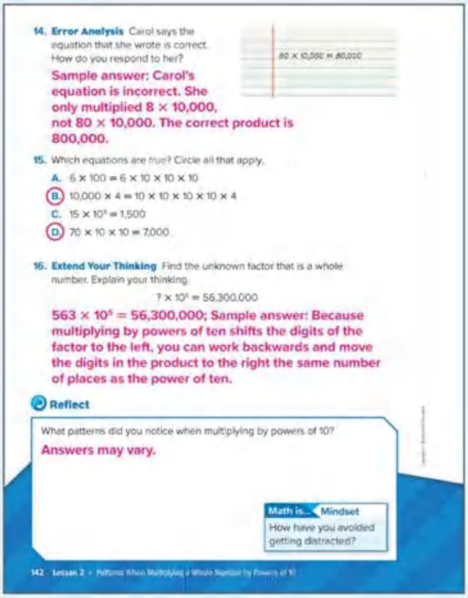
9. $571 \times$ 10 $= 5{,}710$
10. $43 \times$ 100,000 $= 4{,}300{,}000$
11. $6 \times$ 1,000 $= 6{,}000$
12. $28 \times$ 10,000 $= 280{,}000$

13. How can you describe the relationship between the equations shown?

$6 \times 10^5 = 600{,}000$
$6 \times 10^7 = 60{,}000{,}000$
$6 \times 10^9 = 6{,}000{,}000{,}000$

Sample answer: Each time the exponent increases by 2, the digits in the first factor shift 2 more places to the left.

Unit 5 • Multiply Multi-Digit Whole Numbers 141



14. **Error Analysis** Carol says the equation that she wrote is correct. How do you respond to her?

$80 \times 10{,}000 = 80{,}000$

Sample answer: Carol's equation is incorrect. She only multiplied $8 \times 10{,}000$, not $80 \times 10{,}000$. The correct product is 800,000.

15. Which equations are *true*? Circle all that apply.
    - A. $6 \times 100 = 6 \times 10 \times 10 \times 10$
    - [✓ B.] $10{,}000 \times 4 = 10 \times 10 \times 10 \times 10 \times 4$
    - C. $15 \times 10^3 = 1{,}500$
    - [✓ D.] $70 \times 10 \times 10 = 7{,}000$

16. **Extend Your Thinking** Find the unknown factor that is a whole number. Explain your thinking.

$$? \times 10^5 = 56{,}300{,}000$$

$563 \times 10^5 = 56{,}300{,}000$; Sample answer: Because multiplying by powers of ten shifts the digits of the factor to the left, you can work backwards and move the digits in the product to the right the same number of places as the power of ten.

Reflect

What patterns did you notice when multiplying by powers of 10?

Answers may vary.

Math is... Mindset
How have you avoided getting distracted?

142 Lesson 2 • Patterns When Multiplying a Whole Number by Powers of 10

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 7 Some students may develop a habit of adding the same number of zeros as the power to the first digit of a multiple of 10 or 100, resulting in an error. Make sure they remember to add zeros to the number being multiplied.

Item Analysis

Item	DOK	Rigor
1–12	1	Procedural Skill and Fluency
13–16	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- What patterns did you notice when multiplying by powers of 10?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What steps did you take to maintain your focus today?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can determine the products of numbers multiplied by powers of 10 written with exponents.
- I can describe the pattern for multiplying by powers of 10.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	3	Multiply whole numbers by powers of 10 patterns	5.NBT.A.2
2	2	Multiply whole numbers by powers of 10 patterns	5.NBT.A.2
3	2	Multiply whole numbers by powers of 10 patterns	5.NBT.A.2
4	2	Multiply whole numbers by powers of 10 patterns	5.NBT.A.2
5	2	Multiply whole numbers by powers of 10 patterns	5.NBT.A.2

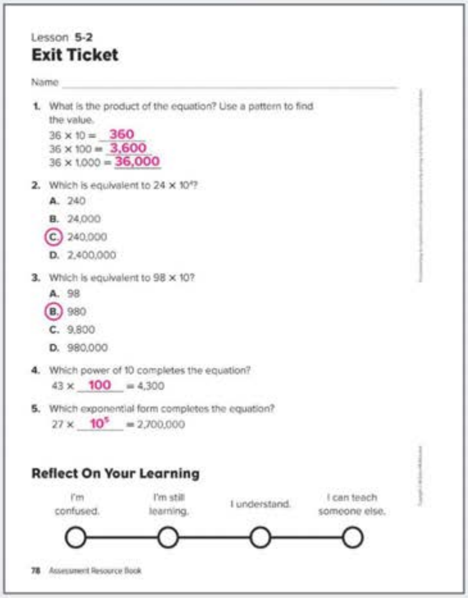
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
5 of 5	Additional Practice or any of the B or E activities
4 of 5	*Take Another Look* or any of the B activities
3 or fewer of 5	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking


Lesson 5-2

Exit Ticket

Name ______

1. What is the product of the equation? Use a pattern to find the value.
   36 × 10 = 360
   36 × 100 = 3,600
   36 × 1,000 = 36,000

2. Which is equivalent to 24×10^4?
   A. 240
   B. 24,000
   [✓ C.] 240,000
   D. 2,400,000

3. Which is equivalent to 98 × 10?
   A. 98
   [✓ B.] 980
   C. 9,800
   D. 980,000

4. Which power of 10 completes the equation?
   43 × 100 = 4,300

5. Which exponential form completes the equation?
   $27 \times 10^5 = 2{,}700{,}000$

Reflect On Your Learning

I'm confused. ○ — I'm still learning. ○ — I understand. ○ — I can teach someone else. ○

78 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Place Value Slide

Work with students in small groups. Give each student index cards for the digits 1–9, and three cards with 0. Have each student create a number using three cards. Announce an operation and power of 10, such as "multiply by 100" or "divide by 1,000." Students shift their cards with respect to the decimal point to display the results, inserting 0s as needed. Have students explain how the operation affects where the decimal point is.

GO ONLINE

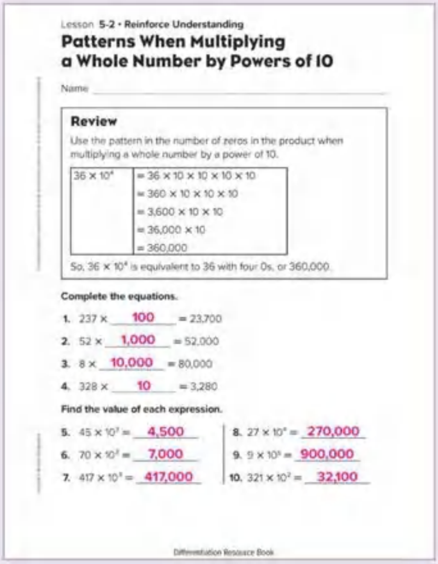
Take Another Look Lessons

Assign the interactive lessons to reinforce targeted skills.

- Introduction to Powers of 10
- Multiply by Powers of 10 (Decimal Point)

INDEPENDENT WORK

Differentiation Resource Book, p. 39



Lesson 5-2 • Reinforce Understanding

Patterns When Multiplying a Whole Number by Powers of 10

Name ____________

Review

Use the pattern in the number of zeros in the product when multiplying a whole number by a power of 10.

36×10^4	$= 36 \times 10 \times 10 \times 10 \times 10$ $= 360 \times 10 \times 10 \times 10$ $= 3{,}600 \times 10 \times 10$ $= 36{,}000 \times 10$ $= 360{,}000$

So, 36×10^4 is equivalent to 36 with four 0s, or 360,000.

Complete the equations.

1. $237 \times$ 100 $= 23{,}700$
2. $52 \times$ 1,000 $= 52{,}000$
3. $8 \times$ 10,000 $= 80{,}000$
4. $328 \times$ 10 $= 3{,}280$

Find the value of each expression.

5. $45 \times 10^2 =$ 4,500
6. $70 \times 10^2 =$ 7,000
7. $417 \times 10^3 =$ 417,000
8. $27 \times 10^4 =$ 270,000
9. $9 \times 10^5 =$ 900,000
10. $321 \times 10^2 =$ 32,100

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multiplying by 10 Tic Tac Toe

Students practice multiplying whole numbers and decimals by 10 and 100.

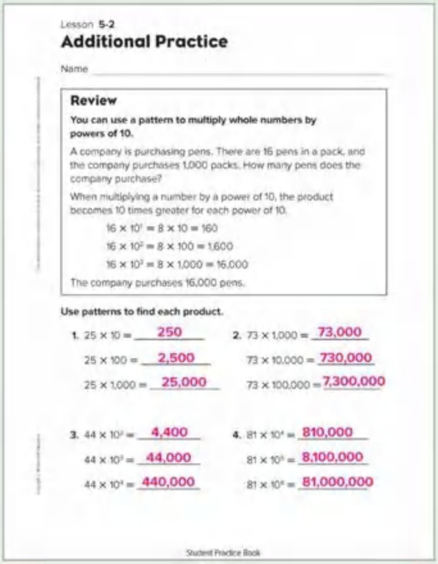
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 39–40



Lesson 5-2

Additional Practice

Name ____________

Review

You can use a pattern to multiply whole numbers by powers of 10.

A company is purchasing pens. There are 16 pens in a pack, and the company purchases 1,000 packs. How many pens does the company purchase?

When multiplying a number by a power of 10, the product becomes 10 times greater for each power of 10.

$16 \times 10^1 = 8 \times 10 = 160$

$16 \times 10^2 = 8 \times 100 = 1{,}600$

$16 \times 10^3 = 8 \times 1{,}000 = 16{,}000$

The company purchases 16,000 pens.

Use patterns to find each product.

1. $25 \times 10 =$ 250
   $25 \times 100 =$ 2,500
   $25 \times 1{,}000 =$ 25,000
2. $73 \times 1{,}000 =$ 73,000
   $73 \times 10{,}000 =$ 730,000
   $73 \times 100{,}000 =$ 7,300,000
3. $44 \times 10^2 =$ 4,400
   $44 \times 10^3 =$ 44,000
   $44 \times 10^4 =$ 440,000
4. $81 \times 10^4 =$ 810,000
   $81 \times 10^5 =$ 8,100,000
   $81 \times 10^6 =$ 81,000,000

Student Practice Book

Own It! Digital Station

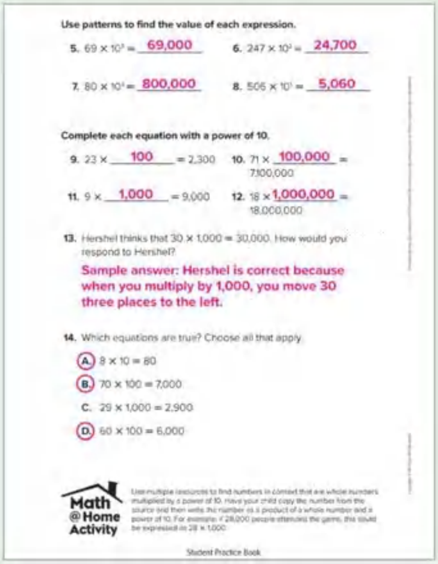
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 39–40



Use patterns to find the value of each expression.

5. $69 \times 10^3 =$ 69,000 **6.** $247 \times 10^2 =$ 24,700

7. $80 \times 10^4 =$ 800,000 **8.** $506 \times 10^1 =$ 5,060

Complete each equation with a power of 10.

9. 23 × 100 = 2,300 **10.** 71 × 100,000 = 7,100,000

11. 9 × 1,000 = 9,000 **12.** 18 × 1,000,000 = 18,000,000

13. Hershel thinks that 30 × 1,000 = 30,000. How would you respond to Hershel?

Sample answer: Hershel is correct because when you multiply by 1,000, you move 30 three places to the left.

14. Which equations are true? Choose all that apply.

[✓ A.] 8 × 10 = 80
[✓ B.] 70 × 100 = 7,000
C. 29 × 1,000 = 2,900
[✓ D.] 60 × 100 = 6,000

Math @Home Activity Use multiple resources to find numbers in context that are whole numbers multiplied by a power of 10. Have your child copy the number from the source and then write the number as a product of a whole number and a power of 10. For example, if 28,000 people attended the game, this could be expressed as 28 × 1,000.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Make a Pulley System Students use measurements to create a pulley system. *The content of this card has concepts covered later in Lesson 5-7. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 40

Lesson **5-2 • Extend Thinking**

Patterns When Multiplying a Whole Number by Powers of 10

Name ______________________

In the table below, the distance of each planet from the sun is provided in kilometers. Rewrite each distance as a product with a power of 10. The first one is done for you. (Source: theplanets.org)

Planet	Distance From the Sun (km)	My Answer
Mercury	57,910,000 km	5791×10^4
Venus	108,200,000 km	$1,082 \times 10^5$
Earth	149,600,000 km	$1,496 \times 10^5$
Mars	227,940,000 km	$22,794 \times 10^4$
Jupiter	778,330,000 km	$77,833 \times 10^4$
Saturn	1,424,600,000 km	$14,246 \times 10^5$
Uranus	2,873,550,000 km	$287,355 \times 10^4$
Neptune	4,501,000,000 km	$4,501 \times 10^6$

Use your previous work to rewrite the table so that all distances from the sun are multiplied by 10^3. The first one is done for you.

Planet	Distance From the Sun (km)	My Answer
Mercury	57,910,000 km	$57,910 \times 10^3$
Venus	108,200,000 km	$108,200 \times 10^3$
Earth	149,600,000 km	$149,600 \times 10^3$
Mars	227,940,000 km	$227,940 \times 10^3$
Jupiter	778,330,000 km	$778,330 \times 10^3$
Saturn	1,424,600,000 km	$1,424,600 \times 10^3$
Uranus	2,873,550,000 km	$2,873,550 \times 10^3$
Neptune	4,501,000,000 km	$4,501,000 \times 10^3$

Differentiation Resource Book

LESSON **5-3**

Estimate Products of Multi-Digit Factors

Learning Targets

- I can explain how to estimate products of multi-digit factors.
- I can estimate products of multi-digit factors to determine if calculations are reasonable.
- I can use an estimated product to make predictions about a calculated solution.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

Math Practices and Processes

MPP Use appropriate tools strategically.

Vocabulary

Math Term	**Academic Terms**
estimate	accurate
round	relevant

Materials

The materials may be for any part of the lesson.

- calculators
- index cards
- number cubes

Focus

Content Objectives	**Language Objectives**	**SEL Objective**
• Students estimate products of multi-digit factors using the same strategies used to estimate products of lesser factors. • Students use estimated products to make predictions about a calculated solution. • Students use estimated products to assess the reasonableness of a calculated solution.	• Students discuss estimating products while answering *Wh-* questions. • To maximize linguistic and cognitive meta-awareness, ELs participate in MLR7: Compare and Connect.	• Students determine the strategies and analyses necessary to make informed decisions when engaging in mathematical practices.

Coherence

Previous	**Now**	**Next**
• Students multiplied two two-digit numbers, using strategies based on place value and the properties of operations (Grade 4). • Students examined place-value patterns when a whole number was multiplied by a power of 10 (Unit 5).	• Students estimate products of multi-digit factors to determine if calculations are reasonable.	• Students will find products of two- and three-digit factors using area models and partial products (Unit 5). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build their understanding of multiplying multi-digit numbers by estimating products. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students build proficiency estimating the product of multiplying multi-digit numbers.	• Students estimate and find products to solve problems based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine
About How Much?

5–7 min

Build Fluency Students build number sense as they estimate the sum of two decimals. Remind students that they should use mental math strategies to estimate the sums and that they should not be computing exact answers.

These prompts encourage students to talk about their reasoning:

- What strategy did you use to estimate each sum?
- How can you tell when a calculated sum is not reasonable?
- What is another way to find an estimate?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about how changing a factor (like what is done when estimating a product) changes a product.

Notice & Wonder

- What do you notice? What do you wonder?

Teaching Tip It may help students understand the Notice & Wonder situation better by thinking of the area on the left as something being covered by the blue rectangles, like a table and tablecloths, or a window and curtains, or pieces of paper.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' noticings and wonderings about how changing a factor in a multiplication equation impacts the product and are based on possible comments and questions that students may make during the share out.

- What factors were changed in the expression 15 × 12?
- Which one is closest in area to 15 × 12?
- Which one is farthest away in area from 15 × 12?

Math is... Mindset

- What helps you make sense of a situation?

SEL Responsible Decision-Making: Analyze Situations

As students work through the Notice & Wonder routine, have them think about alternative ways to consider the factors and products. Encourage students to use a different strategy to check their answer. Remind them that thinking flexibly can help them work through challenging problems/mathematical tasks.

Transition to Explore & Develop

Ask questions that get students thinking about how estimating products can be useful. Guide the discussion to encourage students to think about multi-digit factors that they cannot easily multiply mentally. Encourage students to think about how they can use products of numbers they already know to find estimates.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we can find an estimate for a product and how we can use those estimates we find.

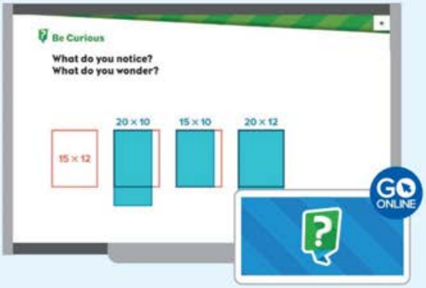
Lesson 5-3
Estimate Products of Multi-Digit Factors

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset
What helps you make sense of a situation?

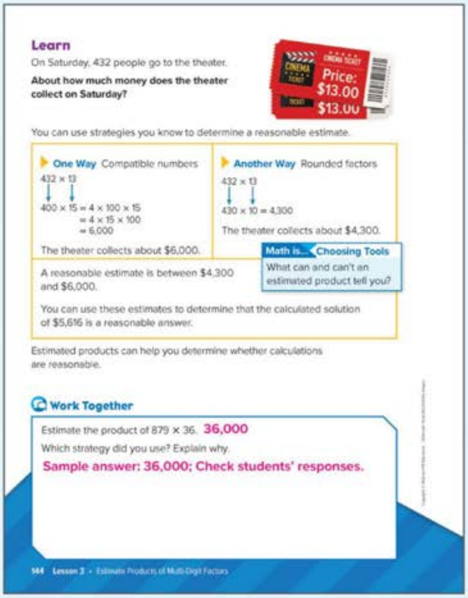
Unit 5 • Multiply Multi-Digit Whole Numbers 142



Be Curious

What do you notice?
What do you wonder?

Explore & Develop
20 min



Learn

On Saturday, 432 people go to the theater.

About how much money does the theater collect on Saturday?

You can use strategies you know to determine a reasonable estimate.

One Way Compatible numbers

432×13

$400 \times 15 = 4 \times 100 \times 15$
$= 4 \times 15 \times 100$
$= 6{,}000$

The theater collects about $6,000.

Another Way Rounded factors

432×13

$430 \times 10 = 4{,}300$

The theater collects about $4,300.

Math is... Choosing Tools
What can and can't an estimated product tell you?

A reasonable estimate is between $4,300 and $6,000.

You can use these estimates to determine that the calculated solution of $5,616 is a reasonable answer.

Estimated products can help you determine whether calculations are reasonable.

Work Together

Estimate the product of 879 × 36. **36,000**

Which strategy did you use? Explain why.

Sample answer: 36,000; Check students' responses.

144 Lesson 3 • Estimate Products of Multi-Digit Factors

❶ Pose the Problem

ETP Pose Purposeful Questions

- What operation will you use to solve the problem?
- Do you need to find an exact answer? Why or why not?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students. Provide students with a problem similar to the one on the Learn page. Instruct each student to solve it individually, and then have the students compare and contrast the strategies they used. Revisit this activity throughout the lesson to help students build proficiency.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How are using compatible numbers and rounding to estimate products similar? How are they different?
- How can estimating a product help you determine whether a calculated product is reasonable?

Key Takeaways

- Estimating products can help make predictions about a calculated solution.
- Estimating products helps assess the reasonableness of a calculated solution.
- Strategies used to estimate products of lesser factors, such as rounding and compatible numbers, can also be used to estimate products of multi-digit factors.

Work Together

As students share out their responses, ask them to explain the differences in the strategies used and their estimates. Encourage students to make predictions about the calculated product based on their estimates.

Common Misconception Remind students that there are no real "rules" for creating compatible numbers or rounded numbers to use in their estimates. The goal is to find two numbers that are easy for them to multiply mentally and quickly.

LOM Language of Math

Looking at 6 jelly beans and knowing there are 6 of them without counting is called *subitizing*. Looking at a jar full of jelly beans saying there are "about 100 of them" is *estimating*. Students practiced subitizing when they were younger and just learning numbers.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students estimate products of multi-digit factors using various strategies. They will compare their estimates.

Materials: number cubes

Directions: Students play a game where the greater estimate wins. Have students discuss estimation strategies they have used in the past, and how they can apply those strategies to multiplication. Students roll the number cubes to create two 2-digit factors. Each student estimates the product of a multiplication equation using a strategy of their choosing. The student with the higher estimate wins that round.

After students have compared their estimates, students work together to predict whether each estimate is greater than or less than the actual product.

ETP Support Productive Struggle

- How can you make an estimate that you know is greater than the calculated product?
- How can you make an estimate that you know is less than the calculated product?
- Which strategy do you think helps you find a more accurate estimate?

Math is... Choosing Tools

- What can and can't an estimated product tell you?

Students detect possible errors using estimation, recognizing both the insight to be gained from, and limitations of, estimation.

Activity Debrief: Have students share their strategies for determining a greater estimate and their prediction of how their estimate compares to the calculated product. For each multiplication expression shared, provide students with a calculated product. Facilitate a class discussion to use their estimate to assess the reasonablesness of the calculated product.

Have students revisit the Pose the Problem question and discuss answers.

- About how much money does the theater collect on Saturday?

Guided Exploration

Students use two different strategies to estimate products of multi-digit factors. They will then compare their estimates to the calculated product and use their estimates to assess if the calculated product is reasonable.

ETP Facilitate Meaningful Mathematical Discourse

Have the students mentally find the product of 400 and 15. Make sure they share their strategies and ask useful questions to improve each others' strategies: Ask:

- What strategy did you use? Why?
- Can you understand someone else's strategy?
- How would you find the exact solution to this problem?

- **Think About It:** What other compatible numbers could you use?
- How can you ou use place value to explain why 43×10 = 4,300?

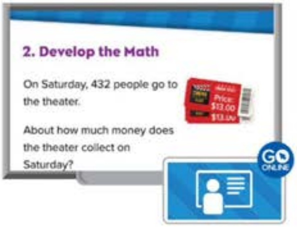
Have the students compare the calculated and estimated products. Ask:

- Is the calculated result reasonable? Why or why not?
- Why is the estimate using compatible numbers greater than the calculated product?
- Will compatible numbers always result in an estimate greater than the calculated product? Why or why not?
- Why is the estimate using rounded numbers less than the calculated product?
- Will rounded numbers always result in an estimate greater than the calculated product? Why or why not?

Math is... Choosing Tools

- What can and can't an estimated product tell you?

Students detect possible errors using estimation, recognizing both the insight to be gained from, and the limitations of, estimation.



2. Develop the Math

On Saturday, 432 people go to the theater.

About how much money does the theater collect on Saturday?

EL English Learner Scaffolds

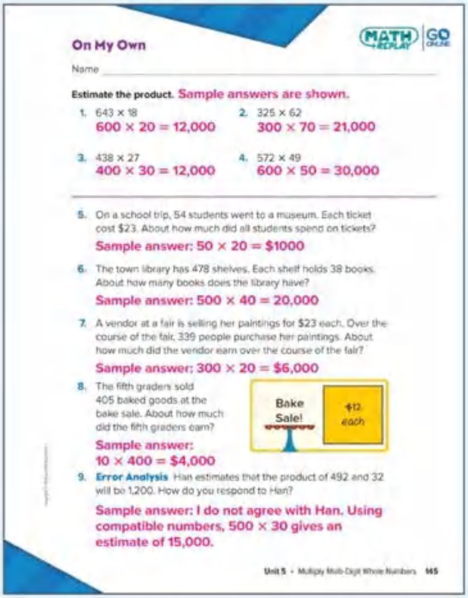
Entering/Emerging Support students' understanding of using the infinitive to express purpose. Go to your classroom door. Say *I can turn the knob to open the door*. Then pick up a [crayon]. Say, *I can use this [crayon] to [color a picture]*. Finally, ask students to complete the sentence, saying the answer aloud: *I can use a pencil ____ (to write) my name*.

Developing/Expanding Support students' understanding of using the infinitive to express purpose. Go to your classroom door. Say *I can turn the knob to open the door*. Then pick up a [crayon]. Say, *I can use this [crayon] to [color a picture]*. Finally, ask students to say something that they can do, using the same sentence pattern. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to explain how they can use compatible numbers or rounded numbers to find an estimate. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, I disagree because...* or *No, can use compatible numbers to find an estimate by....*

Practice & Reflect

10 min



On My Own

Name

Estimate the product. Sample answers are shown.

1. 643 × 18
600 × 20 = 12,000

2. 325 × 62
300 × 70 = 21,000

3. 438 × 27
400 × 30 = 12,000

4. 572 × 49
600 × 50 = 30,000

5. On a school trip, 54 students went to a museum. Each ticket cost $23. About how much did all students spend on tickets?
Sample answer: 50 × 20 = $1000

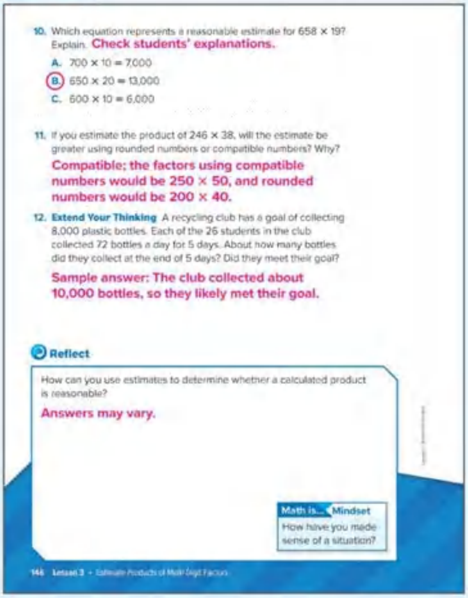
6. The town library has 478 shelves. Each shelf holds 38 books. About how many books does the library have?
Sample answer: 500 × 40 = 20,000

7. A vendor at a fair is selling her paintings for $23 each. Over the course of the fair, 339 people purchase her paintings. About how much did the vendor earn over the course of the fair?
Sample answer: 300 × 20 = $6,000

8. The fifth graders sold 405 baked goods at the bake sale. About how much did the fifth graders earn?
Sample answer:
10 × 400 = $4,000

9. **Error Analysis** Han estimates that the product of 492 and 32 will be 1,200. How do you respond to Han?
Sample answer: I do not agree with Han. Using compatible numbers, 500 × 30 gives an estimate of 15,000.

Unit 5 • Multiply Multi-Digit Whole Numbers 145



10. Which equation represents a reasonable estimate for 658 × 19? Explain. Check students' explanations.
A. 700 × 10 = 7,000
[✓ B.] 650 × 20 = 13,000
C. 600 × 10 = 6,000

11. If you estimate the product of 246 × 38, will the estimate be greater using rounded numbers or compatible numbers? Why?
Compatible; the factors using compatible numbers would be 250 × 50, and rounded numbers would be 200 × 40.

12. **Extend Your Thinking** A recycling club has a goal of collecting 8,000 plastic bottles. Each of the 26 students in the club collected 72 bottles a day for 5 days. About how many bottles did they collect at the end of 5 days? Did they meet their goal?
Sample answer: The club collected about 10,000 bottles, so they likely met their goal.

Reflect

How can you use estimates to determine whether a calculated product is reasonable?

Answers may vary.

Math is... Mindset
How have you made sense of a situation?

146 Lesson 3 • Estimate Products of Multi-Digit Factors

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercise 9 If students front-end estimate to 400 and 30, they may see that 4 × 3 = 12 and forget the correct place value, so about 1,200 would seem like an estimate of the product. Remind students to make sure they are using the correct place value when estimating using rounded numbers.

Item Analysis

Item	DOK	Rigor
1–4	1	Procedural Skill and Fluency
5–8	2	Application
9–12	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you use estimates to determine if a calculated product is reasonable?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did flexible thinking help you with your work today?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain how to estimate products of multi-digit factors.
- I can estimate products of multi-digit factors to determine if calculations are reasonable.
- I can use an estimated product to make predictions about a calculated solution.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Estimate products of multi-digit numbers	5.NBT.B.5
2	2	Estimate products of multi-digit numbers	5.NBT.B.5
3	2	Estimate products of multi-digit numbers	5.NBT.B.5
4	2	Estimate products of multi-digit numbers	5.NBT.B.5
5	3	Estimate products of multi-digit numbers	5.NBT.B.5

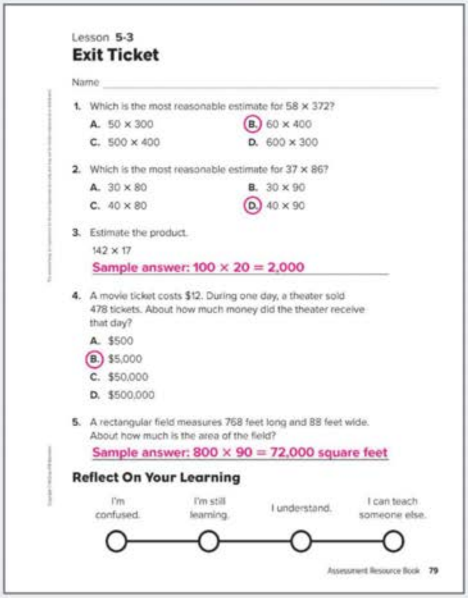
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
5 of 5	Additional Practice or any of the B or E activities
4 of 5	*Take Another Look* or any of the B activities
3 or fewer of 5	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking


Lesson 5-3

Exit Ticket

Name

1. Which is the most reasonable estimate for 58 × 372?
   - A. 50 × 300
   - [✓ B.] 60 × 400
   - C. 500 × 400
   - D. 600 × 300
2. Which is the most reasonable estimate for 37 × 86?
   - A. 30 × 80
   - B. 30 × 90
   - C. 40 × 80
   - [✓ D.] 40 × 90
3. Estimate the product.

   142 × 17

   Sample answer: 100 × 20 = 2,000
4. A movie ticket costs $12. During one day, a theater sold 478 tickets. About how much money did the theater receive that day?
   - A. $500
   - [✓ B.] $5,000
   - C. $50,000
   - D. $500,000
5. A rectangular field measures 768 feet long and 88 feet wide. About how much is the area of the field?

   Sample answer: 800 × 90 = 72,000 square feet

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 79

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Is the Product Reasonable?

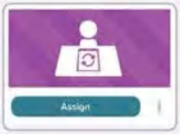
Prepare a set of index cards with expressions describing the product of one 2-digit number and one 3-digit number. Provide some cards showing the correct product and some showing a clearly incorrect product. Work with students to use estimation strategies to determine which products are reasonable and which are incorrect.

GO ONLINE

Take Another Look Lesson

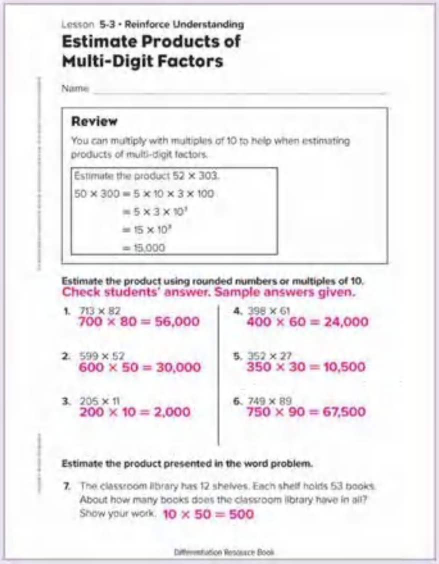
Assign the interactive lesson to reinforce targeted skills.

- Estimate Products (Whole Number Factors)



INDEPENDENT WORK

Differentiation Resource Book, p. 41



Lesson 5-3 • Reinforce Understanding

Estimate Products of Multi-Digit Factors

Name

Review

You can multiply with multiples of 10 to help when estimating products of multi-digit factors.

Estimate the product 52 × 303.

$50 \times 300 = 5 \times 10 \times 3 \times 100$

$= 5 \times 3 \times 10^3$

$= 15 \times 10^3$

$= 15{,}000$

Estimate the product using rounded numbers or multiples of 10.
Check students' answer. Sample answers given.

1. 713 × 82
700 × 80 = 56,000

2. 599 × 52
600 × 50 = 30,000

3. 205 × 11
200 × 10 = 2,000

4. 398 × 61
400 × 60 = 24,000

5. 352 × 27
350 × 30 = 10,500

6. 749 × 89
750 × 90 = 67,500

Estimate the product presented in the word problem.

7. The classroom library has 12 shelves. Each shelf holds 53 books. About how many books does the classroom library have in all? Show your work. 10 × 50 = 500

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Estimating Products Bingo Students practice finding estimated products.

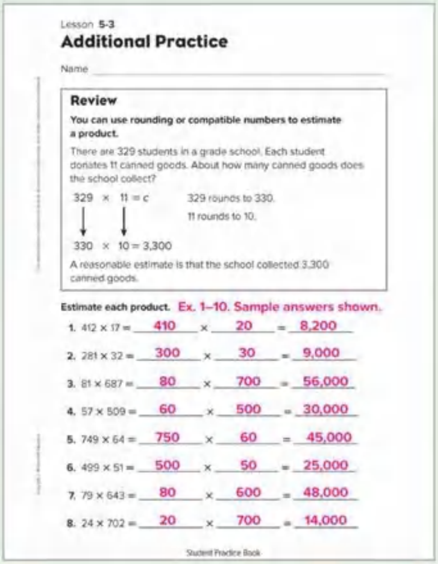
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 41–42



Lesson 5-3

Additional Practice

Name

Review

You can use rounding or compatible numbers to estimate a product.

There are 329 students in a grade school. Each student donates 11 canned goods. About how many canned goods does the school collect?

$329 \times 11 = c$ 329 rounds to 330.
11 rounds to 10.

$330 \times 10 = 3{,}300$

A reasonable estimate is that the school collected 3,300 canned goods.

Estimate each product. Ex. 1–10. Sample answers shown.

1. 412 × 17 = 410 × 20 = 8,200
2. 281 × 32 = 300 × 30 = 9,000
3. 81 × 687 = 80 × 700 = 56,000
4. 57 × 509 = 60 × 500 = 30,000
5. 749 × 64 = 750 × 60 = 45,000
6. 499 × 51 = 500 × 50 = 25,000
7. 79 × 643 = 80 × 600 = 48,000
8. 24 × 702 = 20 × 700 = 14,000

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Assign

Use It! Application Station

Let's Celebrate Students use charts to create a budget for a graduation celebration.

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Assign

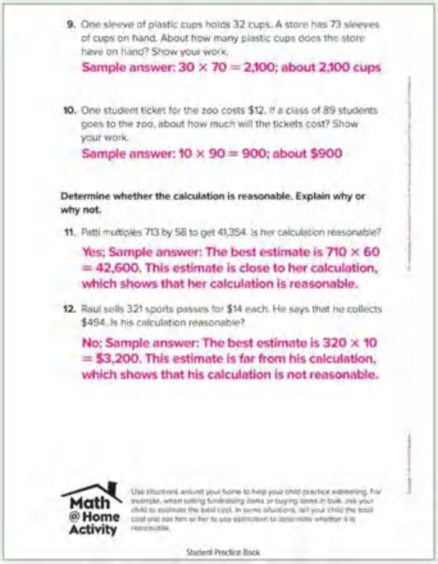
Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Assign

INDEPENDENT WORK

Student Practice Book, pp. 41–42



9. One sleeve of plastic cups holds 32 cups. A store has 73 sleeves of cups on hand. About how many plastic cups does the store have on hand? Show your work.
   Sample answer: 30 × 70 = 2,100; about 2,100 cups

10. One student ticket for the zoo costs $12. If a class of 89 students goes to the zoo, about how much will the tickets cost? Show your work.
    Sample answer: 10 × 90 = 900; about $900

Determine whether the calculation is reasonable. Explain why or why not.

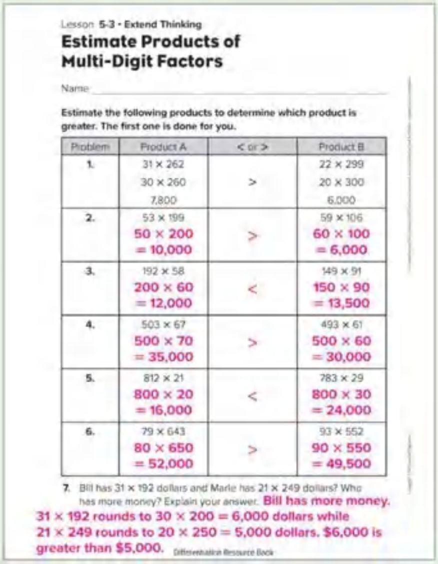
11. Patti multiples 713 by 58 to get 41,354. Is her calculation reasonable?
    Yes; Sample answer: The best estimate is 710 × 60 = 42,600. This estimate is close to her calculation, which shows that her calculation is reasonable.

12. Raul sells 321 sports passes for $14 each. He says that he collects $494. Is his calculation reasonable?
    No; Sample answer: The best estimate is 320 × 10 = $3,200. This estimate is far from his calculation, which shows that his calculation is not reasonable.

Math @Home Activity Use situations around your home to help your child practice estimating. For example, when selling fundraising items or buying items in bulk, ask your child to estimate the total cost. In some situations, tell your child the total cost and ask him or her to use estimation to determine whether it is reasonable.

Student Practice Book

Differentiation Resource Book, p. 42



Lesson 5-3 • Extend Thinking

Estimate Products of Multi-Digit Factors

Name ______________________

Estimate the following products to determine which product is greater. The first one is done for you.

Problem	Product A	< or >	Product B
1.	31 × 262 30 × 260 7,800	>	22 × 299 20 × 300 6,000
2.	53 × 199 50 × 200 = 10,000	>	59 × 106 60 × 100 = 6,000
3.	192 × 58 200 × 60 = 12,000	<	149 × 91 150 × 90 = 13,500
4.	503 × 67 500 × 70 = 35,000	>	493 × 61 500 × 60 = 30,000
5.	812 × 21 800 × 20 = 16,000	<	783 × 29 800 × 30 = 24,000
6.	79 × 643 80 × 650 = 52,000	>	93 × 552 90 × 550 = 49,500

7. Bill has 31 × 192 dollars and Marie has 21 × 249 dollars? Who has more money? Explain your answer. Bill has more money. 31 × 192 rounds to 30 × 200 = 6,000 dollars while 21 × 249 rounds to 20 × 250 = 5,000 dollars. $6,000 is greater than $5,000.

Differentiation Resource Book

LESSON **5-4**

Use Area Models to Multiply Multi-Digit Factors

Learning Target

- I can use an area model and partial products to multiply multi-digit whole numbers.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Look for and make use of structure.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	**Academic Terms**
area model	debate
decompose	speculate
partial products	

Materials

The materials may be for any part of the lesson.

- none

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students use an area model to determine partial products and add partial products to calculate the product.	• Students explain how to use an area model to multiply while answering *Wh-* questions. • To support optimizing output, ELs participate in MLR4: Info Gap.	• Students explore taking different perspectives on approaches to problem solving.

Coherence

Previous	**Now**	**Next**
• Students multiplied two 2-digit numbers, using strategies based on place value and the properties of operations (Grade 4). • Students estimated products of multi-digit factors to determine if calculations are reasonable (Unit 5).	• Students find products of two- and three-digit factors using area models and partial products.	• Students use the partial products strategy to multiply a multi-digit number by a multi-digit number (Unit 5). • Students add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students connect multi-digit multiplication with area models and partial products to make use of students' conceptual understanding of place value. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students use the conceptual framework provided by the Distributive Property to organize their work and gain skill and fluency in multiplying single-digit numbers by multi-digit numbers.	• Students use the Distributive Property to solve problems based on real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Greater Than or Less Than

5–7 min

Build Fluency Students build number sense as they determine whether the sum of two decimals is greater than 100 or less than 100.

Remind students that they should use mental-math strategies to form their comparisons and that they should not be computing exact sums.

These prompts encourage students to talk about their reasoning:

- How did you estimate to determine if the sum is greater than 100 or less than 100?
- How can you use place value to help you answer the question?
- Which digit in each number has the greatest impact on the sum? Which digit is next most important? Explain.

Launch 5–7 min

Sense-Making Routine

Purpose Students use area models to multiply multi-digit numbers.

Notice & Wonder

- What do you see?

Teaching Tip You may want to have students copy the area model on their own piece of paper. This can help them become familiar with drawing area models later in the lesson.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of how multiplication relates to area models and are based on possible comments and questions that students may make during the share out.

- How could you find the area of the box?
- How does the area of the whole box compare to the area of the boxes inside itl?
- If you knew the area of all the smaller boxes, how could you find the area of the box they are inside?

Math is... Mindset

- How can you show that you understand your partner's point of view?

SEL Social Awareness: Develop Perspective

Encourage students to think about different ways to consider the Notice & Wonder routine. With a partner, have them share different tools, strategies, representations, or methods they can use to explain what they see. Invite students to consider and build off their partners' ideas.

Transition to Explore & Develop

Ask questions that get students thinking about how the area of a rectangle can be found by adding the areas of rectangles it is composed of.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we can we use area models to understand multi-digit multiplication and to calculate products.

Lesson 5-4

Use Area Models to Multiply Multi-Digit Factors

Be Curious

What do you see?

Math is... Mindset

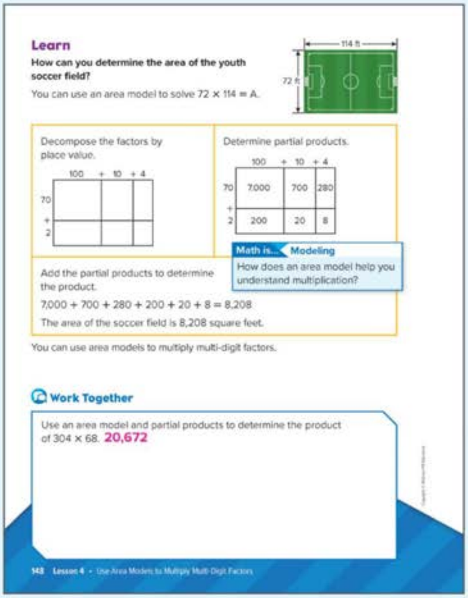
How can you show that you understand your partner's point of view?

Be Curious

What do you see?

Explore & Develop

20 min



Learn

How can you determine the area of the youth soccer field?

You can use an area model to solve 72 × 114 = A.

Decompose the factors by place value.

	100	+ 10	+ 4
70			
+ 2			

Determine partial products.

	100	+ 10	+ 4
70	7,000	700	280
+ 2	200	20	8

Math is... Modeling
How does an area model help you understand multiplication?

Add the partial products to determine the product.

7,000 + 700 + 280 + 200 + 20 + 8 = 8,208

The area of the soccer field is 8,208 square feet.

You can use area models to multiply multi-digit factors.

Work Together

Use an area model and partial products to determine the product of 304 × 68. 20,672

148 Lesson 4 • Use Area Models to Multiply Multi-Digit Factors

❶ Pose the Problem

ETP Pose Purposeful Questions

- What operation can you use to determine area?
- What strategies do you know for multiplying?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Info Gap

Pair students. Provide Partner A with a problem like the one on the Learn page. Provide Partner B with the information to solve the problem. Instruct Partner B to ask A what information they need, and for A to respond, explaining why they need it. Have students continue until the problem is completed.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How do you decompose each factor when you use an area model?
- How do you determine the partial products when you use an area model?
- How do you determine the product when you use an area model?

Key Takeaway

- One multiplication strategy uses an area model to determine partial products, which are then added together to arrive at the product.

Work Together

Before students begin calculating the product, have them first make an estimate using compatible numbers and rounded numbers. After students have calculated the product using an area model and partial products, have them use their estimate to check that the product is reasonable.

Common Misconception Students may be confused about how to decompose 304 since there are no tens in it. Point out that it can be decomposed as 300 + 0 + 4, or just 300 + 4.

LOM Language of Math

Tell students that *decompose* means "to break down into simpler elements." We decompose a number by breaking it down by place value. Similarly, you can decompose words by breaking them down to their base word and prefix or suffix (*unhappy* decomposes into *un-* and *happy* or "not happy"). Either way, decomposing can make things easier to understand.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore area models to determine different ways to decompose them to form partial products.

Directions: Ask students to write a multiplication problem using one 3-digit factor and one 1-digit factor and draw an area model to represent the product. Have students record as many ways as possible to decompose the area model. Invite students to share ways they decomposed the area model and focus attention on similar methods of decomposing, such as decomposing by place value.

- Do you think these methods of decomposing will work for multiplying two multi-digit numbers?

Have students explore different ways to decompose an area model that represents the product of 114 × 72 and find the product.

ETP Support Productive Struggle

- How can you apply your method of using an area model to multiply a 3-digit factor by a 1-digit factor to multiplying a 3-digit factor by a 2-digit factor?
- Is your answer reasonable? How do you know?
- How is your area model the same as or different from another student's method?

Math is... Modeling

- How does an area model help you understand multiplication?

Students map the quantities in a practical situation using a model, and assess if the model has served its purpose.

Activity Debrief: Discuss with students that an area model is one method they can use to multiply multi-digit numbers. Using this method, they can decompose by place value, find partial products, and add partial products to calculate the product of two multi-digit whole numbers.

Guided Exploration

Students expand their knowledge of multiplying with multi-digit factors by breaking down factors by place value, creating an area model, finding partial products, and adding partial products to find the product.

ETP Use and Connect Mathematical Representations

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- Will you use compatible numbers or rounded numbers to estimate the solution? Why?

Have the students draw their own area models and fill them out as they work through the problem as a class.

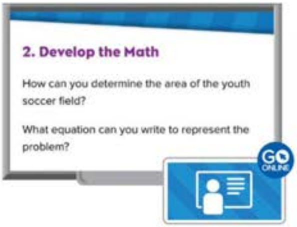
- How can you decompose each factor?
- How can you determine the multiplication expression that repesents the area of each region of the area model?
- How can you determine the partial productfor each region?

- **Think About It:** Is the calculated result reasonable? Why or why not?

Math is... Modeling

- How does an area model help you understand multiplication?

Students map the quantities in a practical situation using a model, and assess if the model has served its purpose.



2. Develop the Math

How can you determine the area of the youth soccer field?

What equation can you write to represent the problem?

EL English Learner Scaffolds

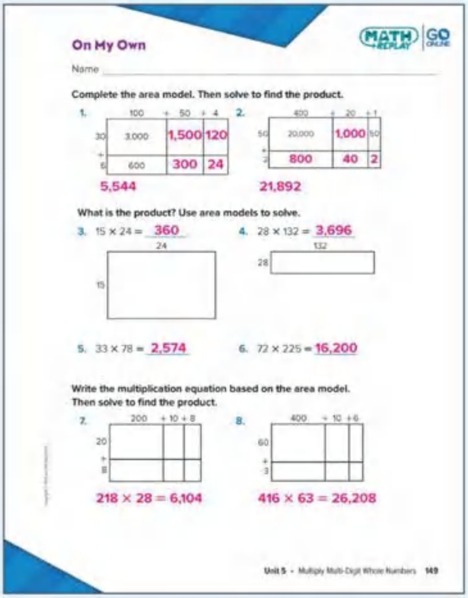
Entering/Emerging Support students' understanding of the abbreviation for *feet (ft)* by showing students other common abbreviations they may know. Write the name of a male that students know well on the board. (Mister [Smith]/ Mr. [Smith]) Say, *Mister [Smith]*. Point to *Mister*. Say *Mister* again and point to *Mr*. Say *This is short for mister*. Point to the *M* and *r* in *Mister* for emphasis on the letters used in the abbreviation. Repeat the task with other abbreviations.

Developing/Expanding Support students' understanding of the abbreviation for *feet (ft)* by showing students other common abbreviations they may know. Ask students to look at the Learn page. Ask *Can you find an abbreviation*? Once they find *ft*, ask them to search the page for the full word.

Bridging/Reaching Ask students to explain what *ft* is short for and explain how they know/figured it out. Have students work together to brainstorm other math abbreviations they may know and to sort them into categories, such as people, measurement, etc.

Practice & Reflect

10 min



On My Own

Name

Complete the area model. Then solve to find the product.

1\.

	100	+ 50	+ 4
30	3,000	1,500	120
+ 6	600	300	24

5,544

2\.

	400	+ 20	+ 1
50	20,000	1,000	50
+ 2	800	40	2

21,892

What is the product? Use area models to solve.

3\. 15 × 24 = 360

4\. 28 × 132 = 3,696

5\. 33 × 78 = 2,574

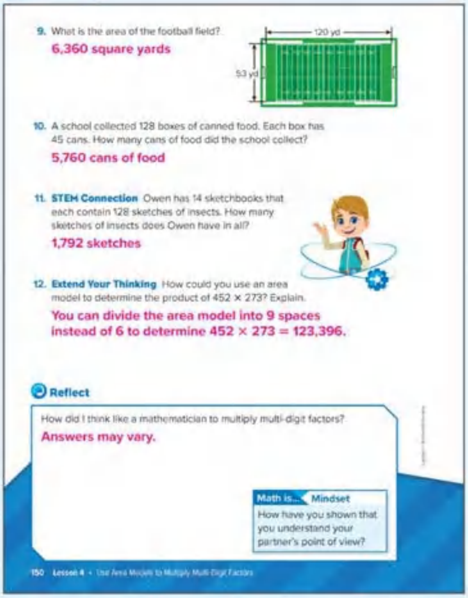
6\. 72 × 225 = 16,200

Write the multiplication equation based on the area model. Then solve to find the product.

7\. 218 × 28 = 6,104

8\. 416 × 63 = 26,208

Unit 5 • Multiply Multi-Digit Whole Numbers 149



9\. What is the area of the football field?

6,360 square yards

10\. A school collected 128 boxes of canned food. Each box has 45 cans. How many cans of food did the school collect?

5,760 cans of food

11\. **STEM Connection** Owen has 14 sketchbooks that each contain 128 sketches of insects. How many sketches of insects does Owen have in all?

1,792 sketches

12\. **Extend Your Thinking** How could you use an area model to determine the product of 452 × 273? Explain.

You can divide the area model into 9 spaces instead of 6 to determine 452 × 273 = 123,396.

Reflect

How did I think like a mathematician to multiply multi-digit factors?

Answers may vary.

Math is... Mindset

How have you shown that you understand your partner's point of view?

150 Lesson 4 • Use Area Models to Multiply Multi-Digit Factors

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Misconception: Exercises 9–11 When using partial products to multiply a 3-digit factor by a 2-digit factor, students may forget about the third digit in the 3-digit factor. Remind students to create regions in their area models for that digit, and to find the partial products that belong in those regions.

Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9–11	2	Application
12	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did I think like a mathematician to multiply multi-digit numbers?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have I worked to understand my partner's thinking?

Students reflect on how they practiced social awareness.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can use an area model and partial products to multiply multi-digit whole numbers.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Use area models to multiply multi-digit factors	5.NBT.B.5
2	2	Use area models to multiply multi-digit factors	5.NBT.B.5
3	3	Use area models to multiply multi-digit factors	5.NBT.B.5

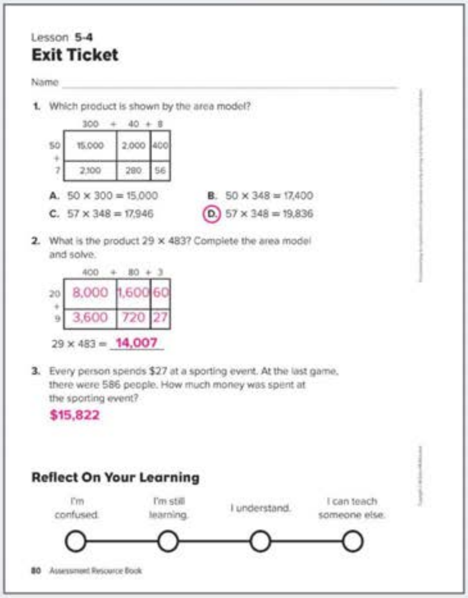
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 5-4

Exit Ticket

Name ______________________

1. Which product is shown by the area model?

	300	40	8
50	15,000	2,000	400
7	2,100	280	56

A. 50 × 300 = 15,000
B. 50 × 348 = 17,400
C. 57 × 348 = 17,946
[✓ D.] 57 × 348 = 19,836

2. What is the product 29 × 483? Complete the area model and solve.

	400	80	3
20	8,000	1,600	60
9	3,600	720	27

29 × 483 = 14,007

3. Every person spends $27 at a sporting event. At the last game, there were 586 people. How much money was spent at the sporting event?

$15,822

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

80 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Multiplication Challenge

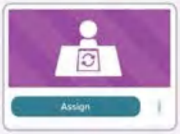
Work with students in groups of 3. The first student writes a single-digit multiplication fact, such as 6 × 7 = 42. The second student inserts a digit to the left of the second factor and writes a new equation (for example, 6 × 57 = 342). The third student inserts a digit to the left of the 2-digit factor and writes a new equation. Help students understand how to relate the products shown using an area model to the products previously obtained.

GO ONLINE

Take Another Look Lesson

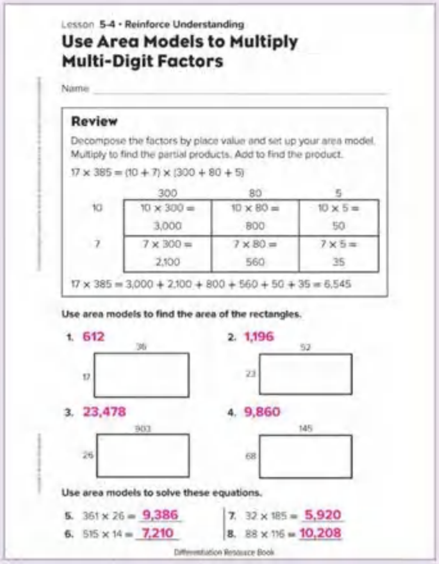
Assign the interactive lesson to reinforce targeted skills.

- Multiply 2-Digit Numbers (Area Models)



INDEPENDENT WORK

Differentiation Resource Book, p. 43



Lesson 5-4 • Reinforce Understanding

Use Area Models to Multiply Multi-Digit Factors

Name

Review

Decompose the factors by place value and set up your area model. Multiply to find the partial products. Add to find the product.

17 × 385 = (10 + 7) × (300 + 80 + 5)

	300	80	5
10	10 × 300 = 3,000	10 × 80 = 800	10 × 5 = 50
7	7 × 300 = 2,100	7 × 80 = 560	7 × 5 = 35

17 × 385 = 3,000 + 2,100 + 800 + 560 + 50 + 35 = 6,545

Use area models to find the area of the rectangles.

1. 612
36
17

2. 1,196
52
23

3. 23,478
903
26

4. 9,860
145
68

Use area models to solve these equations.

5. 361 × 26 = 9,386
6. 515 × 14 = 7,210
7. 32 × 185 = 5,920
8. 88 × 116 = 10,208

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Area Model Task Cards

Students use area models to multiply.

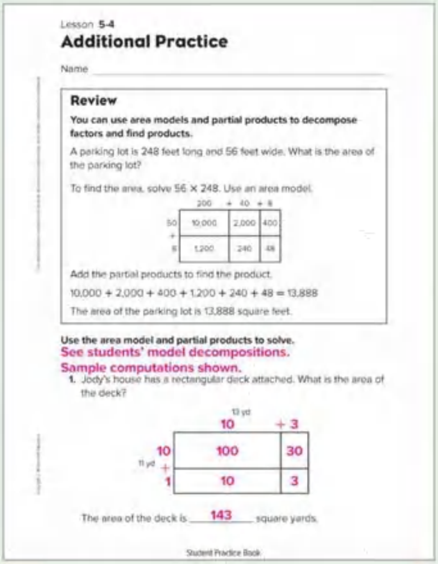
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 43–44



Lesson 5-4

Additional Practice

Name

Review

You can use area models and partial products to decompose factors and find products.

A parking lot is 248 feet long and 56 feet wide. What is the area of the parking lot?

To find the area, solve 56 × 248. Use an area model.

	200	+ 40	+ 8
50	10,000	2,000	400
+ 6	1,200	240	48

Add the partial products to find the product.

10,000 + 2,000 + 400 + 1,200 + 240 + 48 = 13,888

The area of the parking lot is 13,888 square feet.

Use the area model and partial products to solve.

See students' model decompositions.

Sample computations shown.

1. Jody's house has a rectangular deck attached. What is the area of the deck?

13 yd

	10	+ 3
11 yd 10	100	30
+ 1	10	3

The area of the deck is 143 square yards.

Student Practice Book

Own It! Digital Station

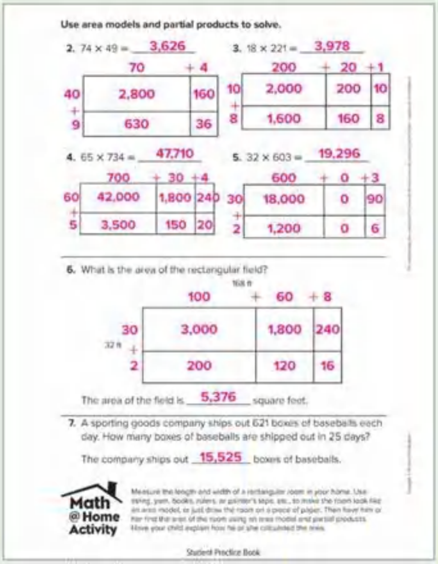
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 43–44



Use area models and partial products to solve.

2. 74 × 49 = 3,626

	70	+ 4
40	2,800	160
+ 9	630	36

3. 18 × 221 = 3,978

	200	+ 20	+ 1
10	2,000	200	10
+ 8	1,600	160	8

4. 65 × 734 = 47,710

	700	+ 30	+ 4
60	42,000	1,800	240
+ 5	3,500	150	20

5. 32 × 603 = 19,296

	600	+ 0	+ 3
30	18,000	0	90
+ 2	1,200	0	6

6. What is the area of the rectangular field?

168 ft

32 ft

	100	+ 60	+ 8
30	3,000	1,800	240
+ 2	200	120	16

The area of the field is 5,376 square feet.

7. A sporting goods company ships out 621 boxes of baseballs each day. How many boxes of baseballs are shipped out in 25 days?

The company ships out 15,525 boxes of baseballs.

Math @ Home Activity

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Washington Color School Movement—Color Field Painting Students create art to represent a base number with an exponent.

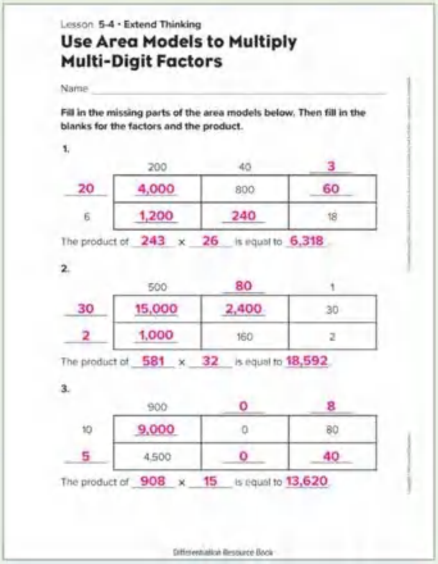
GO ONLINE

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 44



Lesson 5-4 • Extend Thinking

Use Area Models to Multiply Multi-Digit Factors

Name ______

Fill in the missing parts of the area models below. Then fill in the blanks for the factors and the product.

1.

	200	40	3
20	4,000	800	60
6	1,200	240	18

The product of 243 × 26 is equal to 6,318

2.

	500	80	1
30	15,000	2,400	30
2	1,000	160	2

The product of 581 × 32 is equal to 18,592

3.

	900	0	8
10	9,000	0	80
5	4,500	0	40

The product of 908 × 15 is equal to 13,620

Differentiation Resource Book

LESSON **5-5**

Use Partial Products to Multiply Multi-Digit Factors

Learning Targets

- I can use partial products to help me multiply multi-digit factors.
- I can explain how to use partial products to multiply.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

Math Practices and Processes

MPP Use appropriate tools strategically.

MPP Look for and make use of structure.

Vocabulary

Math Terms	**Academic Terms**
area model	analyze
partial products	suggest

Materials

The materials may be for any part of the lesson.

- number cubes

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students determine partial products by decomposing the factors and adding partial products to calculate the product.	• Students discuss how to solve multiplication equations using partial products while answering *Wh-* and Yes/No questions. • To support sense-making and cultivating conversation, ELs participate in MLR8: Discussion Supports and MLR3: Critique, Correct, and Clarify.	• Students practice strategies for persisting at a mathematical task, such as setting a small goal or setting timers for remaining focused.

Coherence

Previous	**Now**	**Next**
• Students multiplied two two-digit numbers, using place value and the properties of operations (Grade 4). • Students found products of two- and three-digit factors (Unit 5).	• Students use the partial products strategy to multiply a multi-digit number by a multi-digit number.	• Students connect the partial products strategy to an algorithm (Unit 5). • Students add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build their understanding of multiplication by using partial products to multiply multi-digit factors. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students gain skill and fluency in evaluating partial products when multiplying multi-digit factors.	• Students apply their understanding of partial products to solve problems with real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Greater Than or Less Than

5–7 min

Build Fluency Students build number sense as they determine whether sums and a product are greater than 800 or less than 800. Remind students that they should use mental math strategies to form their comparisons and that they should not be computing exact results.

These prompts encourage students to talk about their reasoning:

- What was your strategy for estimating the value of each expression?
- How did you determine if each expression was greater than 800 or less than 800?
- How do you know that your estimates are reasonable?

Launch 5–7 min

Purpose Students explore how an area model relates to a multiplication equation stepped out with partial products.

Notice & Wonder

- What do you notice? What do you wonder?

Teaching Tip Have students work in pairs as they notice and wonder. Encourage students to work together to determine where the factors come from (for example, 40 is from the tens place in 43 and 300 is from the hundreds place in 374).

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help students connect an area model to the partial products strategy and are based on possible comments and questions that students may make during the share out.

- How do the strategies appear to be related to one another?

Math is… Mindset

- What steps can you take to focus on your work today?

SEL Self-Management: Self-Discipline

Help students develop strong learning habits by providing them opportunities to practice self-regulation. Before beginning the Notice & Wonder routine, discuss ways that students will manage distractions and stay focused on their work noticing and wondering.

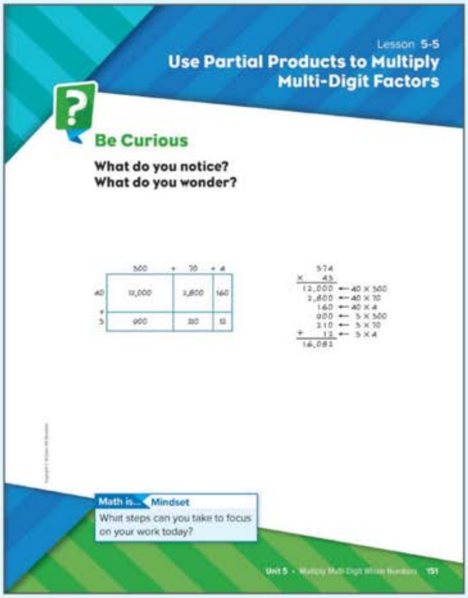
Transition to Explore & Develop

Ask questions that get students thinking about how they can use partial products to solve a multiplication equation without using an area model. Students should begin to understand multiplication in a more abstract sense.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how a strategy using partial products can help us solve multiplication equations.

Sense-Making Routine



Lesson 5-5

Use Partial Products to Multiply Multi-Digit Factors

Be Curious

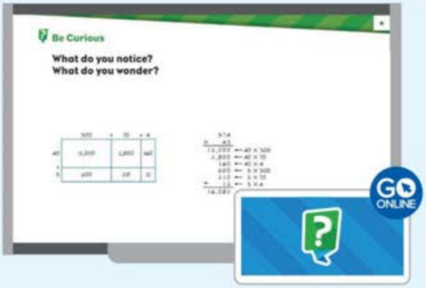
What do you notice?
What do you wonder?

374
× 43
12,000 ← 40 × 300
2,800 ← 40 × 70
160 ← 40 × 4
900 ← 3 × 300
210 ← 3 × 70
+ 12 ← 3 × 4
16,082

Math is… Mindset

What steps can you take to focus on your work today?

Unit 5 • Multiply Multi-Digit Whole Numbers 151

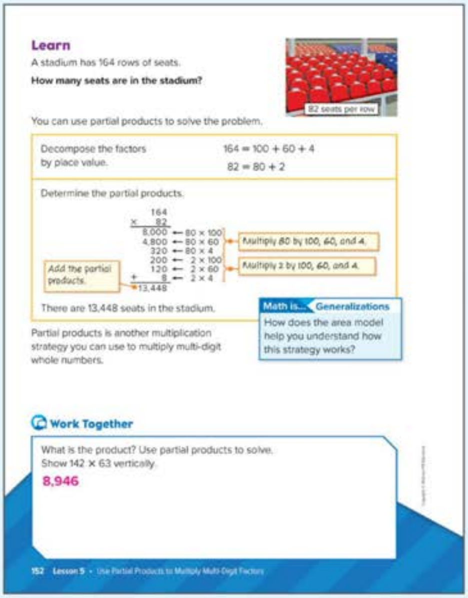


Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

A stadium has 164 rows of seats.

How many seats are in the stadium?

You can use partial products to solve the problem.

Decompose the factors by place value.

$164 = 100 + 60 + 4$

$82 = 80 + 2$

Determine the partial products.

$$\begin{array}{r l}
164 & \\
\times\ 82 & \\
\hline
8{,}000 & \leftarrow 80 \times 100 \\
4{,}800 & \leftarrow 80 \times 60 \\
320 & \leftarrow 80 \times 4 \\
200 & \leftarrow 2 \times 100 \\
120 & \leftarrow 2 \times 60 \\
+\ 8 & \leftarrow 2 \times 4 \\
\hline
13{,}448 &
\end{array}$$

Multiply 80 by 100, 60, and 4.

Multiply 2 by 100, 60, and 4.

Add the partial products.

There are 13,448 seats in the stadium.

Partial products is another multiplication strategy you can use to multiply multi-digit whole numbers.

Math is... Generalizations
How does the area model help you understand how this strategy works?

Work Together

What is the product? Use partial products to solve. Show 142 × 63 vertically.

8,946

152 Lesson 5 • Use Partial Products to Multiply Multi-Digit Factors

❶ Pose the Problem

MLR Discussion Supports

As students engage in discussing the answers to both questions, restate statements they make as a question to seek clarification and to confirm comprehension, providing validation or correction when necessary. Encourage students to challenge each other's ideas when warranted, as well as to elaborate on their ideas and give examples.

ETP Pose Purposeful Questions

- What are the important quantities in this problem?
- What strategies have you used to solve similar problems?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Critique, Correct, and Clarify

Make a false claim for students to critique. Write a multiplication problem on the board. Decompose the factors, using an incorrect place value for one of the decompositions. Say, *I decomposed this problem correctly. Yes or No?* Have the class discuss how to correct your mistake. Revisit this activity throughout the lesson.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How can you decompose factors without using an area model?
- How can you determine the partial products you use in the partial products strategy?

Key Takeaway

- Another multiplication strategy is to calculate partial products of decomposed factors, then add the partial products to determine the product.

Work Together

Before students begin calculating the product, tell them to estimate a product that they can later check to see if their final product is reasonable.

Have students work to calculate the product using only partial products without an area model.

Common Error Students may use the value of an incorrect place value when finding partial products (for example, using 600 instead of 60 when decomposing 63). Have students estimate before solving so they have an idea of what a reasonable product is.

LOM Language of Math

Explain to students that *partial* in this context means "only in part." Each partial product is part of the actual product. People may also be partial to things they like very much above others, as in, "Brighton likes fruit, but is partial to blueberries."

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore ways to record their work when using partial products to multiply.

Directions: Ask students to write a multiplication problem using one 3-digit factor and one 1-digit factor. Have students determine the product in as many different ways as they can. Invite students to share their different methods, focusing attention on similar methods that involve finding partial products.

ETP Implement Tasks That Promote Reasoning and Problem Solving

- What steps did you take to determine the product?
- What patterns do you notice as you calculate each partial product?
- Is your calculated product reasonable? How do you know?

Activity Debrief: Display a multiplication problem using the vertical format. Work with students to record the steps for finding each partial product, then adding to determine the product.

Math is... Generalizations

- How does the area model help you understand how this strategy works?

Students look for both general methods and shortcuts.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine how many seats are in the stadium?

Guided Exploration

Students use partial products to multiply using multi-digit factors, while following along with an area model.

ETP Use and Connect Mathematical Representations

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- Will you use compatible numbers or rounded numbers to estimate the solution? Why?

Have the students draw their own area models and fill them out as they work through the problem as a class. Ask:

- How can you decompose each factor?
- How can you determine the multiplication expression that represents the area of each region of the area model?
- How can you determine the partial product for each region?
- **Think About It:** What patterns do you see in how the place values of the factors are used to find the partial products in this strategy?

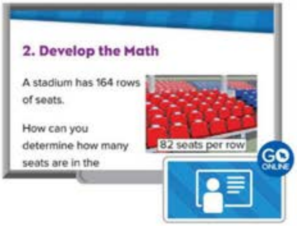
Have the students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is... Generalizations

- How does the area model help you understand how this strategy works?

Students look for both general methods and shortcuts.



2. Develop the Math

A stadium has 164 rows of seats.

How can you determine how many seats are in the

EL English Learner Scaffolds

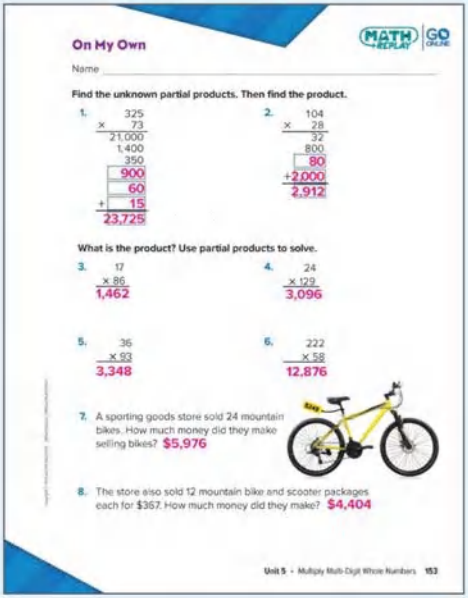
Entering/Emerging Support students in understanding the word *vertical* using manipulatives or drawings and say *This is vertical*. Be sure to motion up-down to emphasize what makes the object/drawing vertical. Then choose two more objects or use two more drawings, one being vertical, and one being horizontal. Show each item, and ask *Is this vertical?*

Developing/Expanding Support students in understanding the word *vertical* using manipulatives or drawings and say *This is vertical*. Be sure to motion up-down to emphasize what makes the object/drawing vertical. Then choose two more objects or use two more drawings, one being vertical, and one being horizontal. Ask students to tell you which item is vertical, and to explain how they know. Provide sentence frames for students who need more guidance.

Bridging/Reaching Instruct students to explain what *vertical* means, and how it compares to *horizontal*. Then encourage students to list synonyms and antonyms for both words using a dictionary for guidance. Have students compare their lists, giving suggestions and corrections as needed.

Practice & Reflect

10 min



On My Own

Name

Find the unknown partial products. Then find the product.

1.
325
× 73
21,000
1,400
350
900
60
+ 15
23,725

2.
104
× 28
32
800
80
+2,000
2,912

What is the product? Use partial products to solve.

3. 17 × 86 = 1,462

4. 24 × 129 = 3,096

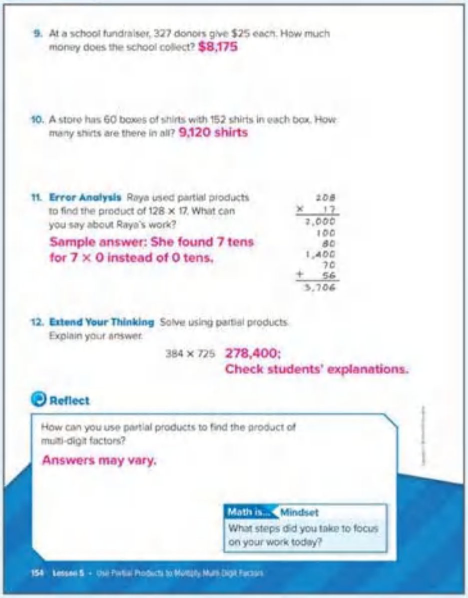
5. 36 × 93 = 3,348

6. 222 × 58 = 12,876

7. A sporting goods store sold 24 mountain bikes. How much money did they make selling bikes? $5,976

8. The store also sold 12 mountain bike and scooter packages each for $367. How much money did they make? $4,404

Unit 5 • Multiply Multi-Digit Whole Numbers 153



9. At a school fundraiser, 327 donors give $25 each. How much money does the school collect? $8,175

10. A store has 60 boxes of shirts with 152 shirts in each box. How many shirts are there in all? 9,120 shirts

11. **Error Analysis** Raya used partial products to find the product of 128 × 17. What can you say about Raya's work?
Sample answer: She found 7 tens for 7 × 0 instead of 0 tens.

208
× 17
2,000
100
80
1,400
70
+ 56
3,706

12. **Extend Your Thinking** Solve using partial products. Explain your answer.
384 × 725 278,400;
Check students' explanations.

Reflect

How can you use partial products to find the product of multi-digit factors?
Answers may vary.

Math is... Mindset
What steps did you take to focus on your work today?

154 Lesson 5 • Use Partial Products to Multiply Multi-Digit Factors

Practice

ETP **Build Procedural Fluency from Conceptual Understanding**

Common Misconception: Exercise 11 Students certainly may include partial products for the ones place in 60. While 0× 100, 0 × 50, and 0 × 2 all yield partial products of 0, including those partial products as "placeholders" can help students better understand how to use the strategy.

Item Analysis

Item	DOK	Rigor
1–6	1	Procedural Skill and Fluency
7–11	2	Application
12–13	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you use partial products to find the product of multi-digit factors?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What steps did you take to focus on your work today?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use partial products to help me multiply multi-digit factors.
- I can explain how to use partial products to multiply.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Use partial products to multiply multi-digit factors	5.NBT.B.5
2	2	Use partial products to multiply multi-digit factors	5.NBT.B.5
3	3	Use partial products to multiply multi-digit factors	5.NBT.B.5

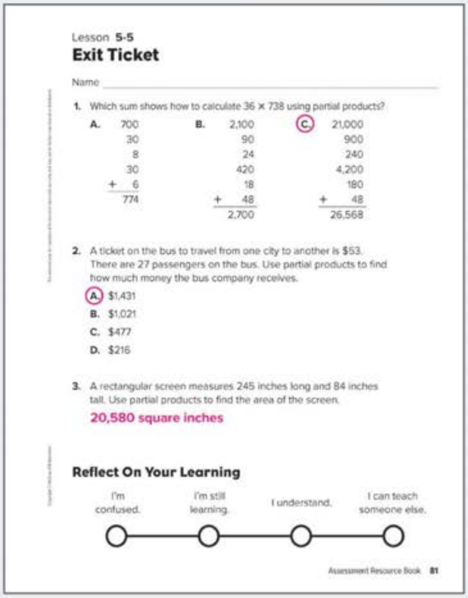
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 5-5
Exit Ticket

Name

1. Which sum shows how to calculate 36 × 738 using partial products?

A.	B.	[✓ C.]
700	2,100	21,000
30	90	900
8	24	240
30	420	4,200
+ 6	18	180
774	+ 48	+ 48
	2,700	26,568

2. A ticket on the bus to travel from one city to another is $53. There are 27 passengers on the bus. Use partial products to find how much money the bus company receives.
   [✓ A.] $1,431
   B. $1,021
   C. $477
   D. $216

3. A rectangular screen measures 245 inches long and 84 inches tall. Use partial products to find the area of the screen.
   20,580 square inches

Reflect On Your Learning

○ I'm confused.
○ I'm still learning.
○ I understand.
○ I can teach someone else.

Assessment Resource Book 81

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Distribute the Factors

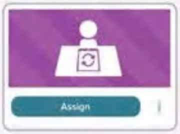
Have students roll number cubes to create two 2-digit numbers. Students then write a multiplication equation and estimate the product. They write the equation using partial products and find the product. Then, they compare their work for accuracy. Help students recognize how the partial products relate to an area model.

GO ONLINE

Take Another Look Lesson

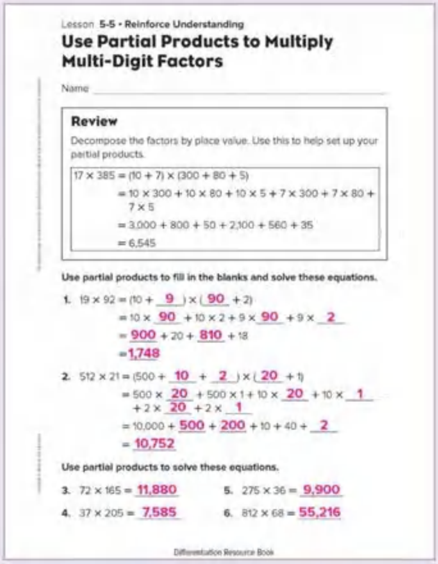
Assign the interactive lesson to reinforce targeted skills.

- Multiply 2-Digit Numbers (Area Models)



INDEPENDENT WORK

Differentiation Resource Book, p. 45



Lesson **5-5 • Reinforce Understanding**

Use Partial Products to Multiply Multi-Digit Factors

Name ______________________

Review

Decompose the factors by place value. Use this to help set up your partial products.

$17 \times 385 = (10 + 7) \times (300 + 80 + 5)$

$= 10 \times 300 + 10 \times 80 + 10 \times 5 + 7 \times 300 + 7 \times 80 + 7 \times 5$

$= 3{,}000 + 800 + 50 + 2{,}100 + 560 + 35$

$= 6{,}545$

Use partial products to fill in the blanks and solve these equations.

1. $19 \times 92 = (10 + \underline{9}) \times (\underline{90} + 2)$

$= 10 \times \underline{90} + 10 \times 2 + 9 \times \underline{90} + 9 \times \underline{2}$

$= \underline{900} + 20 + \underline{810} + 18$

$= \underline{1{,}748}$

2. $512 \times 21 = (500 + \underline{10} + \underline{2}) \times (\underline{20} + 1)$

$= 500 \times \underline{20} + 500 \times 1 + 10 \times \underline{20} + 10 \times \underline{1} + 2 \times \underline{20} + 2 \times \underline{1}$

$= 10{,}000 + \underline{500} + \underline{200} + 10 + 40 + \underline{2}$

$= \underline{10{,}752}$

Use partial products to solve these equations.

3. $72 \times 165 = \underline{11{,}880}$
4. $37 \times 205 = \underline{7{,}585}$
5. $275 \times 36 = \underline{9{,}900}$
6. $812 \times 68 = \underline{55{,}216}$

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Partial Products Concentration

Students use partial products to multiply.

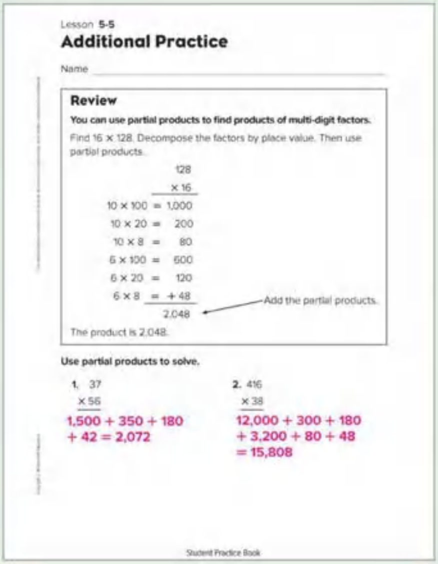
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 45–46



Lesson **5-5**

Additional Practice

Name ______________________

Review

You can use partial products to find products of multi-digit factors.

Find 16×128. Decompose the factors by place value. Then use partial products.

$$\begin{array}{rcr} & & 128 \\ & & \times\ 16 \\ \hline 10 \times 100 & = & 1{,}000 \\ 10 \times 20 & = & 200 \\ 10 \times 8 & = & 80 \\ 6 \times 100 & = & 600 \\ 6 \times 20 & = & 120 \\ 6 \times 8 & = & +\ 48 \\ \hline & & 2{,}048 \end{array}$$

Add the partial products.

The product is 2,048.

Use partial products to solve.

1. 37×56

$1{,}500 + 350 + 180 + 42 = 2{,}072$

2. 416×38

$12{,}000 + 300 + 180 + 3{,}200 + 80 + 48 = 15{,}808$

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Assign

Use It! Application Station

Make a Pulley System Students use measurements to create a pulley system. *The content of this card has concepts covered later in Lesson 5-7. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Assign

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Assign

INDEPENDENT WORK

Student Practice Book, pp. 45–46

Use partial products to solve.

3. 472
× 83
32,000 + 5,600 + 160
+ 1,200 + 210 + 6
= 39,176

4. 508
× 27
10,000 + 0 + 16
+ 3,500 + 0 + 56
= 13,716

5. A mural is painted on a rectangular wall that is 154 feet long and 16 feet tall. What is the area of the wall?
2,464 square feet

6. A basketball costs $78. A team orders 25 basketballs. How much does the team spend for the basketballs?
$1,950

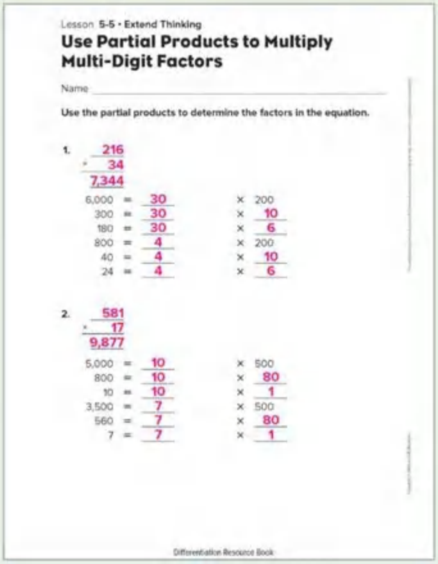
7. A rectangular cornfield measures 358 meters long and 64 meters wide. What is the area of the cornfield?
22,912 square meters

8. A T-shirt company ships out 250 boxes of shirts each week. Each box holds 48 shirts. How many shirts does the company ship out each week?
12,000 shirts

Math @ Home Activity With your child, measure the length and width of a rectangular room or wall in your home in inches. Then have them find the area of the room or wall using partial products. Have your child explain how he or she calculated the area.

Student Practice Book

Differentiation Resource Book, p. 46



Lesson 5-5 • Extend Thinking

Use Partial Products to Multiply Multi-Digit Factors

Name ____________

Use the partial products to determine the factors in the equation.

1. 216
× 34
7,344
6,000 = 30 × 200
300 = 30 × 10
180 = 30 × 6
800 = 4 × 200
40 = 4 × 10
24 = 4 × 6

2. 581
× 17
9,877
5,000 = 10 × 500
800 = 10 × 80
10 = 10 × 1
3,500 = 7 × 500
560 = 7 × 80
7 = 7 × 1

Differentiation Resource Book

LESSON **5-6**

Relate Partial Products to an Algorithm

Learning Targets

- I can multiply using an algorithm.
- I can describe an algorithm for multiplication.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	Academic Terms
algorithm	procedure
partial products	prove
regroup	

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- number cubes

Focus

Content Objectives	Language Objectives	SEL Objective
• Students use an algorithm to multiply multi-digit factors by a one-digit factor. • Students understand and explain a multiplication algorithm.	• Students discuss strategies to multiply while using *as...as*. • To support optimizing output, ELs participate in MLR1: Stronger and Clearer Each Time.	• Students collaborate with peers to complete a mathematical task and offer constructive feedback to the mathematical ideas posed by others.

Coherence

Previous	Now	Next
• Students multiplied two two-digit numbers, using strategies based on place value and the properties of operations (Grade 4). • Students used the partial products strategy to multiply a multi-digit number by a multi-digit number (Unit 5).	• Students connect the partial products strategy to an algorithm, and use that algorithm to multiply multi-digit numbers by 1-digit numbers.	• Students will use an algorithm to multiply two multi-digit factors (Unit 5). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students develop an understanding of how they can solve problems using a multiplication algorithm. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students demonstrate procedural skill and fluency in performing the steps to solve multiplication equations using an algorithm.	• Students solve real-world multiplication problems using partial products and an algorithm. *Application is not a targeted element of rigor for this standard.*

Number Routine
Greater Than or Less Than

5–7 min

Build Fluency Students build number sense as they determine whether sums of three decimals are greater than 1,200 or less than 1,200. Remind students that they should use mental math strategies to form their comparisons and that they should not be computing exact sums.

These prompts encourage students to talk about their reasoning:

- What strategies did you use to estimate if each sum is greater than 1,200 or less than 1,200?
- How can you use place value to help you estimate the sum?
- Which place-value position in each number has the greatest impact in the sum? Which place-value position is next most important? Explain.
- How do you know your estimates are reasonable?

Launch 5–7 min

Sense-Making Routine

Purpose Students explore how partial products relate to a multiplication algorithm.

Notice & Wonder

- What do you notice? What do you wonder?

Teaching Tip You may want to have students copy down the equations themselves so that they can more easily compare them as they Notice & Wonder.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' curiosity about how partial products relate to an algorithm and are based on possible comments and questions that students may make during the share out.

- What strategy was used on the left to solve the equation?
- How do you think the multiplication equation on the right was solved?

Math is... Mindset

- How can you be part of the classroom community?

SEL Relationship Skills: Social Engagement

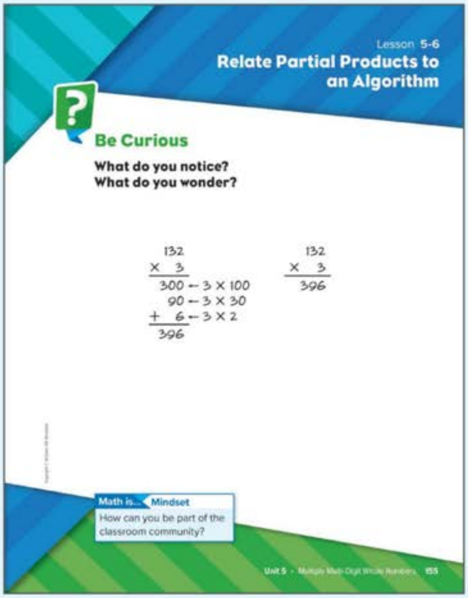
As students engage in collaborative discourse around the Notice & Wonder routine, invite them to give constructive or helpful feedback to their peers. As students engage and discuss how the strategies for multiplying are similar and different, they are strengthening their relationship skills. Remind students that active listening and building on the ideas of others can help them connect with one another and work toward achieving shared goals.

Transition to Explore & Develop

Ask questions that get students thinking about how each multiplication strategy is using place value to find the product. Guide the discussion to have students think about how these strategies can help them determine the product of other multi-digit numbers.

ETP Establish Mathematics Goals to Focus Learning

- Let's explore an algorithm for multiplying that is related to the partial products strategy.



Lesson 5-6
Relate Partial Products to an Algorithm

Be Curious

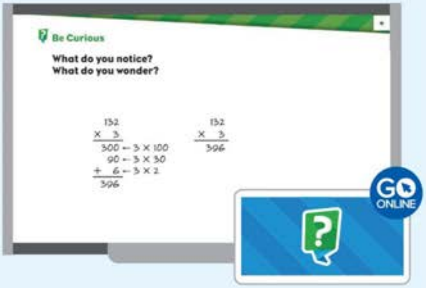
What do you notice?
What do you wonder?

132
× 3
300 ← 3 × 100
90 ← 3 × 30
+ 6 ← 3 × 2
396

132
× 3
396

Math is... Mindset
How can you be part of the classroom community?

Unit 5 • Multiply Multi-Digit Whole Numbers 155



Be Curious

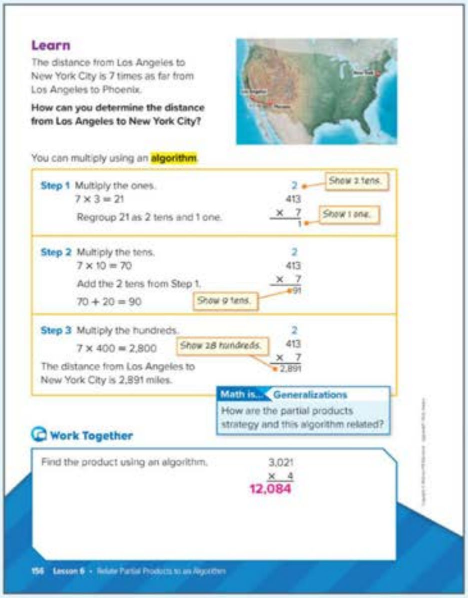
What do you notice?
What do you wonder?

132
× 3
300 ← 3 × 100
90 ← 3 × 30
+ 6 ← 3 × 2
396

132
× 3
396

Explore & Develop

20 min



Learn

The distance from Los Angeles to New York City is 7 times as far from Los Angeles to Phoenix.

How can you determine the distance from Los Angeles to New York City?

You can multiply using an **algorithm**.

Step 1 Multiply the ones.
$7 \times 3 = 21$
Regroup 21 as 2 tens and 1 one.

$$\begin{array}{r} 2 \\ 413 \\ \times \quad 7 \\ \hline 1 \end{array}$$

Show 2 tens.
Show 1 one.

Step 2 Multiply the tens.
$7 \times 10 = 70$
Add the 2 tens from Step 1.
$70 + 20 = 90$

$$\begin{array}{r} 2 \\ 413 \\ \times \quad 7 \\ \hline 91 \end{array}$$

Show 9 tens.

Step 3 Multiply the hundreds.
$7 \times 400 = 2{,}800$

$$\begin{array}{r} 2 \\ 413 \\ \times \quad 7 \\ \hline 2{,}891 \end{array}$$

Show 28 hundreds.

The distance from Los Angeles to New York City is 2,891 miles.

Math is... Generalizations
How are the partial products strategy and this algorithm related?

Work Together

Find the product using an algorithm.

$$\begin{array}{r} 3{,}021 \\ \times \quad 4 \\ \hline 12{,}084 \end{array}$$

156 Lesson 6 • Relate Partial Products to an Algorithm

1 Pose the Problem

Pose Purposeful Questions

- What are you trying to find?
- What strategies do you already know that you can use to calculate the product?

2 Develop the Math

Choose the option that best meets your instructional goals.

Stronger and Clearer Each Time

Pair students and give them a multiplication problem to solve using this algorithm. Have them individually write sentences explaining the steps they took to solve the problem. Then have them share their writing with their partner and revise if necessary. Revisit throughout the lesson for reinforcement.

3 Bring It Together

Elicit and Use Evidence of Student Thinking

- How is using this algorithm related to using partial products?
- How do you use this algorithm to solve a multiplication equation?

Key Takeaway

- An algorithm is another way to determine a product.

Work Together

Direct students to estimate the product before they calculate using this algorithm. After students have calculated the product using this algorithm, encourage them to check the product by using partial products. Encourage students to discuss how the two strategies are related. When multiplying using an algorithm, it is a common practice to start by multiplying the digits in the ones place.

Common Error The Work Together problem has a factor with an "internal" zero (3,021). Make sure students understand that this means when they multiply 4 by the digit in the hundreds place, the value will be 0. Encourage students to think of how they would represent the hundreds place in 3,021 using base-ten blocks.

Language of Math

Algorithm comes from the name of the 9th century Persian mathematician, astronomer, and geographer Muhammad ibn Mūsā al-Khwārizmī who was called *Algorithmi* in Latin. His Arabic book *Al-jabr* is the first work dedicated to what would come to be known as algebra.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using an algorithm to solve a multiplication problem.

Materials: base-ten blocks

Directions: Display the following multiplication problem. Have students work in small groups to determine a logical sequence of steps that was taken to determine the product. Have students record their steps and explanations. Students may choose to use base-ten blocks or an area model to help make sense of the solution method.

$$\begin{array}{r} 2 \\ 413 \\ \times\ 7 \\ \hline \mathbf{2{,}891} \end{array}$$

Support Productive Struggle

- How can you represent the factors using base-ten blocks?
- How are the two tens regrouped?
- How can you use what you know about partial products to find the sequence of steps used to solve the equation?

Math is... Generalizations

- How are the partial products strategy and this algorithm related?

Students notice if calculations are repeated in the partial products strategy and look for shortcuts.

Activity Debrief: Have students share their sequence of steps to explain the solution method. Explain that an *algorithm* is a step-by-step method for performing calculations. Walk through the steps for the multiplication algorithm shown.

Guided Exploration

Students apply what they know about solving multiplication equations using partial products to use an algorithm to solve multiplication equations.

Use and Connect Mathematical Representations

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- Will you use compatible numbers or rounded numbers to estimate the solution? Why?

Have the students find the product using the partial products strategy. Ask:

- How will you decompose the factors by place value to find partial products?
- **Think About It:** What other algorithms do you already know how to use?
- Why do you regroup the two tens? How is this different from using partial products? How is it different?

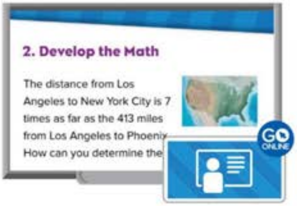
Have the students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is... Generalizations

- How are the partial products strategy and this algorithm related?

Students notice if calculations are repeated in the partial products strategy and look for shortcuts.



2. Develop the Math

The distance from Los Angeles to New York City is 7 times as far as the 413 miles from Los Angeles to Phoeni
How can you determine the

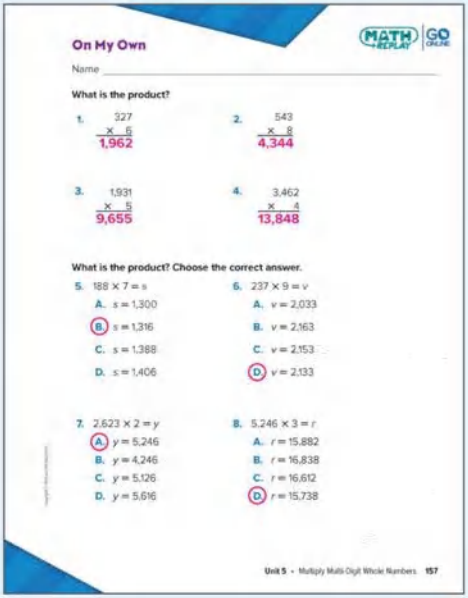
English Learner Scaffolds

Entering/Emerging Support students in understanding using *as...as* for comparing, using manipulatives. Choose two objects that have something in common to compare, such as a ruler and a pencil. Say *The ruler is as straight as the pencil*. Choose two more sets of objects to compare using *as...as*. Finally, show students two more pairs of objects. With one pair make a correct comparison, and with the other pair, make an incorrect one.

Developing/Expanding Support students in understanding using *as...as* for comparing, using manipulatives. Choose two objects that have something in common to compare, such as a ruler and a pencil. Say *The ruler is as straight as the pencil*. Choose two more sets of objects to compare using *as...as*. Finally, ask students to choose two classroom objects to compare, using *as...as*. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to compare two objects using *as...as*. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, that's not correct because...* or *No, that isn't as .... as...*

Practice & Reflect 10 min



On My Own

Name ________________

What is the product?

1. $$\begin{array}{r} 327 \\ \times\ 6 \\ \hline 1{,}962 \end{array}$$

2. $$\begin{array}{r} 543 \\ \times\ 8 \\ \hline 4{,}344 \end{array}$$

3. $$\begin{array}{r} 1{,}931 \\ \times\ 5 \\ \hline 9{,}655 \end{array}$$

4. $$\begin{array}{r} 3{,}462 \\ \times\ 4 \\ \hline 13{,}848 \end{array}$$

What is the product? Choose the correct answer.

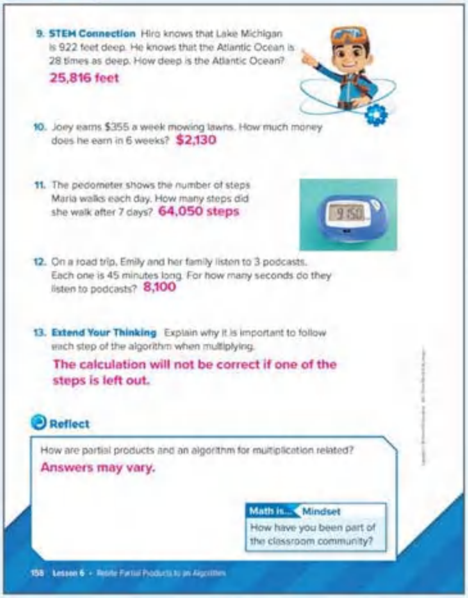
5. $188 \times 7 = s$
   A. $s = 1{,}300$
   [✓ B.] $s = 1{,}316$
   C. $s = 1{,}388$
   D. $s = 1{,}406$

6. $237 \times 9 = v$
   A. $v = 2{,}033$
   B. $v = 2{,}163$
   C. $v = 2{,}153$
   [✓ D.] $v = 2{,}133$

7. $2{,}623 \times 2 = y$
   [✓ A.] $y = 5{,}246$
   B. $y = 4{,}246$
   C. $y = 5{,}126$
   D. $y = 5{,}616$

8. $5{,}246 \times 3 = r$
   A. $r = 15{,}882$
   B. $r = 16{,}838$
   C. $r = 16{,}612$
   [✓ D.] $r = 15{,}738$

Unit 5 • Multiply Multi-Digit Whole Numbers 157



9. **STEM Connection** Hiro knows that Lake Michigan is 922 feet deep. He knows that the Atlantic Ocean is 28 times as deep. How deep is the Atlantic Ocean? **25,816 feet**

10. Joey earns $355 a week mowing lawns. How much money does he earn in 6 weeks? **$2,130**

11. The pedometer shows the number of steps Maria walks each day. How many steps did she walk after 7 days? **64,050 steps**

12. On a road trip, Emily and her family listen to 3 podcasts. Each one is 45 minutes long. For how many seconds do they listen to podcasts? **8,100**

13. **Extend Your Thinking** Explain why it is important to follow each step of the algorithm when multiplying.
The calculation will not be correct if one of the steps is left out.

Reflect

How are partial products and an algorithm for multiplication related?
Answers may vary.

Math is... Mindset
How have you been part of the classroom community?

158 Lesson 6 • Relate Partial Products to an Algorithm

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 1–8 While using this algorithm, some students may add a regrouped amount before performing the multiplication. For example, while calculating Exercise 1 and finding that $6 \times 7 = 42$, students may regroup the 4 tens and add them to the 2 tens before multiplying by 6, rather than multiplying then adding.

Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9–12	2	Application
13	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How are partial products and an algorithm for multiplication related?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you connect with your classmates today?

Students reflect on how they developed stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can multiply using an algorithm.
- I can describe an algorithm for multiplication.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Multiply multi-digit numbers by a 1-digit number using an algorithm	5.NBT.B.5
2	2	Multiply multi-digit numbers by a 1-digit number using an algorithm	5.NBT.B.5
3	2	Multiply multi-digit numbers by a 1-digit number using an algorithm	5.NBT.B.5
4	3	Multiply multi-digit numbers by a 1-digit number using an algorithm	5.NBT.B.5

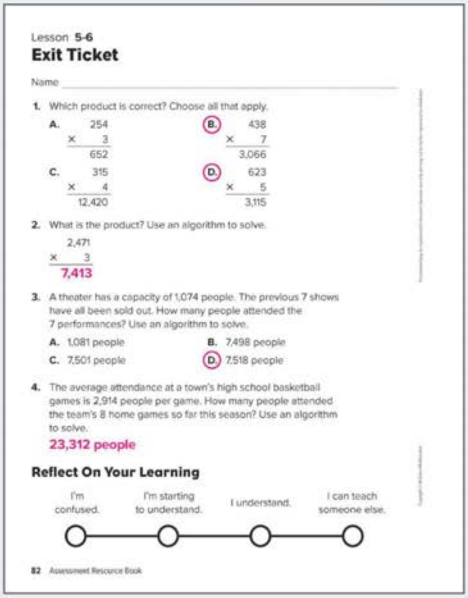
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the Ⓑ or Ⓔ activities
3 of 4	*Take Another Look* or any of the Ⓑ activities
2 or fewer of 4	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson **5-6**

Exit Ticket

Name ______________________

1. Which product is correct? Choose all that apply.

A. $\begin{array}{r} 254 \\ \times\ \ 3 \\ \hline 652 \end{array}$ [✓ B.] $\begin{array}{r} 438 \\ \times\ \ 7 \\ \hline 3{,}066 \end{array}$

C. $\begin{array}{r} 315 \\ \times\ \ 4 \\ \hline 12{,}420 \end{array}$ [✓ D.] $\begin{array}{r} 623 \\ \times\ \ 5 \\ \hline 3{,}115 \end{array}$

2. What is the product? Use an algorithm to solve.

$\begin{array}{r} 2{,}471 \\ \times\ \ 3 \\ \hline 7{,}413 \end{array}$

3. A theater has a capacity of 1,074 people. The previous 7 shows have all been sold out. How many people attended the 7 performances? Use an algorithm to solve.

A. 1,081 people B. 7,498 people
C. 7,501 people [✓ D.] 7,518 people

4. The average attendance at a town's high school basketball games is 2,914 people per game. How many people attended the team's 8 home games so far this season? Use an algorithm to solve.

23,312 people

Reflect On Your Learning

I'm confused.	I'm starting to understand.	I understand.	I can teach someone else.
○	○	○	○

82 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Roll to Multiply

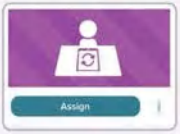
Work with students in pairs. Have students roll a number cube 4 times to create a 3-digit number by 1-digit number multiplication problem. Work with the students to solve the problem, with one student using partial products and the other using an algorithm. Make sure students understand how the algorithm relates to the partial products. Have students switch roles and repeat the process with new numbers.

GO ONLINE

Take Another Look Lessons

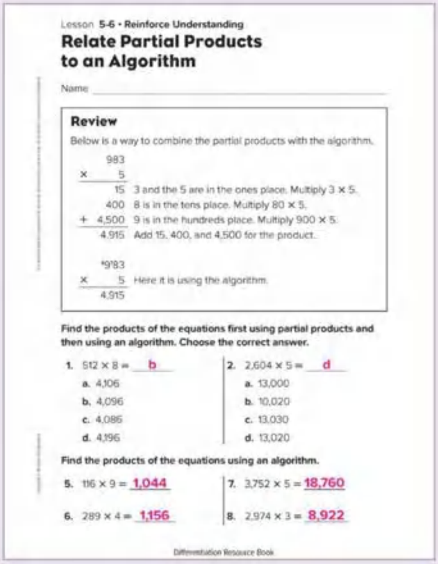
Assign the interactive lessons to reinforce targeted skills.

- Multiply 3- by 1-Digit Numbers
- Multiply 4- by 1-Digit Numbers



INDEPENDENT WORK

Differentiation Resource Book, p. 47



Lesson **5-6 • Reinforce Understanding**

Relate Partial Products to an Algorithm

Name ______________________

Review

Below is a way to combine the partial products with the algorithm.

$$\begin{array}{rl} 983 & \\ \times \quad 5 & \\ \hline 15 & \text{3 and the 5 are in the ones place. Multiply 3 × 5.} \\ 400 & \text{8 is in the tens place. Multiply 80 × 5.} \\ + \; 4{,}500 & \text{9 is in the hundreds place. Multiply 900 × 5.} \\ \hline 4{,}915 & \text{Add 15, 400, and 4,500 for the product.} \end{array}$$

$$\begin{array}{rl} {}^{4}9{}^{1}83 & \\ \times \quad 5 & \text{Here it is using the algorithm.} \\ \hline 4{,}915 & \end{array}$$

Find the products of the equations first using partial products and then using an algorithm. Choose the correct answer.

1. 512 × 8 = b
   - a. 4,106
   - b. 4,096
   - c. 4,086
   - d. 4,196

2. 2,604 × 5 = d
   - a. 13,000
   - b. 10,020
   - c. 13,030
   - d. 13,020

Find the products of the equations using an algorithm.

5. 116 × 9 = 1,044

6. 289 × 4 = 1,156

7. 3,752 × 5 = 18,760

8. 2,974 × 3 = 8,922

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multiplication Standard Algorithm Task Cards

Students identify errors in multiplication using the standard algorithm.

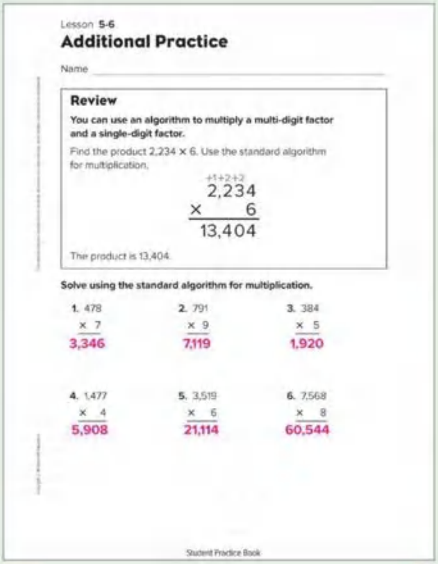
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 47–48



Lesson **5-6**

Additional Practice

Name ______________________

Review

You can use an algorithm to multiply a multi-digit factor and a single-digit factor.

Find the product 2,234 × 6. Use the standard algorithm for multiplication.

$$\begin{array}{r} {}^{+1+2+2} \\ 2{,}234 \\ \times \quad 6 \\ \hline 13{,}404 \end{array}$$

The product is 13,404.

Solve using the standard algorithm for multiplication.

1. 478 × 7 = 3,346
2. 791 × 9 = 7,119
3. 384 × 5 = 1,920
4. 1,477 × 4 = 5,908
5. 3,519 × 6 = 21,114
6. 7,568 × 8 = 60,544

Student Practice Book

Own It! Digital Station

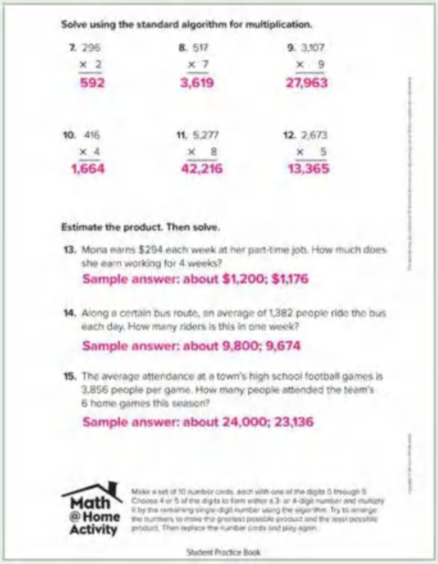
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 47–48



Solve using the standard algorithm for multiplication.

7. 296 × 2 = 592

8. 517 × 7 = 3,619

9. 3,107 × 9 = 27,963

10. 416 × 4 = 1,664

11. 5,277 × 8 = 42,216

12. 2,673 × 5 = 13,365

Estimate the product. Then solve.

13. Mona earns $294 each week at her part-time job. How much does she earn working for 4 weeks?
Sample answer: about $1,200; $1,176

14. Along a certain bus route, an average of 1,382 people ride the bus each day. How many riders is this in one week?
Sample answer: about 9,800; 9,674

15. The average attendance at a town's high school football games is 3,856 people per game. How many people attended the team's 6 home games this season?
Sample answer: about 24,000; 23,136

Math @Home Activity Make a set of 10 number cards, each with one of the digits 0 through 9. Choose 4 or 5 of the digits to form either a 3- or 4-digit number and multiply it by the remaining single-digit number using the algorithm. Try to arrange the numbers to make the greatest possible product and the least possible product. Then replace the number cards and play again.

Student Practice Book

WORKSTATIONS

GO ONLINE

INDEPENDENT WORK

E Extend Thinking

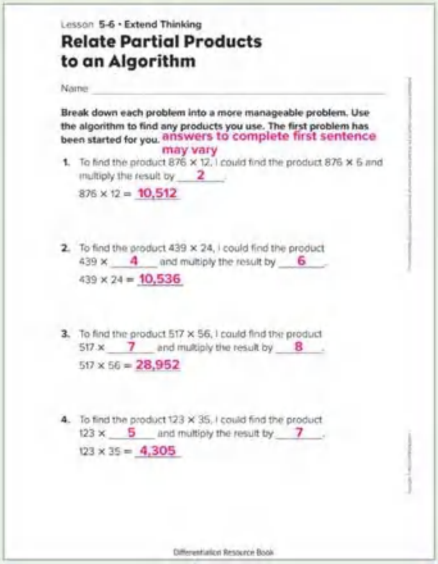
Use It! Application Station

Let's Celebrate Students use charts to create a budget for a graduation celebration.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

Differentiation Resource Book, p. 48



Lesson **5-6 • Extend Thinking**

Relate Partial Products to an Algorithm

Name ____________________

Break down each problem into a more manageable problem. Use the algorithm to find any products you use. The first problem has been started for you. **answers to complete first sentence may vary**

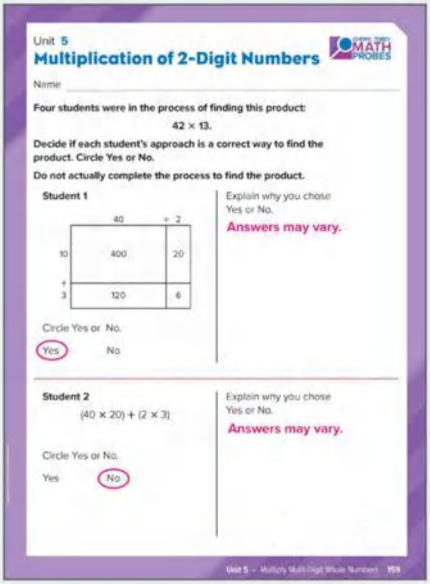
1. To find the product 876 × 12, I could find the product 876 × 6 and multiply the result by **2**.
876 × 12 = **10,512**

2. To find the product 439 × 24, I could find the product 439 × **4** and multiply the result by **6**.
439 × 24 = **10,536**

3. To find the product 517 × 56, I could find the product 517 × **7** and multiply the result by **8**.
517 × 56 = **28,952**

4. To find the product 123 × 35, I could find the product 123 × **5** and multiply the result by **7**.
123 × 35 = **4,305**

Differentiation Resource Book



Unit 5

Multiplication of 2-Digit Numbers

Name

Four students were in the process of finding this product:

42 × 13.

Decide if each student's approach is a correct way to find the product. Circle Yes or No.

Do not actually complete the process to find the product.

Student 1

	40	+ 2
10	400	20
+ 3	120	6

Circle Yes or No.

[✓ Yes] No

Explain why you chose Yes or No.

Answers may vary.

Student 2

(40 × 20) + (2 × 3)

Circle Yes or No.

Yes [✓ No]

Explain why you chose Yes or No.

Answers may vary.

Unit 5 • Multiply Multi-Digit Whole Numbers 159

Student 3

13 × 40 + 13 × 2

Circle Yes or No.

[✓ Yes] No

Explain why you chose Yes or No.

Answers may vary.

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

160 Math Probe | Multiplication of 2-Digit Numbers

Analyze the Probe

Formative Assessment

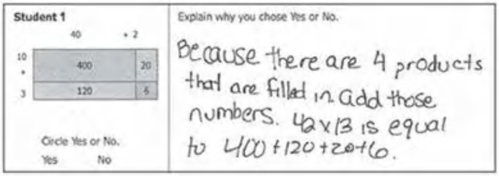
Targeted Concept Evaluate different strategies and representations in preparation for applying the standard algorithm for multiplying multi-digit numbers.

Targeted Misconceptions Some students multiply 2-digit numbers by multiplying the ones digits and the tens digits—and then adding the results. This misconception may stem from applying addition approaches to multiplication or from not knowing different ways to think about multiplication. Some students do not understand how to decompose factors to use with an area representation. When some students multiply, they treat a digit in the tens place as if it were in the ones place.

Sample Student Work

Below are examples of students' explanations.

Sample A



Student 1

	40	+ 2
10	400	20
+ 3	120	6

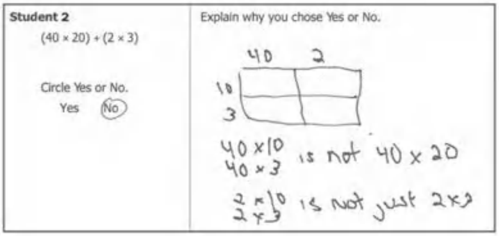
Circle Yes or No.

Yes No

Explain why you chose Yes or No.

Because there are 4 products that are filled in Add those numbers. 42x13 is equal to 400+120+20+6.

Sample B



Student 2

(40 × 20) + (2 × 3)

Circle Yes or No.

Yes [✓ No]

Explain why you chose Yes or No.

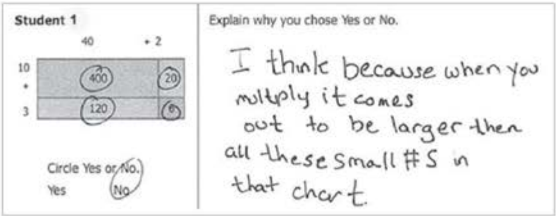
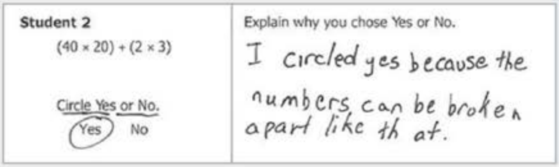
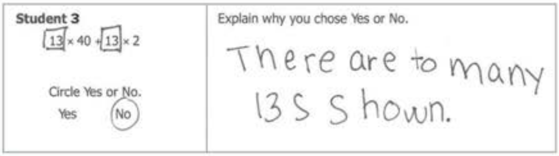
	40	2
10		
3		

40 x 10
40 x 3 is not 40 x 20

2 x 10
2 x 3 is not just 2x3

Collect and Assess Student Work

Collect and review student responses to determine possible misconceptions. See examples in If-Then chart.

IF incorrect...	THEN the student likely ...	Sample Misconceptions
Student 1: No	has difficulty interpreting an area representation for multiplication. The student may not be able to connect the partial products shown in the area representation with the partial products derived in the partial-products strategy.	In this case, the student does not reason about the sum of the partial products shown.  **Student 1** Circle Yes or No. Yes [✓ No] Explain why you chose Yes or No. I think because when you multply it comes out to be larger then all these small #S in that chart.
Student 2: Yes	does not fully understand the process of using partial products to multiply two 2-digit numbers. The student believes that multiplying the value of the tens digits (40 × 10) and multiplying the ones digits (2 × 3), then adding the two partial products, provides the product for 42 × 13.	In this case, the student does not consider whether the decomposition of the numbers shown is accurate.  **Student 2** $(40 \times 20) + (2 \times 3)$ Circle Yes or No. [✓ Yes] No Explain why you chose Yes or No. I circled yes because the numbers can be broken apart like th at.
Student 3: No	has difficulty recognizing decomposition as a strategy that works for multiplication. Some students fail to recognize that multiplication is commutative: 42 × 13 = 13 × 42, and you can think of this as 13 groups of 40 and 13 groups of 2.	In this case, the student does not recognize when multiplying, a 2nd can be decomposed and each multiplied by 13.  **Student 3** $\boxed{13} \times 40 + \boxed{13} \times 2$ Circle Yes or No. Yes [✓ No] Explain why you chose Yes or No. There are to many 13S Shown.

Many of the above difficulties result in a combination of correct and incorrect responses.
For correct responses, be sure to check for sound reasoning.

Take Action

Choose from the following resources or suggestions:

- Revisit estimation and partial products in Lessons 5-3 and 5-5.
- Encourage a routine of using estimation as a tool for determining the reasonableness of answers and approaches.
- Show examples of both correct and incorrect approaches to multiplication to spark a discussion about correct strategies and to address common misconceptions.
- Provide practice decomposing 2-digit numbers to reinforce place-value ideas, such as the fact that the value of a 4 in the tens place is 40, not 4. Discuss how decomposing numbers can make computation easier.
- Connect numeric expressions to the area representation to reinforce that in 2-digit multiplication, each digit of a factor is multiplied by each digit of the other factor.

Revisit the Probe After additional instruction, have students review their initial answers to the probe. Use these questions for discussion:

- Are there any answers you would like to change? Explain why you might want to change them.
- Are there any questions that you still have about any of the exercises on this probe?

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

LESSON **5-7**

Multiply Multi-Digit Factors Fluently

Learning Targets

- I can use an algorithm to multiply multi-digit factors.
- I can explain how to use an algorithm to multiply.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.5** Fluently multiply multi-digit whole numbers using the standard algorithm.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	Academic Terms
algorithm	analyze
	note
	transition

Materials

The materials may be for any part of the lesson.

- *Multiplication Algorithm* Teaching Resource
- number cubes
- spinners

Focus

Content Objective	Language Objectives	SEL Objective
• Students use an algorithm to multiply two multi-digit factors.	• Students explain how to use an algorithm to multiply while answering *Wh-* and Yes/No questions. • To support maximizing linguistic and cognitive meta-awareness and optimizing output, ELs participate in MLR5: Co-Craft Questions and Problems.	• Students identify and discuss the emotions experienced during math learning.

Coherence

Previous	Now	Next
• Students multiplied two two-digit numbers, using strategies based on place value (Grade 4). • Students connected the partial products strategy to an algorithm (Unit 5).	• Students use an algorithm to multiply two multi-digit factors.	• Students multiply decimals (Unit 6). • Students add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build their understanding of multiplying two multi-digit factors. *Conceptual understanding is not a targeted element of rigor for this standard.*	• Students gain proficiency in using an algorithm to multiply two multi-digit factors efficiently.	• Students apply their understanding of an algorithm of multiplication to solve problems with real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

What's Another Way to Write It?

5–7 min

Build Fluency Students build number sense as they write three different expressions that are equivalent to 7.5.

Remind students that there will be many different possible combinations of numbers and operations that are equivalent to 7.5. As solutions are given, record them for students to evaluate and compare.

These prompts encourage students to talk about their reasoning:

- What numbers might you typically think about using first?
- What strategies did you use to get started?
- How can you use one expression to create a new expression?
- Describe a situation when you would need to write an expression that is equivalent to 7.5.

Launch 5–7 min

Sense-Making Routine

Purpose Students start thinking about how this algorithm aligns with the partial products strategy when multiplying multi-digit numbers by multi-digit numbers.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip As students Notice & Wonder, you may want to have them discuss the similarities and differences and keep track of what they say in a chart for everyone to see.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' noticing and wondering of how this algorithm aligns with the partial products strategy when multiplying multi-digit numbers by multi-digit numbers and are based on possible comments and questions that students may make during the share out.

- What is the sum of the first three partial products on the left? Is that number the same as either partial product on the right?
- What is the sum of the last three partial products on the left? Is that number the same as either partial product on the right?

Math is... Mindset

- What makes you feel excited when doing math?

SEL Self-Awareness: Identify Emotions

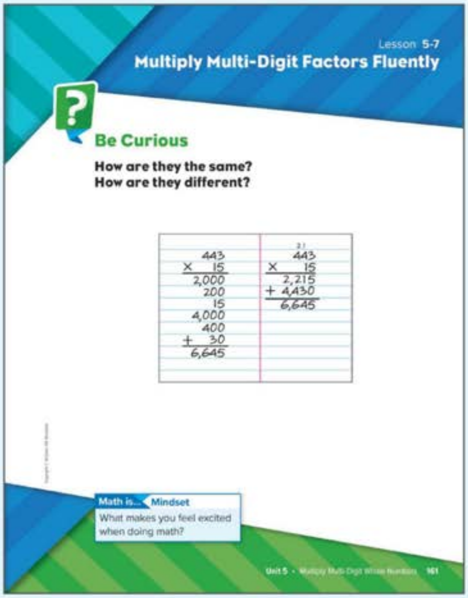
As students complete the Notice & Wonder routine, invite them to share how they organized their work or what they noticed about how you organized your work. For example, you may have written down similarities and differences between the two multiplication strategies as two organized lists. Invite students to discuss the tools they may use to organize their work while multiplying multi-digit factors fluently. Encourage them to think about why this tool may be helpful for their work with multiplying multi-digit factors fluently.

Transition to Explore & Develop

Ask questions that get students thinking about how they can use an algorithm to solve multiplication equations with multi-digit factors.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how this algorithm works when we multiply multi-digit numbers by multi-digit numbers.



Lesson 5-7

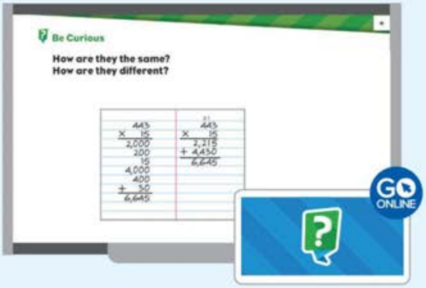
Multiply Multi-Digit Factors Fluently

Be Curious

How are they the same?
How are they different?

Math is... Mindset

What makes you feel excited when doing math?

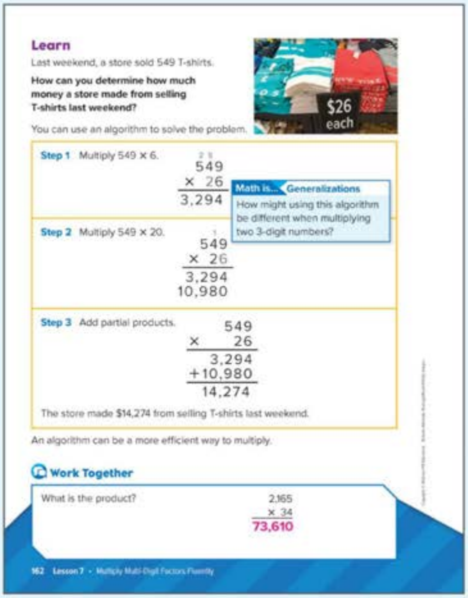


Be Curious

How are they the same?
How are they different?

Explore & Develop

20 min



Learn

Last weekend, a store sold 549 T-shirts.

How can you determine how much money a store made from selling T-shirts last weekend?

You can use an algorithm to solve the problem.

$26 each

Step 1 Multiply 549 × 6.

$$\begin{array}{r} {\scriptstyle 2\,5} \\ 549 \\ \times\ \ 26 \\ \hline 3{,}294 \end{array}$$

Math is... Generalizations
How might using this algorithm be different when multiplying two 3-digit numbers?

Step 2 Multiply 549 × 20.

$$\begin{array}{r} {\scriptstyle 1} \\ 549 \\ \times\ \ 26 \\ \hline 3{,}294 \\ 10{,}980 \end{array}$$

Step 3 Add partial products.

$$\begin{array}{r} 549 \\ \times\ \ \ \ 26 \\ \hline 3{,}294 \\ +10{,}980 \\ \hline 14{,}274 \end{array}$$

The store made $14,274 from selling T-shirts last weekend.

An algorithm can be a more efficient way to multiply.

Work Together

What is the product?

$$\begin{array}{r} 2{,}165 \\ \times\ 34 \\ \hline 73{,}610 \end{array}$$

162 Lesson 7 • Multiply Multi-Digit Factors Fluently

❶ Pose the Problem

ETP Pose Purposeful Questions

- What are you trying to find?
- What information do you already know?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Co-Craft Questions and Problems

Pair students and have them co-create a problem similar to the one on the Learn page. Have them work together to solve their problem and then trade their problem with another pair. After each pair solves the other pair's problems, have them form a group of four to check solutions and correct any mistakes that may have been made. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How is using this algorithm to multiply by a 1-digit number similar to using this algorithm to multiply by a 2-digit number? How is it different?

Key Takeaway

- An algorithm has a consistent process for recording products when multiplying two multi-digit factors.

Work Together

Before students begin calculating the product, have them estimate the product. After students have solved the problem using an algorithm, have them use partial products to solve the equation and discuss howthe strategies are related.

! Common Misconception Students may only pay attention to the digits in the factors and not their place value. Make sure students remember that, for example, they are multiplying 4 × 60 instead of 4 × 6.

LOM Language of Math

Make sure students understand that *regrouping* means different mathematical processes in different mathematical contexts. Discuss with students the similarities and differences in regrouping in adding, subtracting, or multiplying.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore extending a multiplication algorithm to multiply two multi-digit factors.

Materials: *Multiplication Algorithm* Teaching Resource

Directions: Distribute copies of the *Multiplication Algorithm* Teaching Resource. Students will extend what they learned in the previous lesson to complete the algorithm for 549 × 26.

ETP Support Productive Struggle

- What digits will you multiply first?
- How will you use regrouping while multiplying?
- What is the last step to finding the product?

Math is... Generalizations

- How might using this algorithm be different when multiplying a 3-digit number by a 3-digit number?

Students notice if calculations are repeated and look for general methods.

Activity Debrief: Have students share their thinking as they complete the algorithm to find the product. Encourage students to think about the value of the digits, rather than simply the digits themselves. For example, rather than multiplying the digit 2 by the digit 9, students should think about the values of the digits.

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Multiplication Algorithm

Guided Exploration

Students use an algorithm to multiply two multi-digit factors.

ETP Facilitate Meaningful Discourse

Have the students create the equation. Ask:

- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- Will you use compatible numbers or rounded numbers to estimate the solution? Why?

Have the students find the product of 549 and 6 using the algorithm from Lesson 6.

- **Think About It:** How is the partial product 9 × 6 = 54 represented in the product of 549 and 6, and why is it represented that way?

Before multiplying 540 by 20, have the students find the product of 549 and 2 using the algorithm from Lesson 6. After they have found the product, ask:

- How can you use that product and place value arguments to determine the product of 549 and 20?
- **Think About It:** Why is there a 0 in the ones place of the product of 549 and 20?

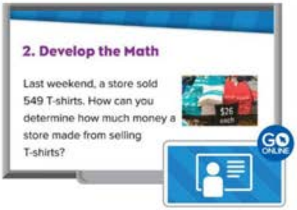
Have the students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is... Generalizations

- How might using this algorithm be different when multiplying a 3-digit number by a 3-digit number?

Students notice if calculations are repeated and look for general methods.



2. Develop the Math

Last weekend, a store sold 549 T-shirts. How can you determine how much money a store made from selling T-shirts?

EL English Learner Scaffolds

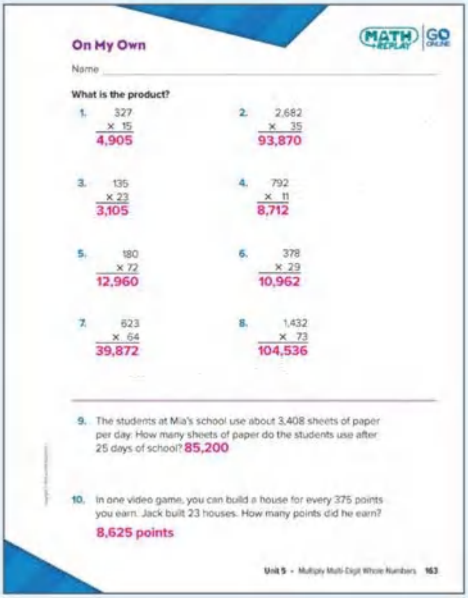
Entering/Emerging Support students in understanding the phrase *make/made money*. Set up a mock buying and selling role play. Give a classroom object, such as a book, a price and pretend to buy it from one of your students. Walk over to another student. "Sell" the book to the student for a higher price. Say, *I made [two dollars]*. Mock buy and sell another item with two students, this time asking after the final sale *How much money did I make?*

Developing/Expanding Support students in understanding the phrase *make/made money*. Set up a mock buying and selling role play. Give a classroom object, such as a book, a price and pretend to buy it from one of your students. Walk over to another student. "Sell" the book to the student for a higher price. Say, *I made [two dollars]*. Then ask students to perform a mock buying and selling role play with a group of three. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to perform mock buying and selling role plays with a group of three students. Have them talk about how much money they made. Then have students discuss different ways of expressing making money, such as *made a profit*, etc.

Practice & Reflect

10 min



On My Own

Name ____________

What is the product?

1. $\begin{array}{r}327\\ \times\ 15\\ \hline 4,905\end{array}$

2. $\begin{array}{r}2,682\\ \times\ \ \ 35\\ \hline 93,870\end{array}$

3. $\begin{array}{r}135\\ \times\ 23\\ \hline 3,105\end{array}$

4. $\begin{array}{r}792\\ \times\ \ 11\\ \hline 8,712\end{array}$

5. $\begin{array}{r}180\\ \times\ 72\\ \hline 12,960\end{array}$

6. $\begin{array}{r}378\\ \times\ 29\\ \hline 10,962\end{array}$

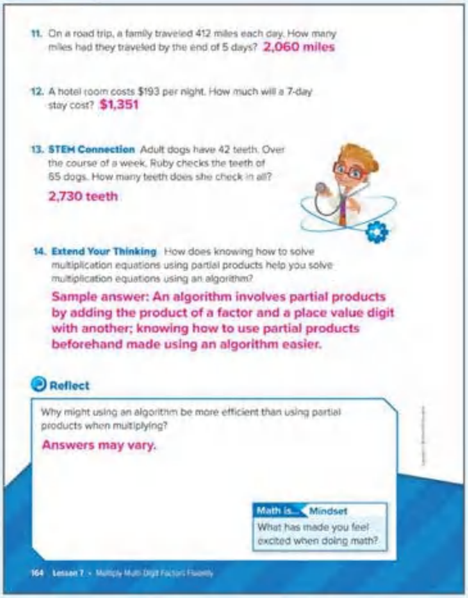
7. $\begin{array}{r}623\\ \times\ 64\\ \hline 39,872\end{array}$

8. $\begin{array}{r}1,432\\ \times\ \ 73\\ \hline 104,536\end{array}$

9. The students at Mia's school use about 3,408 sheets of paper per day. How many sheets of paper do the students use after 25 days of school? **85,200**

10. In one video game, you can build a house for every 375 points you earn. Jack built 23 houses. How many points did he earn?
8,625 points

Unit 5 • Multiply Multi-Digit Whole Numbers 163



11. On a road trip, a family traveled 412 miles each day. How many miles had they traveled by the end of 5 days? **2,060 miles**

12. A hotel room costs $193 per night. How much will a 7-day stay cost? **$1,351**

13. **STEM Connection** Adult dogs have 42 teeth. Over the course of a week, Ruby checks the teeth of 65 dogs. How many teeth does she check in all?
2,730 teeth

14. **Extend Your Thinking** How does knowing how to solve multiplication equations using partial products help you solve multiplication equations using an algorithm?
Sample answer: An algorithm involves partial products by adding the product of a factor and a place value digit with another; knowing how to use partial products beforehand made using an algorithm easier.

Reflect

Why might using an algorithm be more efficient than using partial products when multiplying?

Answers may vary.

Math is... Mindset
What has made you feel excited when doing math?

164 Lesson 7 • Multiply Multi-Digit Factors Fluently

Practice

ETP **Build Procedural Fluency from Conceptual Understanding**

Common Error: Exercises 1–8 Some students do not consider the value of the digits when using a standard algorithm. Some omit the 0 in the ones place in the second partial product. If this error occurs in Exercises 1-8, have students work the problems again by using partial products to reinforce the place value of the digits that are multiplied and written in the algorithm.

Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9–13	2	Application
14	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- Why might using an algorithm be more efficient than using partial products when multiplying?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How has organizing your work helped you?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use an algorithm to multiply multi-digit factors.
- I can explain how to use an algorithm to multiply.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Multiply multi-digit numbers by a 2-digit number using an algorithm	5.NBT.B.5
2	3	Multiply multi-digit numbers by a 2-digit number using an algorithm	5.NBT.B.5
3	3	Multiply multi-digit numbers by a 2-digit number using an algorithm	5.NBT.B.5

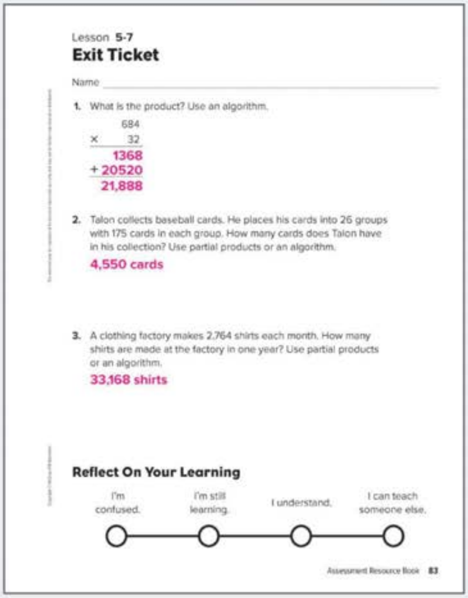
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 5-7

Exit Ticket

Name ______

1. What is the product? Use an algorithm.

$$\begin{array}{r} 684 \\ \times \quad 32 \\ \hline 1368 \\ +\,20520 \\ \hline 21{,}888 \end{array}$$

2. Talon collects baseball cards. He places his cards into 26 groups with 175 cards in each group. How many cards does Talon have in his collection? Use partial products or an algorithm.

4,550 cards

3. A clothing factory makes 2,764 shirts each month. How many shirts are made at the factory in one year? Use partial products or an algorithm.

33,168 shirts

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

Assessment Resource Book 83

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Spin 'n' Roll for Products!

Work with students in pairs using a spinner that contains 2-digit numbers. One student spins the spinner to obtain a factor. The other student rolls a number cube twice to produce a 2-digit factor. Help students multiply the two factors and then check their work using estimation. Have students repeat the process with new numbers.

GO ONLINE

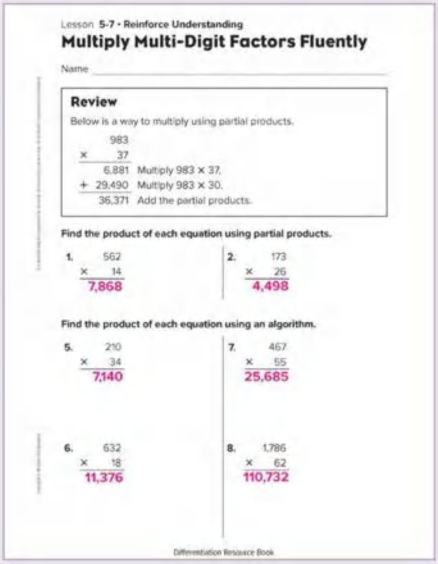
Take Another Look Lessons

Assign the interactive lessons to reinforce targeted skills.

- Multiply Multi-Digit by 2-Digit Numbers
- Mutliply 3-Digit by 3-Digit Numbers
- Multiply Multi-Digit Numbers

INDEPENDENT WORK

Differentiation Resource Book, p. 49



Lesson 5-7 • Reinforce Understanding

Multiply Multi-Digit Factors Fluently

Name ______

Review

Below is a way to multiply using partial products.

983
× 37
6,881 Multiply 983 × 37.
+ 29,490 Multiply 983 × 30.
36,371 Add the partial products.

Find the product of each equation using partial products.

1. 562 × 14 = 7,868

2. 173 × 26 = 4,498

Find the product of each equation using an algorithm.

5. 210 × 34 = 7,140

7. 467 × 55 = 25,685

6. 632 × 18 = 11,376

8. 1,786 × 62 = 110,732

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multiplication Showdown Students practice multiplication of multi-digit numbers.

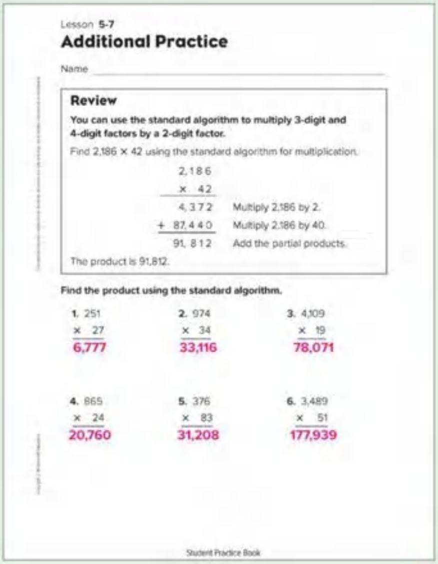
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 49–50



Lesson 5-7

Additional Practice

Name ______

Review

You can use the standard algorithm to multiply 3-digit and 4-digit factors by a 2-digit factor.

Find 2,186 × 42 using the standard algorithm for multiplication.

2,186
× 42
4,372 Multiply 2,186 by 2.
+ 87,440 Multiply 2,186 by 40.
91,812 Add the partial products.

The product is 91,812.

Find the product using the standard algorithm.

1. 251 × 27 = 6,777
2. 974 × 34 = 33,116
3. 4,109 × 19 = 78,071
4. 865 × 24 = 20,760
5. 376 × 83 = 31,208
6. 3,489 × 51 = 177,939

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication using area models.

Use It! Application Station

Make a Pulley System Students use measurements to create a pulley system.

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Websketch Exploration

Assign a websketch exploration to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 49–50

Solve each problem.

7. Wanda makes bracelets to sell at craft shows. Each bracelet she makes uses 38 beads. This year, Wanda has sold 351 bracelets. How many beads did she use to make the bracelets?

13,338 beads

8. Lorenzo saves $136 each week. How much money will he have saved after 1 year (52 weeks)?

$7,072

9. A furniture company provides 84 screws for customers to use to put one bed together. If the company sells 511 beds, how many screws did they provide?

42,924 screws

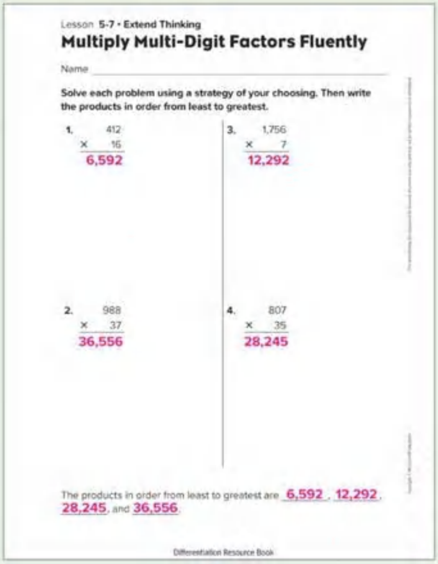
10. Carla averages 8,275 steps each day. At this rate, how many steps will Carla walk in two weeks?

115,850 steps

Math @ Home Activity Make a set of 10 number cards, each with one of the digits 0 through 9. Choose 5 or 6 of the digits to form either a 3- or 4-digit number and multiply it by a number formed by the remaining two numbers. Try to arrange the numbers to make the greatest possible product and the least possible product. Then replace the number cards and play again.

Student Practice Book

Differentiation Resource Book, p. 50



Lesson **5-7 • Extend Thinking**

Multiply Multi-Digit Factors Fluently

Name ______________________

Solve each problem using a strategy of your choosing. Then write the products in order from least to greatest.

1. $412 \times 16 = 6{,}592$

2. $988 \times 37 = 36{,}556$

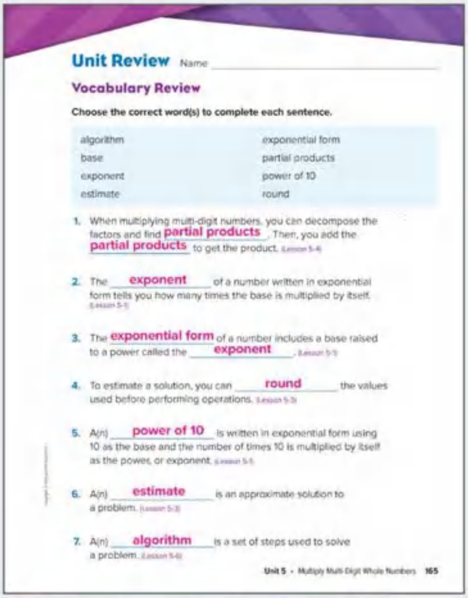
3. $1{,}756 \times 7 = 12{,}292$

4. $807 \times 35 = 28{,}245$

The products in order from least to greatest are 6,592, 12,292, 28,245, and 36,556.

Differentiation Resource Book

Unit Review



Unit Review

Name ____________

Vocabulary Review

Choose the correct word(s) to complete each sentence.

algorithm	exponential form
base	partial products
exponent	power of 10
estimate	round

1. When multiplying multi-digit numbers, you can decompose the factors and find **partial products**. Then, you add the **partial products** to get the product. (Lesson 5-4)

2. The **exponent** of a number written in exponential form tells you how many times the base is multiplied by itself. (Lesson 5-1)

3. The **exponential form** of a number includes a base raised to a power called the **exponent**. (Lesson 5-1)

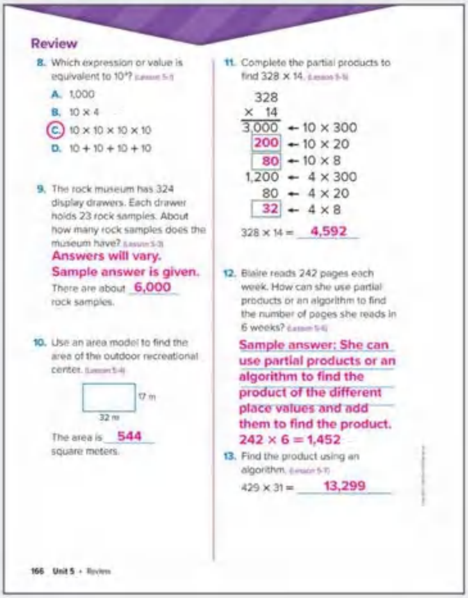
4. To estimate a solution, you can **round** the values used before performing operations. (Lesson 5-3)

5. A(n) **power of 10** is written in exponential form using 10 as the base and the number of times 10 is multiplied by itself as the power, or exponent. (Lesson 5-1)

6. A(n) **estimate** is an approximate solution to a problem. (Lesson 5-3)

7. A(n) **algorithm** is a set of steps used to solve a problem. (Lesson 5-6)

Unit 5 • Multiply Multi-Digit Whole Numbers 165



Review

8. Which expression or value is equivalent to 10^4? (Lesson 5-1)
   - A. 1,000
   - B. 10×4
   - [✓ C.] $10 \times 10 \times 10 \times 10$
   - D. $10 + 10 + 10 + 10$

9. The rock museum has 324 display drawers. Each drawer holds 23 rock samples. About how many rock samples does the museum have? (Lesson 5-3)
   Answers will vary. Sample answer is given.
   There are about **6,000** rock samples.

10. Use an area model to find the area of the outdoor recreational center. (Lesson 5-4)
    17 m
    32 m
    The area is **544** square meters.

11. Complete the partial products to find 328 × 14. (Lesson 5-5)

$$\begin{array}{rl} 328 & \\ \times\ 14 & \\ \hline 3{,}000 & \leftarrow 10 \times 300 \\ \boxed{200} & \leftarrow 10 \times 20 \\ \boxed{80} & \leftarrow 10 \times 8 \\ 1{,}200 & \leftarrow 4 \times 300 \\ 80 & \leftarrow 4 \times 20 \\ \boxed{32} & \leftarrow 4 \times 8 \end{array}$$

328 × 14 = **4,592**

12. Blaire reads 242 pages each week. How can she use partial products or an algorithm to find the number of pages she reads in 6 weeks? (Lesson 5-6)
    Sample answer: She can use partial products or an algorithm to find the product of the different place values and add them to find the product. 242 × 6 = 1,452

13. Find the product using an algorithm. (Lesson 5-7)
    429 × 31 = **13,299**

166 Unit 5 • Review

Students can complete the **Unit Review** to prepare for the **Unit Assessment.** Students may complete the Review in their Interactive eBook in the Digital Student Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	5-4
2	5-1
3	5-1
4	5-3
5	5-1
6	5-3
7	5-6

Review

Item Analysis

Item	DOK	Lesson	Standard
8	2	5-1	5.NBT.A.2
9	2	5-3	5.NBT.A.2
10	2	5-4	5.NBT.A.2
11	2	5-5	5.NBT.A.2
12	3	5-6	5.NBT.A.2
13	2	5-7	5.NBT.B.5

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

GO ONLINE
MATH REPLAY

Item Analysis (continued)

Item	DOK	Lesson	Standard
14	2	5-2	5.NBT.A.2
15	2	5-3	5.NBT.A.2
16	2	5-5	5.NBT.A.2
17	2	5-7	5.NBT.B.5
18	2	5-7	5.NBT.B.5
19	2	5-2	5.NBT.A.2

Performance Task

Standards: 5.NBT.A.2, 5.NBT.B.5

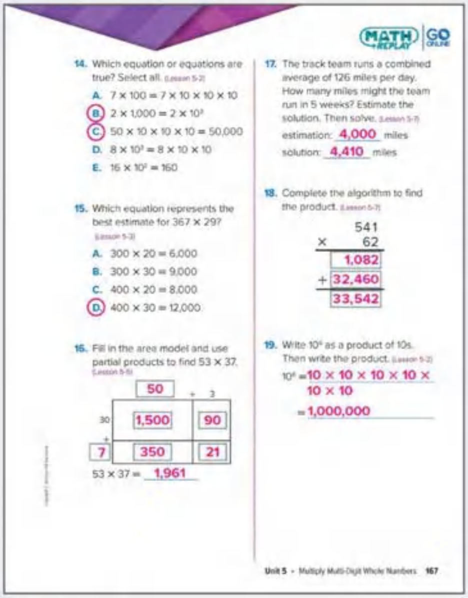
Rubric (6 points)

Part A (DOK 2) – 3 points	
3 POINTS	Student's work reflects a proficiency with subtraction when using exponential forms of a number as a product.
2 POINTS	Student's work reflects a developing proficiency when using exponential forms of a number as a product. The error is a result of subtraction and not with writing an exponential form of a number as a product.
1 POINT	Student's work reflects a developing proficiency when using exponential forms of a number as a product. The error is a result of writing an exponential form of a number as a product.
0 POINTS	Student's work reflects a a poor understanding of using exponential forms of a number as a product.

Part B (DOK 2) – 3 points	
3 POINTS	Student's work reflects a proficiency with multiplying multi-digit numbers with no errors.
2 POINTS	Students work reflects a proficiency with multiplying multi-digit numbers. The error is a result of multiplying by less than 52 weeks in a year.
1 POINT	Student's work reflects developing proficiency with multiplying multi-digit numbers.
0 POINTS	Student's work reflects a poor understanding of multiplying multi-digit numbers.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.



MATH REPLAY | GO ONLINE

14. Which equation or equations are true? Select all. (Lesson 5-2)
A. 7 × 100 = 7 × 10 × 10 × 10
[✓ B.] 2 × 1,000 = 2 × 10^3
[✓ C.] 50 × 10 × 10 × 10 = 50,000
D. 8 × 10^3 = 8 × 10 × 10
E. 16 × 10^2 = 160

15. Which equation represents the best estimate for 367 × 29? (Lesson 5-3)
A. 300 × 20 = 6,000
B. 300 × 30 = 9,000
C. 400 × 20 = 8,000
[✓ D.] 400 × 30 = 12,000

16. Fill in the area model and use partial products to find 53 × 37. (Lesson 5-5)

	50	+ 3
30	1,500	90
+ 7	350	21

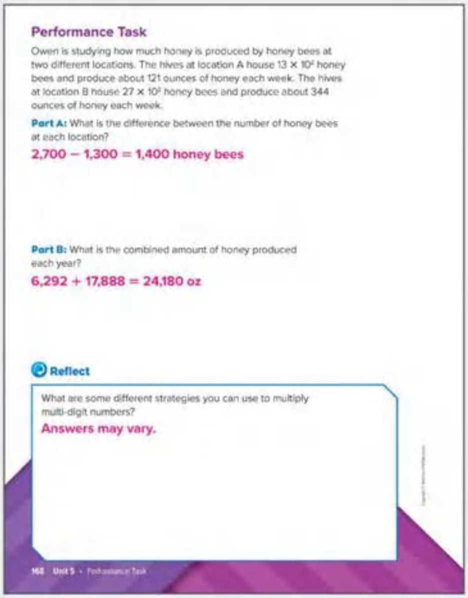
53 × 37 = 1,961

17. The track team runs a combined average of 126 miles per day. How many miles might the team run in 5 weeks? Estimate the solution. Then solve. (Lesson 5-7)
estimation: 4,000 miles
solution: 4,410 miles

18. Complete the algorithm to find the product. (Lesson 5-7)

$$\begin{array}{r} 541 \\ \times\ \ 62 \\ \hline \boxed{1,082} \\ +\ \boxed{32,460} \\ \hline \boxed{33,542} \end{array}$$

19. Write 10^6 as a product of 10s. Then write the product. (Lesson 5-2)
10^6 = 10 × 10 × 10 × 10 × 10 × 10
= 1,000,000



Performance Task

Owen is studying how much honey is produced by honey bees at two different locations. The hives at location A house 13 × 10^2 honey bees and produce about 121 ounces of honey each week. The hives at location B house 27 × 10^2 honey bees and produce about 344 ounces of honey each week.

Part A: What is the difference between the number of honey bees at each location?

2,700 – 1,300 = 1,400 honey bees

Part B: What is the combined amount of honey produced each year?

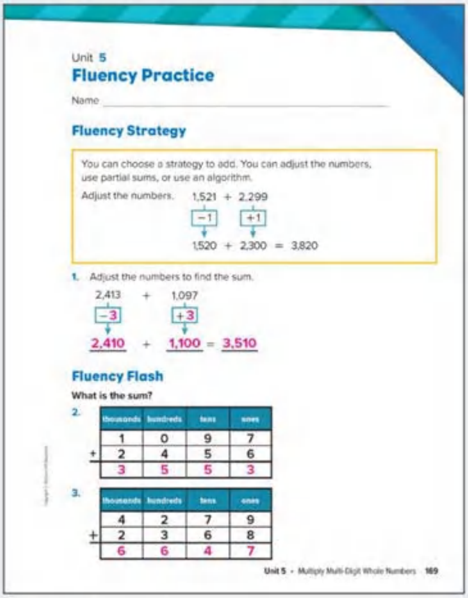
6,292 + 17,888 = 24,180 oz

Reflect

What are some different strategies you can use to multiply multi-digit numbers?

Answers may vary.

Fluency Practice



Unit 5

Fluency Practice

Name ____________________

Fluency Strategy

You can choose a strategy to add. You can adjust the numbers, use partial sums, or use an algorithm.

Adjust the numbers. 1,521 + 2,299

$\boxed{-1}$ $\boxed{+1}$

1,520 + 2,300 = 3,820

1. Adjust the numbers to find the sum.

2,413 + 1,097

$\boxed{-3}$ $\boxed{+3}$

2,410 + 1,100 = 3,510

Fluency Flash

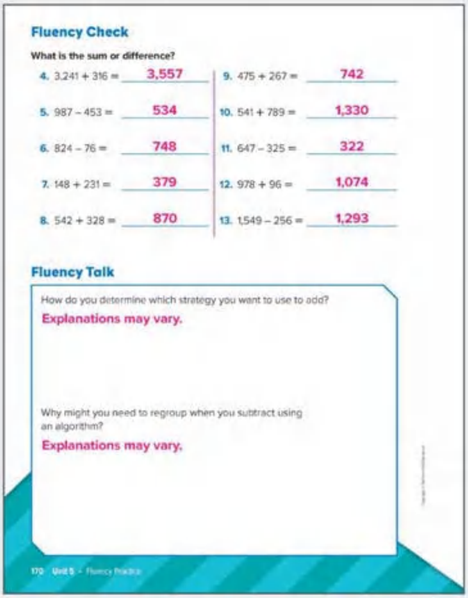
What is the sum?

2.

	thousands	hundreds	tens	ones
	1	0	9	7
+	2	4	5	6
	3	5	5	3

3.

	thousands	hundreds	tens	ones
	4	2	7	9
+	2	3	6	8
	6	6	4	7



Fluency Check

What is the sum or difference?

4. 3,241 + 316 = 3,557
5. 987 − 453 = 534
6. 824 − 76 = 748
7. 148 + 231 = 379
8. 542 + 328 = 870
9. 475 + 267 = 742
10. 541 + 789 = 1,330
11. 647 − 325 = 322
12. 978 + 96 = 1,074
13. 1,549 − 256 = 1,293

Fluency Talk

How do you determine which strategy you want to use to add?

Explanations may vary.

Why might you need to regroup when you subtract using an algorithm?

Explanations may vary.

Fluency practice helps students develop procedural fluency; that is, the “ability to apply procedures accurately, efficiently, and flexibly.” Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students practice choosing a strategy to add fluently.

Fluency Progression

Unit	Skill	Standard
1	Use Partial Sums to Add	4.NBT.B.4
2	Decompose by Place Value to Subtract	4.NBT.B.4
3	Use an Algorithm to Add	4.NBT.B.4
4	Use an Algorithm to Subtract	4.NBT.B.4
5	**Choose a Strategy to Add**	**4.NBT.B.4**
6	Choose a Strategy to Subtract	4.NBT.B.4
7	Multiply by Multiples of 10	5.NBT.B.5
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4

- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Performance Task

Movie Theaters

Students draw on their understanding of multiplying multi-digit numbers. Use the rubric shown to evaluate students' work.

Standards: 5.NBT.A.2, 5.NBT.B.5

Rubric (12 points)

Parts A and B (DOK 2) – 4 points

4 POINTS	Student's work reflects proficiency with multiplying multi-digit factors. Student was able to accurately calculate the answer.
2 POINTS	Student's work reflects developing proficiency with multiplying multi-digit factors. Minor error in calculation resulted in an inaccurate final answer.
0 POINTS	Student's work reflects a weak proficiency of multiplying multi-digit factors. Multiple errors in calculation resulted in an inaccurate final answer.

Part C (DOK 3) – 2 points

2 POINTS	Student's work reflects proficiency with determining which value is the greater of two values. The student justifies their selection with an accurate and reasonable explanation.
1 POINT	Student's work reflects a developing proficiency with determining which value is the greater of two values. The student's justification of their selection is lacking.
0 POINTS	Student's work reflects a weak proficiency in determining which value is the greater of two values. The student's justification of their selection is not present.

Part D (DOK 2) – 4 points

4 POINTS	Student's work reflects proficiency with multiplying multi-digit factors. Student was able to accurately calculate the answer. The student justifies their selection with an accurate and reasonable explanation.
2 POINTS	Student's work reflects developing proficiency with multiplying multi-digit factors. Minor error in calculation resulted in an inaccurate final answer. The student's justification of their selection is lacking.
0 POINTS	Student's work reflects a weak proficiency of multiplying multi-digit factors. Multiple errors in calculation resulted in an inaccurate final answer. The student's justification of their selection is not present.

Part E (DOK 3) – 2 points

2 POINTS	Student's work reflects proficiency with using reasoning in a real-world situation. The student justifies their selection with an accurate and reasonable explanation.
1 POINT	Student's work reflects a developing proficiency in using reasoning in a real-world situation. The student's justification of their selection is lacking.
0 POINTS	Student's work reflects a weak proficiency of using reasoning in a real-world situation. The student's justification of their selection is not present.

Unit 5

Performance Task

Name ______________________

Movie Theaters

A movie theater chain, Action Theaters, is considering replacing their standard seats with reclining seats in order to stay competitive with other theaters. The owners of Action Theaters are researching the costs associated with the renovations as well as the potential gains in ticket sales.

Part A

Action Theaters currently has 21 theaters and each theater has 10 auditoriums. Each auditorium contains 100 seats each. The cost of a movie ticket is currently $8. Assuming all auditoriums at all 21 theaters are full, how much money in ticket sales would be taken in? Show your work.

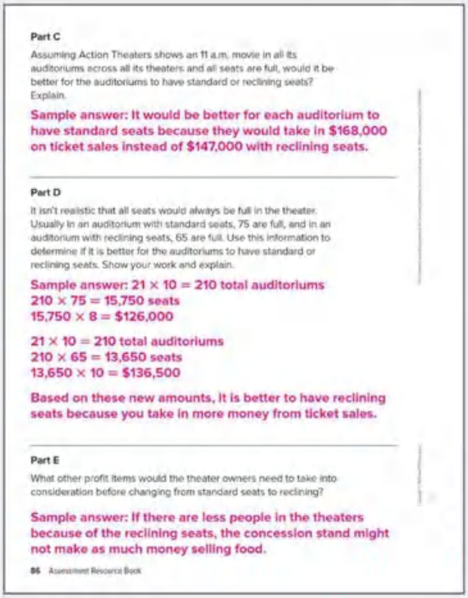
Sample answer: 21 × 10 = 210 total auditoriums
$210 \times 100 = 210 \times 10^2$ seats
$210 \times 10^2 \times 8 = 1{,}680 \times 10^2 = \$168{,}000$

Part B

If Action Theaters makes the switch to reclining seats in all 10 auditoriums in each of their 21 theaters, each auditorium will have less seats. Since the reclining seats take up more room, each auditorium would only have 70 seats each. Because of the reclining seats, the cost of a movie ticket can be raised by $2. Assuming all auditoriums at all 21 theaters are full, how much money in ticket sales would be taken in? Show your work.

Sample answer: 21 × 10 = 210 total auditoriums
210 × 70 = 14,700 seats
14,700 × 10 = $147,000

Assessment Resource Book 85



Part C

Assuming Action Theaters shows an 11 a.m. movie in all its auditoriums across all its theaters and all seats are full, would it be better for the auditoriums to have standard or reclining seats? Explain.

Sample answer: It would be better for each auditorium to have standard seats because they would take in $168,000 on ticket sales instead of $147,000 with reclining seats.

Part D

It isn't realistic that all seats would always be full in the theater. Usually in an auditorium with standard seats, 75 are full, and in an auditorium with reclining seats, 65 are full. Use this information to determine if it is better for the auditoriums to have standard or reclining seats. Show your work and explain.

Sample answer: 21 × 10 = 210 total auditoriums
210 × 75 = 15,750 seats
15,750 × 8 = $126,000

21 × 10 = 210 total auditoriums
210 × 65 = 13,650 seats
13,650 × 10 = $136,500

Based on these new amounts, it is better to have reclining seats because you take in more money from ticket sales.

Part E

What other profit items would the theater owners need to take into consideration before changing from standard seats to reclining?

Sample answer: If there are less people in the theaters because of the reclining seats, the concession stand might not make as much money selling food.

86 Assessment Resource Book

Unit Assessments

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

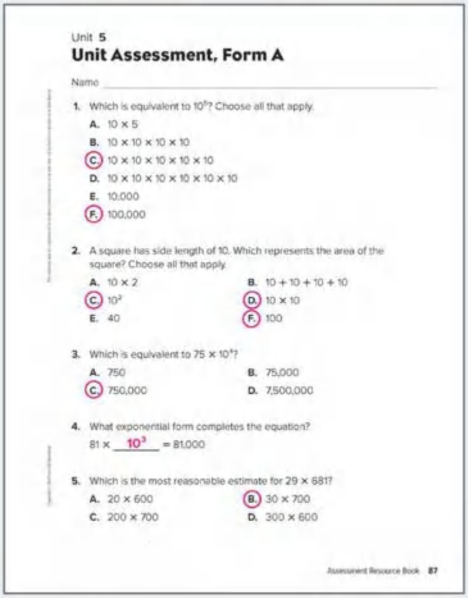
Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	2	5-1	Powers of 10 (Exponents)	5.NBT.A.2
2	2	5-1	Introduction to Powers of Ten	5.NBT.A.2
3	2	5-2	Multiply by Powers of 10	5.NBT.A.2
4	2	5-2	Multiply by Powers of 10	5.NBT.A.2
5	2	5-3	Estimate Products (Whole Number Factors)	5.NBT.B.5
6	3	5-3	Estimate Products (Whole Number Factors)	5.NBT.B.5
7	2	5-4	Multiply 2-Digit Numbers (Area Models)	5.NBT.B.5
8	2	5-5	Multiply 2-Digit Numbers (Area Models)	5.NBT.B.5
9	2	5-6	Multiply 3- by 1-Digit Numbers	5.NBT.B.5
10	2	5-7	Multiply Multi-Digit by 2-Digit Numbers	5.NBT.B.5
11	2	5-4	Multiply 2-Digit Numbers (Area Models)	5.NBT.B.5
12	3	5-4, 5-5, 5-7	Multiply 2-Digit Numbers (Area Models)	5.NBT.B.5
13	3	5-3, 5-6	Estimate Products (Whole Number Factors)	5.NBT.B.5
14	3	5-7	Multiply Multi-Digit by 2-Digit Numbers	5.NBT.B.5

GO ONLINE

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.



Unit 5

Unit Assessment, Form A

Name ____________________

1. Which is equivalent to 10^5? Choose all that apply.
   - A. 10 × 5
   - B. 10 × 10 × 10 × 10
   - [✓ C.] 10 × 10 × 10 × 10 × 10
   - D. 10 × 10 × 10 × 10 × 10 × 10
   - E. 10,000
   - [✓ F.] 100,000

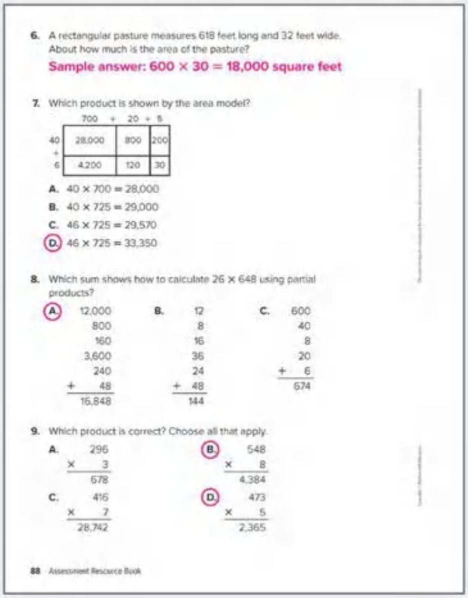
2. A square has side length of 10. Which represents the area of the square? Choose all that apply.
   - A. 10 × 2
   - B. 10 + 10 + 10 + 10
   - [✓ C.] 10^2
   - [✓ D.] 10 × 10
   - E. 40
   - [✓ F.] 100

3. Which is equivalent to 75×10^4?
   - A. 750
   - B. 75,000
   - [✓ C.] 750,000
   - D. 7,500,000

4. What exponential form completes the equation?
   $81 \times \underline{10^3} = 81{,}000$

5. Which is the most reasonable estimate for 29 × 681?
   - A. 20 × 600
   - [✓ B.] 30 × 700
   - C. 200 × 700
   - D. 300 × 600

Assessment Resource Book 87



6. A rectangular pasture measures 618 feet long and 32 feet wide. About how much is the area of the pasture?
   Sample answer: 600 × 30 = 18,000 square feet

7. Which product is shown by the area model?

	700	+ 20	+ 5
40	28,000	800	200
+ 6	4,200	120	30

   - A. 40 × 700 = 28,000
   - B. 40 × 725 = 29,000
   - C. 46 × 725 = 29,570
   - [✓ D.] 46 × 725 = 33,350

8. Which sum shows how to calculate 26 × 648 using partial products?

[✓ A.]
$$\begin{array}{r} 12{,}000 \\ 800 \\ 160 \\ 3{,}600 \\ 240 \\ +\quad 48 \\ \hline 16{,}848 \end{array}$$

B.
$$\begin{array}{r} 12 \\ 8 \\ 16 \\ 36 \\ 24 \\ +\quad 48 \\ \hline 144 \end{array}$$

C.
$$\begin{array}{r} 600 \\ 40 \\ 8 \\ 20 \\ +\quad 6 \\ \hline 674 \end{array}$$

9. Which product is correct? Choose all that apply.

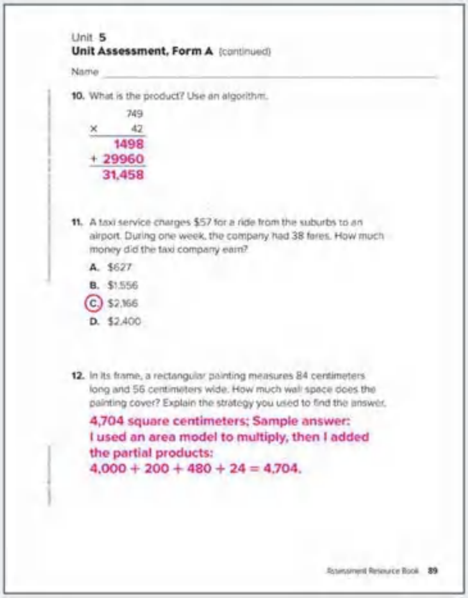
A.
$$\begin{array}{r} 296 \\ \times\quad 3 \\ \hline 678 \end{array}$$

[✓ B.]
$$\begin{array}{r} 548 \\ \times\quad 8 \\ \hline 4{,}384 \end{array}$$

C.
$$\begin{array}{r} 416 \\ \times\quad 7 \\ \hline 28{,}742 \end{array}$$

[✓ D.]
$$\begin{array}{r} 473 \\ \times\quad 5 \\ \hline 2{,}365 \end{array}$$

88 Assessment Resource Book



Unit 5
Unit Assessment, Form A (continued)

Name

10. What is the product? Use an algorithm.

749
× 42
1498
+ 29960
31,458

11. A taxi service charges $57 for a ride from the suburbs to an airport. During one week, the company had 38 fares. How much money did the taxi company earn?

- **A.** $627
- **B.** $1,556
- [✓ **C.**] $2,166
- **D.** $2,400

12. In its frame, a rectangular painting measures 84 centimeters long and 56 centimeters wide. How much wall space does the painting cover? Explain the strategy you used to find the answer.

4,704 square centimeters; Sample answer: I used an area model to multiply, then I added the partial products: 4,000 + 200 + 480 + 24 = 4,704.

Assessment Resource Book 89

13. The average attendance at a town's high school football games is 3,627 people per game. How many people attended the team's 7 home games this season? Give an estimate and the exact number. Explain your strategies.

Sample answer: 28,000; 25,389 people; I rounded 3,627 to 4,000 and multiplied by 7 to get 28,000; I used an algorithm to multiply 7 times 3,627:

3,627
× 7
25,389

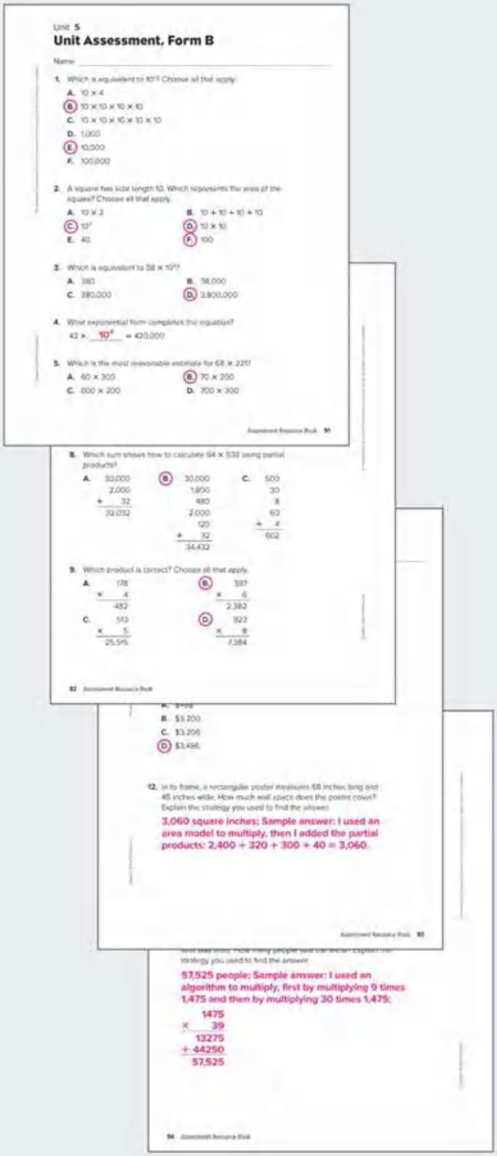
14. A theater has 2,785 seats. For a show's 29 performances, every seat was filled. How many people saw the show? Explain the strategy you used to find the answer.

80,765 people; Sample answer: I used an algorithm to multiply, first by multiplying 9 times 2,785 and then by multiplying 20 times 2,785:

2785
× 29
25065
+ 55700
80,765

90 Assessment Resource Book

Form B



Unit 5
Unit Assessment, Form B

Name

1. Which is equivalent to 10^4? Choose all that apply.

- **A.** 10 × 4
- [✓ **B.**] 10 × 10 × 10 × 10
- **C.** 10 × 10 × 10 × 10 × 10
- **D.** 1,000
- [✓ **E.**] 10,000
- **F.** 100,000

2. A square has side length 10. Which represents the area of the square? Choose all that apply.

- **A.** 10 × 2
- **B.** 10 + 10 + 10 + 10
- [✓ **C.**] 10^2
- [✓ **D.**] 10 × 10
- **E.** 40
- [✓ **F.**] 100

3. Which is equivalent to 38 × 10^5?

- **A.** 380
- **B.** 38,000
- **C.** 380,000
- [✓ **D.**] 3,800,000

4. What exponential form completes the equation?

42 × **10^4** = 420,000

5. Which is the most reasonable estimate for 68 × 221?

- **A.** 60 × 300
- [✓ **B.**] 70 × 200
- **C.** 600 × 200
- **D.** 700 × 300

Assessment Resource Book 91

8. Which sum shows how to calculate 64 × 538 using partial products?

A.
30,000
2,000
+ 32
32,032

[✓ **B.**]
30,000
1,800
480
2,000
120
+ 32
34,432

C.
500
30
8
60
+ 4
602

9. Which product is correct? Choose all that apply.

A.
178
× 4
482

[✓ **B.**]
397
× 6
2,382

C.
513
× 5
25,515

[✓ **D.**]
923
× 8
7,384

92 Assessment Resource Book

- **B.** $3,200
- **C.** $3,206
- [✓ **D.**] $3,486

12. In its frame, a rectangular poster measures 68 inches long and 45 inches wide. How much wall space does the poster cover? Explain the strategy you used to find the answer.

3,060 square inches; Sample answer: I used an area model to multiply, then I added the partial products: 2,400 + 320 + 300 + 40 = 3,060.

Assessment Resource Book 93

strategy you used to find the answer.

57,525 people; Sample answer: I used an algorithm to multiply, first by multiplying 9 times 1,475 and then by multiplying 30 times 1,475:

1475
× 39
13275
+ 44250
57,525

94 Assessment Resource Book

UNIT 6 PLANNER
Multiply Decimals

PACING: 10 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! *Area and Decimal Multiplication* Explore area of rectangles on a grid to learn to place a decimal point in decimal multiplication.			
6-1 Patterns When Multiplying Decimals by Powers of 10	Students use patterns to multiply a decimal by a power of 10. Students explain patterns when multiplying a decimal by a power of 10.	Students explain how to use patterns to multiply a decimal by a power of 10 with the gerund *using*.	Students recognize and work to understand the emotions of others and practice empathetic responses.
6-2 Estimate Products of Decimals	Students estimate products of decimals. Students use estimated products to make predictions about a calculated solution. Students use estimated products to assess the reasonableness of a calculated solution.	Students discuss how to estimate products of two decimals using *by* + gerund.	Students engage in active listening and work collaboratively with a partner to complete mathematical tasks.
6-3 Represent Multiplication Involving Decimals	Students use decimal grids to represent and solve multiplication equations involving decimals.	Students discuss how to solve multiplication equations using decimal grids while answering *Wh-* and Yes/No questions.	Students identify personal traits that make them good students, peers, and math learners.
Math Probe ***Decimal Multiplication*** Estimate products of decimal numbers.			
6-4 Use an Area Model to Multiply Decimals	Students use an area model to determine partial products and add partial products to calculate the product of two decimals.	Students discuss using area models to solve multiplication problems while answering *Wh-* and Yes/No questions and using the term *decompose*.	Students discuss and practice strategies for managing stressful situations.
6-5 Generalizations about Multiplying Decimals	Students use patterns based on place value concepts and properties of operations to determine the placement of the digits in a product.	Students explain how to use patterns in calculations to multiply decimals by making generalizations.	Students reflect on and describe the logic and reasoning used to make a mathematical decision or conclusion.
6-6 Explain Strategies to Multiply Decimals	Students can explain their reasoning for using different strategies to solve. Students explain different strategies to multiply decimals.	Students explain their reasoning for using particular strategies to multiply decimals while answering *Wh-* questions.	Students discuss the value of hearing different viewpoints and approaches to problem solving.
Unit Review **Fluency Practice**			
Unit Assessment **Performance Task**			

FOCUS QUESTION:
What strategies can I use to multiply decimals?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	Academic Terms			
6-1	exponent factor product	analyze reflect	• calculator • number cubes: 1 whole number cube, 1 decimal cube • place-value charts	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.A.2
6-2	estimate range round	cite speculate	• *Blank Open Number Lines* • number cubes	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.7
6-3	decimal grid partition	complex negate	• *Blank Open Number Lines* Teaching Resource • *10 × 10 Grids* Teaching Resource • number cubes	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.7
6-4	area area model decompose partial product	complement evaluate	• base-ten blocks • 0.5 cm grid paper	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.7
6-5	area model digit partial product	assert expand	• place-value charts	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.7
6-6	area model decimal grid decomposition partial product unknown	relevant suggest	• decimal grids • *Show and Explain Your Reasoning* Teaching Resource	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.7

Unit Overview

Focus

Multiplying Decimals

In this unit, students extend on their understanding from Grade 4 of multiplying whole numbers and fractions to multiplying decimals. They use estimation to determine the reasonableness of their answers. Students apply their understanding of multiplying decimals to solve problems in real-world contexts.

Students apply their knowledge of decimal fractions, place value, and the properties of operations to multiply decimals. Later in the unit, students revisit and make use of the pattern they discovered to make a generalization about the placement of the decimal in the product.

Students discover that place value and multiplication strategies work the same way with decimal operations as they do with whole number operations.

- Students can extend their understanding based on these explorations with decimal grids to generalize their methods and understanding. They move to the generalized area model, which serves as a template for their thinking and use of the Distributive Property and partial products. For example, consider 0.25 × 73.
- Students can decompose the factors by place value and set up the following area representation of the product. Now, if students explore further by finding the products 25 × 73, 2.5 × 73, 2.5 × 7.3, and 0.25 × 7.3, they can see that the number of decimal places in the product equals the total decimal places in the factors.

Coherence

What Students Have Learned

- Students used partial products to multiply multi-digit numbers. (Grade 4)
- Students used place value to round decimals. (Grade 5, Unit 3)
- Students identified patterns based on the placement of the decimal point when a decimal was multiplied by a power of 10. (Grade 5, Unit 5)
- Students multiplied multi-digit whole numbers. (Grade 5, Unit 5)
- Students estimated decimal products to determine if calculations were reasonable. (Grade 5, Unit 5)

What Students Are Learning

- Students use strategies based on place value to multiply decimals by powers of 10.
- Students estimate products of decimals to determine reasonable solutions.
- Students represent multiplication with decimals using decimal grids.
- Students use multiplication strategies to multiply decimals to hundredths.

What Students Will Learn

- Students estimate quotients of decimals. (Grade 5, Unit 8)
- Students use strategies to divide with decimals. (Grade 5, Unit 8)
- Students fluently multiply multi-digit decimals using the standard algorithm. (Grade 6)

Rigor

Conceptual Understanding

- Students develop understanding of multiplying decimals by powers of 10.
- Students build on their understanding of partial products and area models to multiply decimals.
- Students extend their understanding of place value to determine the product of two decimal factors.

Procedural Skill and Fluency

- Students develop proficiency in multiplying decimals to hundredths by powers of 10.
- Students use strategies used for multiplying whole numbers to build proficiency with multiplying decimals.
- Students increase proficiency with multiplying decimals by making generalizations about the product of decimal factors.

Application

- Students apply estimated products to successfully solve contextual, real-world problems.
- Students apply their understanding of multiplying using decimals to solve problems with real-world contexts.

Application is not a targeted element of rigor for the standards in this unit.

Effective Teaching Practices

Facilitate Meaningful Mathematical Discourse

In the mathematics classroom, student discourse is an interactive process of collaborative exploration, exchange of ideas, argumentation, and building of shared understanding. It is engaging, commands participation, and promotes deep learning. It is a tool the teacher uses to both ensure and confirm that learning is taking place.

Discourse can be verbal or written and enhanced through visuals. It takes place in a variety of settings and calls for student-student and student-teacher interaction. Student-student discourse allows students to take responsibility for their own learning and the learning of their peers. The student-teacher dynamic has the teacher playing more of a supporting role, making sure that the process follows a productive path. Classroom discourse can also be used to enrich the classroom experience for English language learners.

Each lesson in this program calls for discourse using the think-pair-share model and whole-class discussion. The teacher is a facilitator and performs the following actions—

- Engages students as they explore and share ideas and strategies with each other.
- Observes and gathers information about what students are doing and saying.
- Makes sure the discourse stays relevant to the lesson's goals and progresses toward a meaningful conclusion.

The student is a leader, partner, problem solver, and communicator, and performs the following actions—

- Presents and explains ideas, strategies, representations, and reasoning to peers.
- Seeks to understand the strategies, representations, and approaches of peers.

Math Practices and Processes

Attend to Precision

Attending to precision refers to any action or habit of being accurate, clear, and on point. For example, when students attend to precision, they use care in computations and check their answers, pay attention to units while reasoning about problems, use the clearest possible language to explain ideas, and label representations accurately to connect them to the quantities and relationships in problems. Teachers help students develop the habit of attending to precision by being accurate themselves in their discussions and by requiring it of them in all discourse and classroom activity.

To help students develop the habit of attending to precision, assign tasks that require precision and set clear expectations.

For example:

- Have students talk about their representations with area models and decimal grids.
- Have students discuss how they estimate products, how they know their estimates are reasonable, and how far away a reasonable answer could be from an estimate.
- Have students explain the thought process they use to label their area representations.
- Pay attention to whether and how students attend to the units in the problems they solve and ask them questions that lead to thinking about units.
- Have students describe the pattern they discovered in the position of the decimal point in products.

Social and Emotional Learning

What Skills Will We Develop?

- **Social Awareness – Empathy** (Lesson 6-1): Students who can empathize with others are more able to build positive relationships.
- **Relationship Skills – Build Relationships** (Lesson 6-2): Building positive relationships can help establish a strong classroom community.
- **Self-Awareness – Self-Confidence** (Lesson 6-3): Self-confident students are more willing to take risks, allowing them to learn from mistakes.
- **Self-Management – Manage Stress** (Lesson 6-4): Students who can regulate their stress are resilient and better prepared for academic success.
- **Responsible Decision-Making – Evaluate** (Lesson 6-5): When students evaluate their own logic and reasoning, they can develop understanding that helps them make informed decisions.
- **Social Awareness – Appreciate Diversity** (Lesson 6-6): When students appreciate diversity, they create a stronger, more inclusive classroom community.

Unit Overview

LOM Language of Math

Vocabulary

Students will be using these key terms in this unit.

- **Estimate –** (Lesson 6-2): Students were introduced to this term in the context of solving word problems involving all four operations. Have students discuss how estimation can help them evaluate the reasonableness of a solution.
- **Exponent –** (Lesson 6-1): Students are familiar with this term from their work with place value and expanded form. They know it as a raised number placed next to 10 to tell the number of factors of 10 needed to make products of 100, 1000, and so on. Students use the exponent to determine the number of zeros in those products.
- **Partial products –** (Lesson 6-4): Students were introduced to this term in the context of multiplication in Grade 4. They learned *partial* products as the terms they generate using the Distributive Property.
- **Range*** **–** (Lesson 6-2): Students are introduced to this term in the context of a range of numbers used for factor pairs. A range gives two numbers between which acceptable values fall.

*This is a new term.

MLD Math Language Development

A Focus on Reading

In many respects, reading in math is the same as reading in any academic discipline. In some ways, reading in math is different and requires different or additional strategies.

Consider these unique characteristics of mathematics text.

- Math text is conceptually dense. A single sentence or equation might communicate multiple layers of interdependent content.
- Math text looks different. It includes prose, equations, graphs, tables, symbols, and other means for communicating ideas.
- Math ideas in instructional texts are developed differently. They are developed in a logical progression with the conclusion at the end.
- Math is a language that uses many words common to everyday texts but with different meanings.
- Math requires students to interpret real-world contexts using abstract methods.

The teacher plays a supportive role. Instruction should give attention to the strategies that students can use to read the language more effectively. As a facilitator, interact with students before, while, and after they read.

Before reading—
- If the passage or problem has a title or other telling features, ask students to use them to predict what the content is about.
- Have students tell whether the passage or problem looks like anything they have encountered before.

While reading—
- Have students restate the content in their own words.
- Have students notice the ways that new ideas are built on familiar ones.

After reading—
- Check with students that the problem or passage makes sense to them.

EL English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to multiplying decimals. Because many of the words (using, cost, efficient), phrases (similar to), and structures (by + -ing verbs, if...[then]...) used in this unit could prove challenging to ELs, they are supported in understanding and using them so that the instruction is more accessible.

Lesson 6-1 – *using to express how*
Lesson 6-2 – *by* + *-ing* verbs to answer *how* questions
Lesson 6-3 – *costs*
Lesson 6-4 – *similar to*
Lesson 6-5 – *if...(then)...*
Lesson 6-6 – *efficient*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

What's Another Way to Write It?

Purpose: Build flexibility with number sense and mental math operations.

Overview: Given a number, students generate and share expressions using operations that, when evaluated, have the same value as the number. Students then look for relationships amongst the expressions.

About How Much?

Purpose: Build estimating skills.

Overview: Students estimate the value of expressions (with operations) shown, explaining their strategies and thinking. The teacher records students' estimates, then reveals the value of the expression. Students analyze the estimates and discuss which are closest to the actual value of the expression.

Find the Missing Values

Purpose: Build identification of patterns and efficiency with solving equations while examining a list of related equations.

Overview: Students analyze a series of equations to look for patterns that they can use to determine the missing values in the equations. As students share their analyses and solutions, the teacher can reveal the missing values.

Where Does It Go?

Purpose: Build estimating skills using benchmarks.

Overview: Students place a target number on number lines with different endpoints and justify their placement. In some instances, as a challenge, the target number may not actually belong on one of the number lines.

Sense-Making Routines

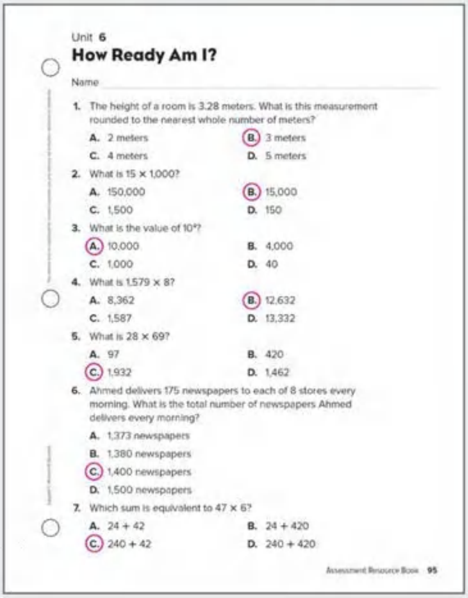
- **Notice & Wonder: What do you notice? What do you wonder?** (Lesson 6-1) In this lesson, students are presented with two sets of equations to think about multiplication and the patterns it creates.
- **Notice & Wonder: How are they the same? How are they different?** (Lesson 6-3) Students compare two dozen eggs to see how they are alike and how they are different.
- **Which Doesn't Belong?** (Lesson 6-4) Students explore the relationships between numbers with common digits but different place values to determine which value has the digits in a different order.
- **Is It Always True?** (Lesson 6-5) Students are provided with a scenario where they have to consider what happens to a product when a factor is multiplied by a power of ten.
- **Numberless Word Problem** (Lessons 6-2 and 6-6) Students are presented with a problem where they need to multiply decimals, but they are not given any numbers. They have to think through what information they would need and how they would solve the problem.

Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. For more information on the Math Language Routines, see the Appendix.

- Lesson 6-1 – Students participate in MLR2: Collect and Display and MLR1: Stronger and Clearer Each Time.
- Lesson 6-2 – Students participate in MLR5: Co-Craft Questions and Problems.
- Lesson 6-3 – Students participate in MLR8: Discussion Supports and MLR6: Three Reads.
- Lesson 6-4 – Students participate in MLR7: Compare and Connect.
- Lesson 6-5 – Students participate in MLR8: Discussion Supports and MLR7: Compare and Connect.
- Lesson 6-6 – Students participate in MLR1: Stronger and Clearer Each Time.

Readiness Diagnostic



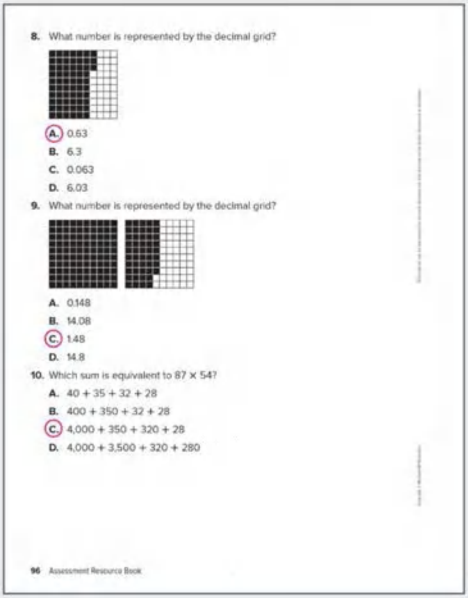
Unit 6

How Ready Am I?

Name ____________________

1. The height of a room is 3.28 meters. What is this measurement rounded to the nearest whole number of meters?
   A. 2 meters [✓ B.] 3 meters
   C. 4 meters D. 5 meters
2. What is 15 × 1,000?
   A. 150,000 [✓ B.] 15,000
   C. 1,500 D. 150
3. What is the value of 10^4?
   [✓ A.] 10,000 B. 4,000
   C. 1,000 D. 40
4. What is 1,579 × 8?
   A. 8,362 [✓ B.] 12,632
   C. 1,587 D. 13,332
5. What is 28 × 69?
   A. 97 B. 420
   [✓ C.] 1,932 D. 1,462
6. Ahmed delivers 175 newspapers to each of 8 stores every morning. What is the total number of newspapers Ahmed delivers every morning?
   A. 1,373 newspapers
   B. 1,380 newspapers
   [✓ C.] 1,400 newspapers
   D. 1,500 newspapers
7. Which sum is equivalent to 47 × 6?
   A. 24 + 42 B. 24 + 420
   [✓ C.] 240 + 42 D. 240 + 420

Assessment Resource Book 95



8. What number is represented by the decimal grid?
   [✓ A.] 0.63
   B. 6.3
   C. 0.063
   D. 6.03
9. What number is represented by the decimal grid?
   A. 0.148
   B. 14.08
   [✓ C.] 1.48
   D. 14.8
10. Which sum is equivalent to 87 × 54?
   A. 40 + 35 + 32 + 28
   B. 400 + 350 + 32 + 28
   [✓ C.] 4,000 + 350 + 320 + 28
   D. 4,000 + 3,500 + 320 + 280

96 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

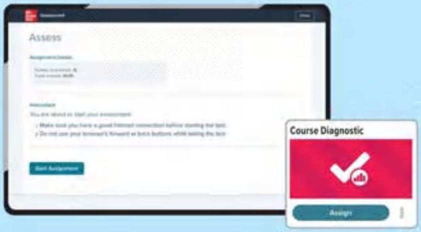
Targeted Intervention

Use Guided Support intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	2	Round to nearest whole number	Round Decimals to Nearest Whole > 1	5.NBT.A.4
2	2	Multiply by power of 10	Introduction to Powers of Ten	5.NBT.A.2
3	2	Powers of 10	Powers of 10 (Exponents)	5.NBT.A.2
4	2	Multiply 4-digit by 1-digit whole numbers	Multiply 4- by 1-Digit Numbers	4.NBT.B.5
5	2	Multiply 2-digit by 2-digit whole numbers	Partial Products (2- by 2-Digit Numbers)	4.NBT.B.5
6	2	Multiply 3-digit number by 1-digit number	Multiply 3- by 1-Digit Numbers	4.NBT.B.5
7	2	Multiplication as partial products	Multiply 2- by 1-Digit Numbers	4.NBT.B.5
8	1	Identify decimal number from decimal grid	Standard & Word Form (Large Numbers)	5.NBT.A.3
9	1	Identify decimal number from decimal grid	Standard & Word Form (Large Numbers)	5.NBT.A.3
10	2	Multiplication as partial products	Partial Products (2- by 2-Digit Numbers)	4.NBT.B.5

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.



Unit Opener

Focus Question

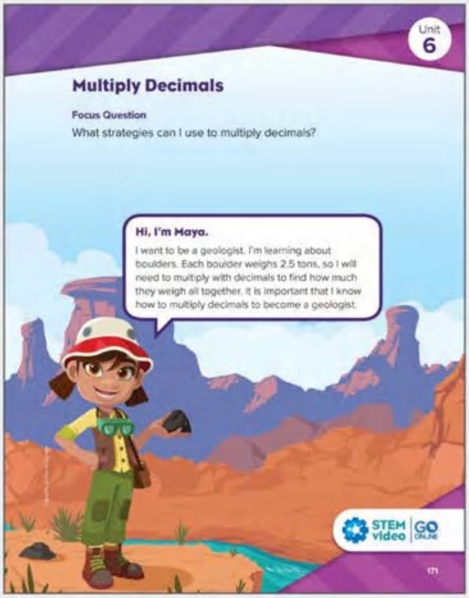
Introduce the Focus Question: *What strategies can I use to multiply decimals?* Ask students to think about what they know about multiplication.

- What strategies did you use to multiply whole numbers?
- How do you think multiplying decimals will be different?

Remind students that at the end of the unit, they will reflect back on what they learned in this unit.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.



Unit 6

Multiply Decimals

Focus Question

What strategies can I use to multiply decimals?

Hi, I'm Maya.

I want to be a geologist. I'm learning about boulders. Each boulder weighs 2.5 tons, so I will need to multiply with decimals to find how much they weigh all together. It is important that I know how to multiply decimals to become a geologist.

STEM in Action

Videos

Students can watch the two STEM videos.

STEM Career: Geologist Maya talks about her aspirations to be a geologist.

Maya Finds the Weight of Boulders Maya talks about how to find the weight of several boulders.

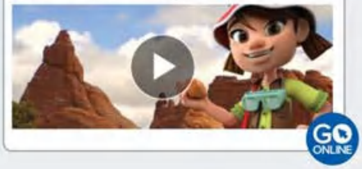
STEM Project Card

Students can complete the STEM Project Card during their workstation time.

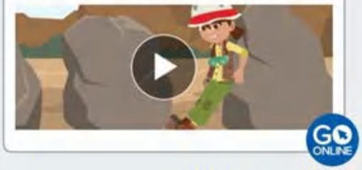
STEM Adventure

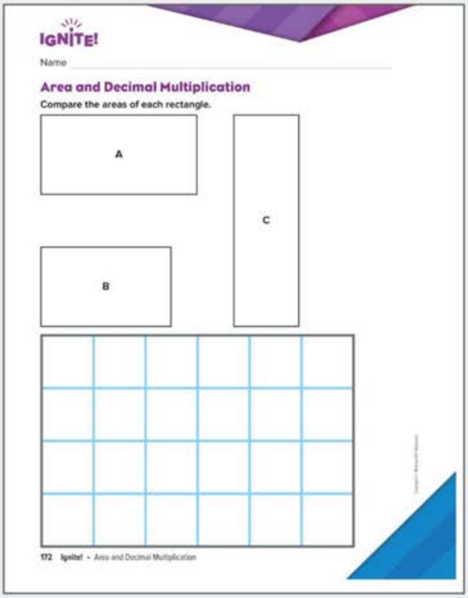
Students can complete the STEM Adventure during their workstation time.

STEM Career: Geologist



Maya Finds the Weight of Boulders





IGNITE!

Name

Area and Decimal Multiplication

Compare the areas of each rectangle.

172 Ignite! • Area and Decimal Multiplication

Ignite!

Area and Decimal Multiplication

Students apply their knowledge of area as they explore preliminary work with decimal multiplication and the intuitive placing of the decimal point in a product.

Materials: scissors, plain paper per student

1. Have students work in pairs to observe Rectangles A, B, and C.
   - Which rectangle do you think has the greatest area? Why?
   - Which rectangle do you think has the least area? Why?
2. Have students trace Rectangles A, B, and C onto their own paper. Then have students cut the copied rectangles and trace them onto the grid.
   - Each square on the grid paper has an area of 1 square unit. Use the grid paper to help you find out the area of each rectangle.
3. Select a few students to explain how they found the area of each rectangle. Make sure the class agrees on the area of each rectangle.
   - How did your original guesses compare with the areas that you found?
4. What are the dimensions of Rectangle A, using decimals?
   - To find 1.5 × 3, think: How much is 3, and half of 3 more?
   - How does that result compare to the area of Rectangle A that you traced on the grid paper?
5. Mention that if we were to multiply the dimensions of Rectangle A without regard to the decimal point, we would obtain 15 × 3 = 45.
   - Where would the decimal point need to go in 45 so that it matches the area of Rectangle A?
   - So, what is the product 1.5 × 3?
6. Repeat Steps 4 and 5 for Rectangles B and C.

   For Rectangle B, students observe that the product of the dimensions without regard to the decimal points is 15 × 25 = 375. Based on the area of Rectangle B, students should conclude that to find the product 1.5 × 2.5, they should place the decimal point between the 3 and the 7 to produce 3.75. So, 1.5 × 2.5 = 3.75.

   For Rectangle C, students observe that the product of the dimensions without regard to the decimal point is 125 × 4 = 500. Based on the area of Rectangle C, students should conclude that to find the product 1.25 × 4, they should place the decimal point between the 5 and the 0 to produce 5.00, or 5. So, 1.25× 4 = 5.00, or 5.

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

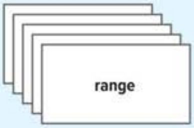
	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with multiplying decimals.	
		• **Multiply by Powers of 10 Showdown**	6-1
		• **Estimating Decimal Products Bingo**	6-2
		• **Decimal Multiplication Task Cards**	6-3
		• **Decimal Multiplication Tic Tac Toe**	6-4
		• **Related Decimal Multiplication Task Cards**	6-5
		• **Related Decimal Multiplication Task Cards**	6-6
Digital Station	Digital Game	**Mad Lab Mix-Up** Students multiply multi-digit numbers.	6-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**Rock Garden** Students use metric measurements to create a model of a rock garden.	6-6
	Connection Card	**School Spirit** Students use area and multiplication to create a school wall mural.	6-4
	Real World Card	**Move to the Left. Now Right!** Students create a maze and write step-by-step directions for getting through it.	6-3

Additional Resources

Use the resources below to provide additional support for this unit.

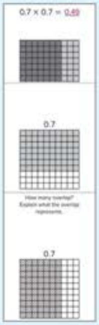
Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the new terms on the front side of the card.



Foldables

Use the unit foldables with Lessons 6-3 and 6-4.



Spiral Review

Students can complete the Spiral Review at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
6-1	5.MD.C.4
6-2	5.NBT.B.5
6-3	5.NBT.A.2
6-4	5.MD.C.3
6-5	5.NBT.A.1
6-6	5.NBT.B.7

LESSON **6-1**

Patterns When Multiplying Decimals by Powers of 10

Learning Targets

- I can use patterns to multiply a decimal by a power of 10.
- I can explain patterns when multiplying a decimal by a power of 10.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.A** Understand the place value system.

◇ **5.NBT.A.2** Explain patterns in the number of zeros of the product when multiplying a number by powers of 10, and explain patterns in the placement of the decimal point when a decimal is multiplied or divided by a power of 10. Use whole-number exponents to denote powers of 10.

Math Practices and Processes

MPP Attend to precision.

MPP Look for and make use of structure.

Vocabulary

Math Terms	Academic Terms
exponent	analyze
factor	reflect
product	

Materials

The materials may be for any part of the lesson.

- calculator
- number cubes: 1 whole number cube, 1 decimal cube
- place-value charts

Focus

Content Objectives	Language Objectives	SEL Objective
• Students use patterns to multiply a decimal by a power of 10. • Students explain patterns when multiplying a decimal by a power of 10.	• Students explain how to use patterns to multiply a decimal by a power of 10 with the gerund *using*. • To support maximizing linguistic and cognitive meta-awareness and optimizing output, ELs participate in MLR2: Collect and Display and MLR1: Stronger and Clearer Each time.	• Students recognize and work to understand the emotions of others and practice empathetic responses.

Coherence

Previous	Now	Next
• Students determined that a digit in one place represents ten times what it represents in the place to its right (Grade 4). • Students multiplied multi-digit whole numbers (Unit 5).	• Students use their knowledge to create strategies based on place value to multiply decimals by powers of 10.	• Students will estimate products of decimals to assess calculated solutions (Lesson 2). • Students will write and evaluate numerical expressions involving whole-number exponents (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students understand multiplying decimals by powers of 10 using strategies based on place value, properties of operations, and patterns in the powers of 10.	• Students develop proficiency in multiplying decimals to hundredths by powers of 10.	• Students apply their understanding to solve contextual problems. *Application is not a targeted element of rigor for this standard.*

Number Routine

What's Another Way to Write It?

5–7 min

Build Fluency Students build number sense as they write three different expressions equivalent to 13.75.

Remind students that there will be many different possible answers to the problem. As solutions are given, record them for students to evaluate and compare.

These prompts encourage students to talk about their reasoning:

- Which of the expressions that you wrote are related? Why?
- Explain how you can use one expression to create a new expression.
- Do you notice any patterns? Explain.

Launch 5–7 min

Sense-Making Routine

Purpose Students notice patterns of zeros when multiplying whole numbers by powers of 10 and consider whether that pattern extends to decimals.

Notice & Wonder

- What do you notice? What do you wonder?

Teaching Tip You may want to have students work in pairs as they notice and wonder. This can help build a productive question and ponder environment that fosters further points of notice and questions for exploration as they collaborate ideas.

ETP **Pose Purposeful Questions**

The questions that follow may be asked in any order. They are meant to help advance students' understanding of how to use patterns to multiply decimals by powers of 10 and are based on possible comments and questions students that may make during the share out.

- Do you think any patterns you noticed work for decimal numbers?
- How do think the patterns might work for decimal numbers?

Math is... Mindset

- How can working with your peers help when solving problems?

SEL **Social Awareness: Empathy**

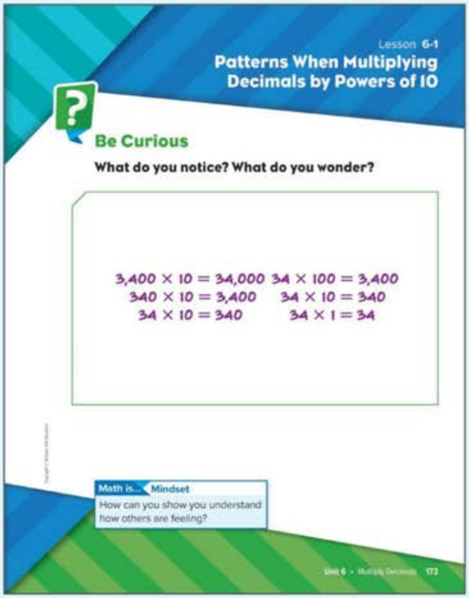
As students work through the Notice & Wonder routine, invite them to collaborate with peers to think about multiplication patterns. Encourage students to share ideas and work together to identify the problem, choose an appropriate model or strategy, and execute the steps necessary to solve the problem.

Transition to Explore & Develop

Have students think about multiplication patterns involving the relationship between the zeros and the powers of 10 as they consider the equations. Guide them toward discussing the effects on place value in the products.

ETP **Establish Mathematics Goals to Focus Learning**

- Let's think about how to use patterns to multiply decimals by powers of 10.



Lesson 6-1

Patterns When Multiplying Decimals by Powers of 10

Be Curious

What do you notice? What do you wonder?

$3{,}400 \times 10 = 34{,}000$ $34 \times 100 = 3{,}400$

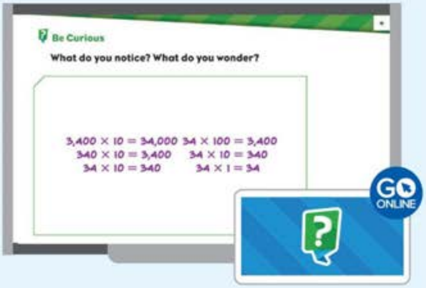
$340 \times 10 = 3{,}400$ $34 \times 10 = 340$

$34 \times 10 = 340$ $34 \times 1 = 34$

Math is... Mindset

How can you show you understand how others are feeling?

Unit 6 • Multiply Decimals 173



Be Curious

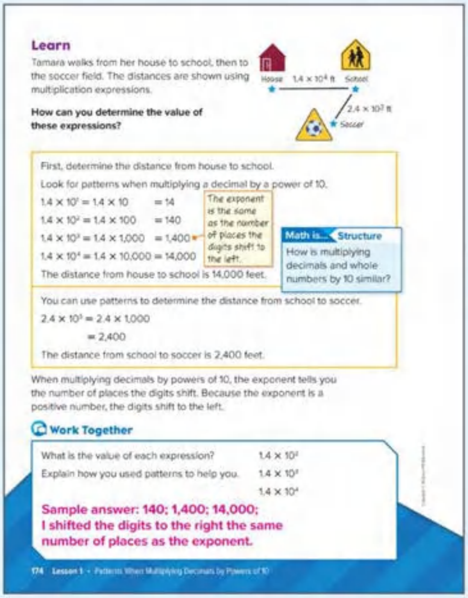
What do you notice? What do you wonder?

$3{,}400 \times 10 = 34{,}000$ $34 \times 100 = 3{,}400$

$340 \times 10 = 3{,}400$ $34 \times 10 = 340$

$34 \times 10 = 340$ $34 \times 1 = 34$

Explore & Develop 20 min



Learn

Tamara walks from her house to school, then to the soccer field. The distances are shown using multiplication expressions.

House 1.4×10^4 ft School

2.4×10^3 ft

Soccer

How can you determine the value of these expressions?

First, determine the distance from house to school.

Look for patterns when multiplying a decimal by a power of 10.

$1.4 \times 10^1 = 1.4 \times 10 = 14$

$1.4 \times 10^2 = 1.4 \times 100 = 140$

$1.4 \times 10^3 = 1.4 \times 1{,}000 = 1{,}400$

$1.4 \times 10^4 = 1.4 \times 10{,}000 = 14{,}000$

The exponent is the same as the number of places the digits shift to the left.

The distance from house to school is 14,000 feet.

Math is... Structure

How is multiplying decimals and whole numbers by 10 similar?

You can use patterns to determine the distance from school to soccer.

$2.4 \times 10^3 = 2.4 \times 1{,}000$

$= 2{,}400$

The distance from school to soccer is 2,400 feet.

When multiplying decimals by powers of 10, the exponent tells you the number of places the digits shift. Because the exponent is a positive number, the digits shift to the left.

Work Together

What is the value of each expression? Explain how you used patterns to help you.

1.4×10^2

1.4×10^3

1.4×10^4

Sample answer: 140; 1,400; 14,000; I shifted the digits to the right the same number of places as the exponent.

174 Lesson 1 • Patterns When Multiplying Decimals by Powers of 10

❶ Pose the Problem

MLR Collect and Display

As students discuss the questions, make a list of key words and phrases you hear, such as *exponent, factor, product, place-value, decimals,* and *patterns*. Display the list and use these expressions to help students connect words they already know and math vocabulary.

ETP Pose Purposeful Questions

- Will the powers of 10 represent large or small values? Explain.
- What techniques did you use to solve similar problems in the past?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and have them work together to solve a problem multiplying by powers of 10. Have them individually write sentences explaining how they used patterns to help them solve the problem. Then have them share their writing with their partner, and if needed, refine their writing. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How would you explain to someone what multiplying a decimal by a power of 10 does to the digits in the number?

Key Takeaway

- Multiplying a decimal by a power of 10 results in a discernable pattern – the digits of the decimal shift left the same number of places as the power.

Work Together

Students use their knowledge of multiplication patterns involving powers of 10 to find the value of three expressions. Students can work on the activity in pairs before sharing their work.

Common Error Students may be tempted to ignore the decimal point and add the number of zeros equal to the exponent to the end of the number. Invite students to ask, “Does this make sense?” if they are making this error.

LOM Language of Math

Remind students that, while they might use the word *power* in daily conversation to describe a superhero or electricity, *power* has a specific mathematical meaning, too. Explain that 10^5 can be read “10 to the fifth power.”

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore place-value patterns when multiplying by powers of 10 and use their patterns to multiply decimals by powers of 10.

Materials: calculator

Directions: Students enter any decimal number on the calculator (e.g. 1.45), then multiply their decimal by 10. Have them predict the product before they press the equal key. Students continue to multiply by 10 mentally, challenging themselves to predict the product before they press the equal key.

ETP Implement Tasks That Promote Reasoning and Problem Solving

- How did you use mental math to predict the product?
- What happens to the digits each time the number is multiplied by 10?
- What are some ways to record your work to look for patterns?
- How could you summarize the results to predict how multiplying a decimal by a power of 10 affects the decimal value?

Math is... Structure

- How are multiplying decimals and whole numbers by 10 similar?

Students use patterns to connect what happens when whole numbers are multiplied by a power of 10 to what happens when decimals are multiplied by a power of 10.

Activity Debrief: Have students share their findings when repeatedly multiplying by 10. Encourage students to write their multiplication expressions by writing the powers of 10 in exponential form. Discuss the relationship between the exponent and the number of places the digits shifted.

Have students revisit the Pose the Problem question and discuss answers.

- How can you determine the value of these expressions?

Guided Exploration

Students write out the factors of 10 to multiply a decimal by a power of 10 to explore and recognize patterns.

ETP Facilitate Meaningful Mathematical Discourse

Have the students find the product of 1.4 and 10. Ask:

- How can you use decimal grids, equal groups, or place value to find the product?

Have the students find the product of 14 and 10^4. Ask:

- How can you use the patterns you have seen to find the product?

- **Think About It:** Can you think of additional ways to write 1.4×10^4?

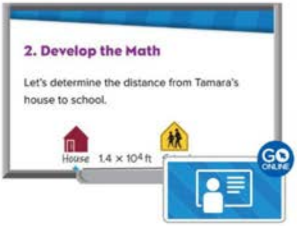
Have the students justify the ways of writing 2.4×10^3. Ask:

- What is the exponent? How do you know?
- How many zeros will there be? How do you know?
- What happens to the digits in 24?

Math is... Structure

- How are multiplying decimals and whole numbers by 10 similar?

Students use patterns to connect what happens when whole numbers are multiplied by a power of 10 to what happens when decimals are multiplied by a power of 10.



2. Develop the Math

Let's determine the distance from Tamara's house to school.

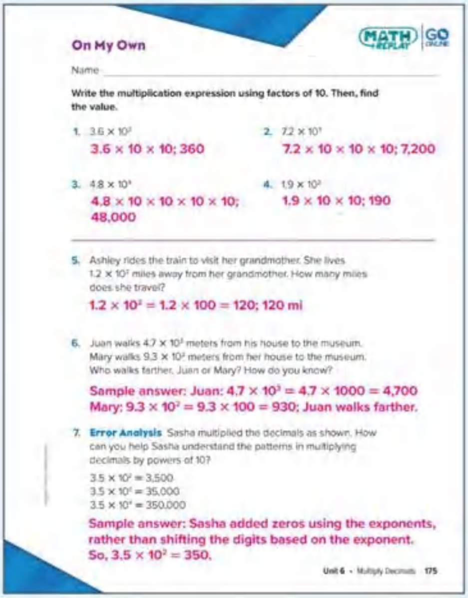
EL English Learner Scaffolds

Entering/Emerging Support students in understanding how the gerund *using* signals how to do something. Using manipulatives, say *I can show how to* [name a task] *using* [your manipulatives]. Demonstrate. Repeat the task twice, once using a correct object to show how to do something, and once using an incorrect object. Ask, *Can I show how to [name task] using this?*

Developing/Expanding Support students in understanding how the gerund *using* signals how to do something. Using manipulatives, say *I can show how to* [name a task] *using* [your manipulatives]. Demonstrate. Repeat the task twice, once using a correct object to show how to do something, and once using an incorrect object. Ask, Can I show how to [name task] using this? Then ask students to make their own sentence with *using*. Provide sentence frames for students who need extra guidance.

Bridging/Reaching Instruct students to use the gerund *using* in their response to the Math Is...Structure question on the Learn page. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding, and explaining why something may be incorrect. For example, *No, that's wrong because.... or No, that's incorrect because....*

Practice & Reflect 10 min



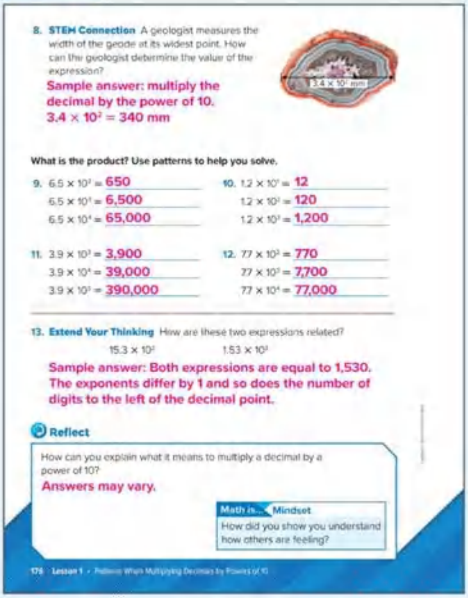
On My Own

Name ______

Write the multiplication expression using factors of 10. Then, find the value.

1. 3.6×10^2
   $3.6 \times 10 \times 10$; 360
2. 7.2×10^3
   $7.2 \times 10 \times 10 \times 10$; 7,200
3. 4.8×10^4
   $4.8 \times 10 \times 10 \times 10 \times 10$; 48,000
4. 1.9×10^2
   $1.9 \times 10 \times 10$; 190
5. Ashley rides the train to visit her grandmother. She lives 1.2×10^2 miles away from her grandmother. How many miles does she travel?
   $1.2 \times 10^2 = 1.2 \times 100 = 120$; 120 mi
6. Juan walks 4.7×10^3 meters from his house to the museum. Mary walks 9.3×10^2 meters from her house to the museum. Who walks farther, Juan or Mary? How do you know?
   Sample answer: Juan: $4.7 \times 10^3 = 4.7 \times 1000 = 4{,}700$
   Mary: $9.3 \times 10^2 = 9.3 \times 100 = 930$; Juan walks farther.
7. **Error Analysis** Sasha multiplied the decimals as shown. How can you help Sasha understand the patterns in multiplying decimals by powers of 10?
   $3.5 \times 10^2 = 3{,}500$
   $3.5 \times 10^3 = 35{,}000$
   $3.5 \times 10^4 = 350{,}000$
   Sample answer: Sasha added zeros using the exponents, rather than shifting the digits based on the exponent. So, $3.5 \times 10^2 = 350$.

Unit 6 • Multiply Decimals 175



8. **STEM Connection** A geologist measures the width of the geode at its widest point. How can the geologist determine the value of the expression?
   Sample answer: multiply the decimal by the power of 10.
   $3.4 \times 10^2 = 340$ mm

What is the product? Use patterns to help you solve.

9. $6.5 \times 10^2 =$ 650
   $6.5 \times 10^3 =$ 6,500
   $6.5 \times 10^4 =$ 65,000
10. $1.2 \times 10^1 =$ 12
    $1.2 \times 10^2 =$ 120
    $1.2 \times 10^3 =$ 1,200
11. $3.9 \times 10^3 =$ 3,900
    $3.9 \times 10^4 =$ 39,000
    $3.9 \times 10^5 =$ 390,000
12. $7.7 \times 10^2 =$ 770
    $7.7 \times 10^3 =$ 7,700
    $7.7 \times 10^4 =$ 77,000
13. **Extend Your Thinking** How are these two expressions related?
    15.3×10^2 1.53×10^3
    Sample answer: Both expressions are equal to 1,530. The exponents differ by 1 and so does the number of digits to the left of the decimal point.

Reflect

How can you explain what it means to multiply a decimal by a power of 10?

Answers may vary.

Math is... Mindset

How did you show you understand how others are feeling?

176 Lesson 1 • Patterns When Multiplying Decimals by Powers of 10

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 1–4 Students may confuse the notation for multiplication with factors of 10 with the normal order of operations. Watch for students first multiplying the value by 10, and then raising the result to the given power. You may want to remind students that the exponent is only applied to the 10, and not the entire expression.

Item Analysis

Item	DOK	Rigor
1–4	1	Procedural Skill and Fluency
5–8	2	Application
9–12	1	Procedural Skill and Fluency
13	4	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you explain what it means to multiply a decimal by a power of 10?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did working with your peers help when solving problems?

Students reflect on how they practiced social awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use patterns to multiply a decimal by a power of 10.
- I can explain patterns when multiplying a decimal by a power of 10.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Multiplying decimals by powers of 10	5.NBT.A.2
2	2	Multiplying decimals by powers of 10	5.NBT.A.2
3	2	Multiplying decimals by powers of 10	5.NBT.A.2
4	2	Multiplying decimals by powers of 10	5.NBT.A.2

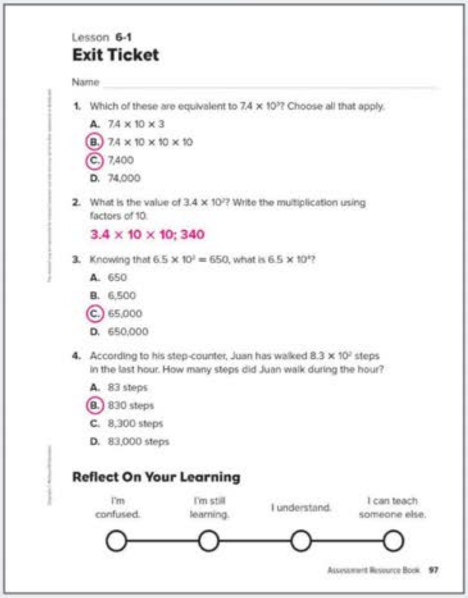
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the Ⓑ or Ⓔ activities
3 of 4	*Take Another Look* or any of the Ⓑ activities
2 or fewer of 4	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 6-1

Exit Ticket

Name

1. Which of these are equivalent to 7.4×10^3? Choose all that apply.
   - A. $7.4 \times 10 \times 3$
   - [✓ B.] $7.4 \times 10 \times 10 \times 10$
   - [✓ C.] 7,400
   - D. 74,000
2. What is the value of 3.4×10^2? Write the multiplication using factors of 10.

   $3.4 \times 10 \times 10$; 340
3. Knowing that $6.5 \times 10^2 = 650$, what is 6.5×10^4?
   - A. 650
   - B. 6,500
   - [✓ C.] 65,000
   - D. 650,000
4. According to his step-counter, Juan has walked 8.3×10^2 steps in the last hour. How many steps did Juan walk during the hour?
   - A. 83 steps
   - [✓ B.] 830 steps
   - C. 8,300 steps
   - D. 83,000 steps

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

Assessment Resource Book 97

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Multiply with Decimals!

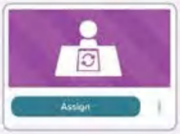
Work with students in small groups. Provide each group with a decimal number cube labeled with tenths and a whole number cube. The number rolled on the whole number cube will represent the power of 10. A student rolls both number cubes. All students multiply the two numbers (such as 0.2×10^5). If necessary, help students write the expression without the exponents to see the pattern. Have students repeat the steps until each one has had a turn to roll the cubes.

GO ONLINE

Take Another Look Lesson

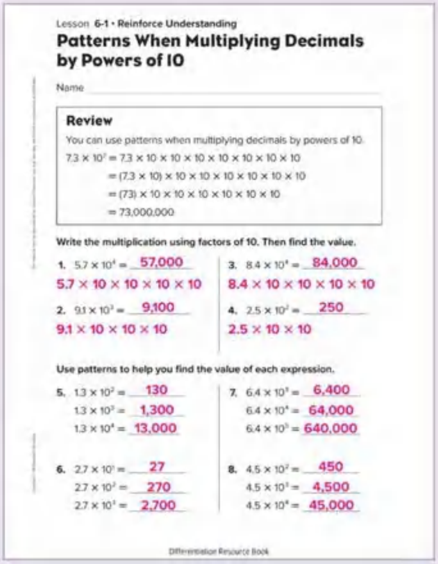
Assign the interactive lesson to reinforce targeted skills.

- Multiply by Powers of 10 (Decimal Point)



INDEPENDENT WORK

Differentiation Resource Book, p. 51



Lesson **6-1 • Reinforce Understanding**

Patterns When Multiplying Decimals by Powers of 10

Name

Review

You can use patterns when multiplying decimals by powers of 10.

$7.3 \times 10^7 = 7.3 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

$= (7.3 \times 10) \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

$= (73) \times 10 \times 10 \times 10 \times 10 \times 10 \times 10$

$= 73{,}000{,}000$

Write the multiplication using factors of 10. Then find the value.

1. $5.7 \times 10^4 =$ 57,000
5.7 × 10 × 10 × 10 × 10

2. $9.1 \times 10^3 =$ 9,100
9.1 × 10 × 10 × 10

3. $8.4 \times 10^4 =$ 84,000
8.4 × 10 × 10 × 10 × 10

4. $2.5 \times 10^2 =$ 250
2.5 × 10 × 10

Use patterns to help you find the value of each expression.

5. $1.3 \times 10^2 =$ 130
$1.3 \times 10^3 =$ 1,300
$1.3 \times 10^4 =$ 13,000

6. $2.7 \times 10^1 =$ 27
$2.7 \times 10^2 =$ 270
$2.7 \times 10^3 =$ 2,700

7. $6.4 \times 10^3 =$ 6,400
$6.4 \times 10^4 =$ 64,000
$6.4 \times 10^5 =$ 640,000

8. $4.5 \times 10^2 =$ 450
$4.5 \times 10^3 =$ 4,500
$4.5 \times 10^4 =$ 45,000

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multiply by Powers of 10 Showdown

Students practice multiplication of decimals.

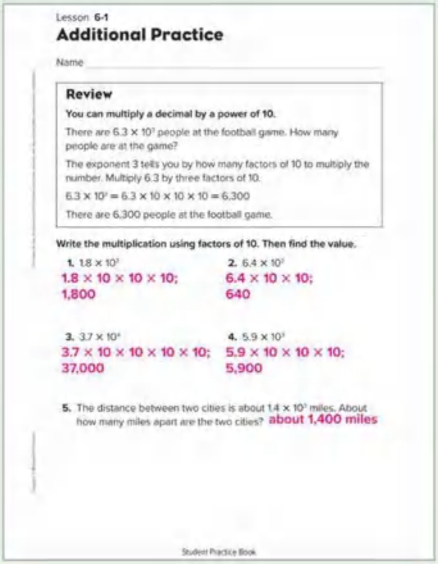
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 51–52



Lesson **6-1**

Additional Practice

Name

Review

You can multiply a decimal by a power of 10.

There are 6.3×10^3 people at the football game. How many people are at the game?

The exponent 3 tells you by how many factors of 10 to multiply the number. Multiply 6.3 by three factors of 10.

$6.3 \times 10^3 = 6.3 \times 10 \times 10 \times 10 = 6{,}300$

There are 6,300 people at the football game.

Write the multiplication using factors of 10. Then find the value.

1. 1.8×10^3
1.8 × 10 × 10 × 10;
1,800

2. 6.4×10^2
6.4 × 10 × 10;
640

3. 3.7×10^4
3.7 × 10 × 10 × 10 × 10;
37,000

4. 5.9×10^3
5.9 × 10 × 10 × 10;
5,900

5. The distance between two cities is about 1.4×10^3 miles. About how many miles apart are the two cities? about 1,400 miles

Student Practice Book

Own It! Digital Station

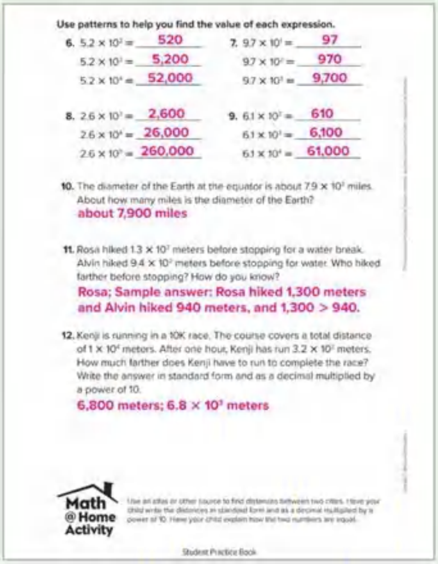
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication of multi-digit numbers.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 51–52



Use patterns to help you find the value of each expression.

6. $5.2 \times 10^2 =$ 520
$5.2 \times 10^3 =$ 5,200
$5.2 \times 10^4 =$ 52,000

7. $9.7 \times 10^1 =$ 97
$9.7 \times 10^2 =$ 970
$9.7 \times 10^3 =$ 9,700

8. $2.6 \times 10^3 =$ 2,600
$2.6 \times 10^4 =$ 26,000
$2.6 \times 10^5 =$ 260,000

9. $6.1 \times 10^2 =$ 610
$6.1 \times 10^3 =$ 6,100
$6.1 \times 10^4 =$ 61,000

10. The diameter of the Earth at the equator is about 7.9×10^3 miles. About how many miles is the diameter of the Earth?
about 7,900 miles

11. Rosa hiked 1.3×10^3 meters before stopping for a water break. Alvin hiked 9.4×10^2 meters before stopping for water. Who hiked farther before stopping? How do you know?
Rosa; Sample answer: Rosa hiked 1,300 meters and Alvin hiked 940 meters, and 1,300 > 940.

12. Kenji is running in a 10K race. The course covers a total distance of 1×10^4 meters. After one hour, Kenji has run 3.2×10^3 meters. How much farther does Kenji have to run to complete the race? Write the answer in standard form and as a decimal multiplied by a power of 10.
6,800 meters; 6.8×10^3 meters

Math @ Home Activity Use an atlas or other source to find distances between two cities. Have your child write the distances in standard form and as a decimal multiplied by a power of 10. Have your child explain how the two numbers are equal.

Student Practice Book

Extend Thinking

WORKSTATIONS

Use It! Application Station

Move to the Left. Now Right! Students create a maze and write step-by-step directions for getting through the maze. *The content of this card has concepts covered later in Lesson 6-3. You may want to assign this card to students ready to explore content covered later in this unit.*

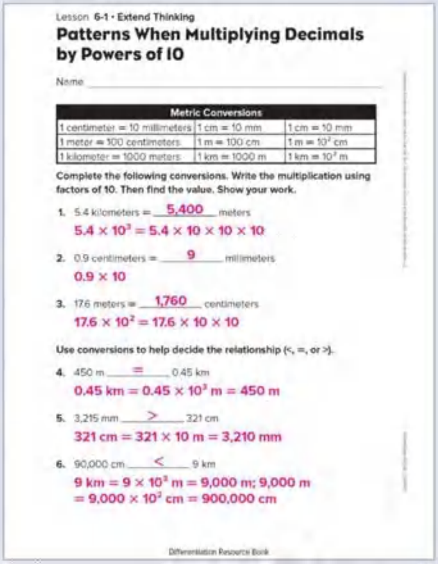
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 52



Lesson **6-1 • Extend Thinking**

Patterns When Multiplying Decimals by Powers of 10

Name ______________________

Metric Conversions		
1 centimeter = 10 millimeters	1 cm = 10 mm	1 cm = 10 mm
1 meter = 100 centimeters	1 m = 100 cm	1 m = 10^2 cm
1 kilometer = 1000 meters	1 km = 1000 m	1 km = 10^3 m

Complete the following conversions. Write the multiplication using factors of 10. Then find the value. Show your work.

1. 5.4 kilometers = 5,400 meters
$5.4 \times 10^3 = 5.4 \times 10 \times 10 \times 10$

2. 0.9 centimeters = 9 millimeters
0.9×10

3. 17.6 meters = 1,760 centimeters
$17.6 \times 10^2 = 17.6 \times 10 \times 10$

Use conversions to help decide the relationship (<, =, or >).

4. 450 m = 0.45 km
$0.45 \text{ km} = 0.45 \times 10^3 \text{ m} = 450 \text{ m}$

5. 3,215 mm > 321 cm
$321 \text{ cm} = 321 \times 10 \text{ m} = 3{,}210 \text{ mm}$

6. 90,000 cm < 9 km
$9 \text{ km} = 9 \times 10^3 \text{ m} = 9{,}000 \text{ m}; 9{,}000 \text{ m}$
$= 9{,}000 \times 10^2 \text{ cm} = 900{,}000 \text{ cm}$

Differentiation Resource Book

LESSON **6-2**

Estimate Products of Decimals

Learning Targets

- I can explain how to estimate products of two decimals.
- I can use an estimated product to make predictions about a calculated solution.
- I can estimate products of decimals to assess if calculations are reasonable.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
estimate	cite
range	speculate
round	

Materials

The materials may be for any part of the lesson.

- *Blank Open Number Lines* Teaching Resource
- number cubes

Focus

Content Objectives	Language Objectives	SEL Objective
• Students estimate products of decimals. • Students use estimated products to make predictions about a calculated solution. • Students use estimated products to assess the reasonableness of a calculated solution.	• Students discuss how to estimate products of two decimals using *by* + gerund. • To support optimizing output, ELs participate in MLR5: Co-Craft Questions and Problems.	• Students engage in active listening and work collaboratively with a partner to complete mathematical tasks.

Coherence

Previous	Now	Next
• Students added and subtracted multi-digit whole numbers (Grade 4). • Students created place-value strategies to multiply decimals by powers of 10 (Lesson 1).	• Students estimate products of decimals to assess if calculated solutions are reasonable.	• Students will represent multiplication of decimals using decimal grids (Lesson 3). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students extend their understanding of estimation as a strategy for determining whether products are reasonable.	• Students build proficiency estimating products of decimals.	• Students find products to solve real-world problems. *Application is not a targeted element of rigor for this standard.*

GO ONLINE

Number Routine About How Much

5–7 min

Build Fluency Students build number sense as they estimate the difference of two 2-digit decimal numbers.

Remind students that this is a mental activity, and exact answers are not needed.

These prompts encourage students to talk about their reasoning:

- How did you determine your estimate?
- Was your strategy the same or different for each expression? Why?
- What is a different way you could estimate the difference?

Launch 5–7 min

Sense-Making Routine

Purpose Students realize they need the price of gas per gallon, the number of gallons she needs, how much money she has, and to estimate a product of decimals to solve the problem.

Numberless Word Problem

- What math do you see in this problem?

Teaching Tip You may want to have students to first come up with their own noticing and wondering. Then have students form small discussion groups where they can share their comments and questions about the map.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of how to estimate products of decimals and are based on possible comments and questions that students may make during the share out.

- What operation would you use to solve this problem? Explain.
- Do you need an exact answer to solve this problem? Explain why or why not?

Math is… Mindset

- What are some ways you or your classmates can contribute to the group today?

SEL Relationship Skills: Build Relationships

Help students identify and understand the value of their role(s) within the class community. As students collaborate in small groups to complete the Numberless Word Problem routine, invite each student to acknowledge the value of each group member. As students discuss what they notice and wonder, have them identify their peers' as well as their own contributions to the collaborative group effort.

Transition to Explore & Develop

Ask questions to get students thinking about the uses of estimates. Guide the discussion to have students think about reasonableness. Students might notice that different estimating strategies will lead to different estimates, and if so, allow it to become part of the conversation.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we might estimate the product of two decimals, and how we could use the estimate.

Lesson 6-2
Estimate Products of Decimals

Be Curious

What math do you see in this problem?

Sadie goes to a gas station to fill up her car. About how much money will she pay?

Math is… Mindset
What are some ways to build a positive relationship with classmates?

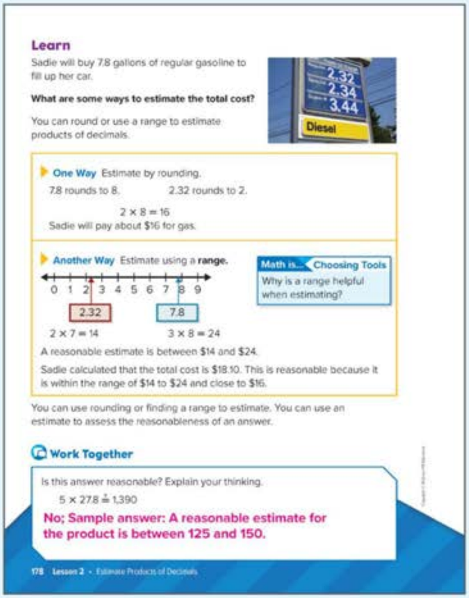
Unit 6 • Multiply Decimals 177

Be Curious

What math do you see in this problem?

Sadie goes to a gas station to fill up her car. About how much money will she pay?

Explore & Develop 20 min



Learn

Sadie will buy 7.8 gallons of regular gasoline to fill up her car.

What are some ways to estimate the total cost?

You can round or use a range to estimate products of decimals.

One Way Estimate by rounding.

7.8 rounds to 8. 2.32 rounds to 2.

$2 \times 8 = 16$

Sadie will pay about $16 for gas.

Another Way Estimate using a **range.**

$2 \times 7 = 14$ $3 \times 8 = 24$

A reasonable estimate is between $14 and $24.

Sadie calculated that the total cost is $18.10. This is reasonable because it is within the range of $14 to $24 and close to $16.

Math is... Choosing Tools

Why is a range helpful when estimating?

You can use rounding or finding a range to estimate. You can use an estimate to assess the reasonableness of an answer.

Work Together

Is this answer reasonable? Explain your thinking.

$5 \times 27.8 \doteq 1{,}390$

No; Sample answer: A reasonable estimate for the product is between 125 and 150.

❶ Pose the Problem

ETP Pose Purposeful Questions

- Why might Sadie want to estimate the total cost?
- How will the total cost be related to the price per gallon and number of gallons?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Co-Craft Questions and Problems

Pair students and have them co-create and solve a problem similar to the one on the Learn page, then trade their problem with another pair. After each pair solves the other pair's problems, have them form a group of four to check solutions and correct any mistake. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How can you use estimates when multiplying decimals?
- How is estimating the products of whole numbers similar to estimating the products of decimal numbers? How is it different?

Key Takeaways

- Estimating products helps make predictions about a calculated solution.
- Estimating products helps assess the reasonableness of a calculated solution.
- Strategies used to estimate products of whole numbers, such as rounding, compatible numbers, and front-end estimation, can also be used to estimate products of decimals.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of how to assess the reasonableness of the product of decimals. Have students work on the activity in pairs before asking them to explain whether the answer provided is reasonable.

Common Error Students may miss the decimal point in 27.8 and round 278 to 280 or 300 to estimate the product instead of multiplying 5 by 27, 28, or 30.

LOM Language of Math

Have students share examples of situations in their life outside of school where they make estimates and how they make them. Make sure tthey include math language like *rounding* or *compatible numbers,* and use it correctly.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore whether an estimated product is greater than or less than an actual product based on comparing factors.

Directions: Display an expression, such as 5.6 × 3.9. For each of the estimates below have students decide whether the product will be greater than or less than the calculated solution. Students should explain their reasoning.

5 × 3	6 × 3
5 × 4	6 × 4

ETP Support Productive Struggle

- How can you make an estimate that you know is greater than the calculated product?
- How can you make an estimate that you know is less than the calculated product?

Activity Debrief: Have students share their ideas about the estimated products. Facilitate a discussion to ensure that students understand that one estimate (6 × 4) is determined by rounding both factors to the nearest whole number. Two estimates (5 × 3 and 6 × 4) create a *range* for reasonable calculated products.

Math is... Choosing Tools

- Why is a range helpful when estimating?

Students detect possible errors by strategically using estimation and other mathematical knowledge.

Have students revisit the Pose the Problem question and discuss answers.

- What are some ways to estimate the total cost?

Guided Exploration

Students build on their understanding of multiplication of whole numbers to estimate products of two decimals.

ETP Facilitate Meaningful Mathematical Discourse

- **Think About It:** What strategies do you know for estimating?
- How would you estimate the product of whole numbers?
- Explain why 7.8 rounds to 8 and 2.32 rounds to 2.

Have the students create the equation after rounding. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Make available the *Blank Open Number Lines* Teaching Resource for students to use as a tool to help them estimate. Ask:

- Between which two whole numbers is 2.32? How do you know?
- Between which two whole numbers is 7.8? How do you know?

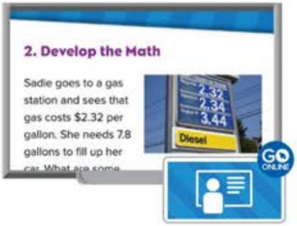
Have the students use their estimate to assess the reasonableness of a calculated solution. Ask:

- If Sadie calculated the total cost to be $18.10, is her calculated solution reasonable? Why or why not?

Math is... Choosing Tools

- Why is a range helpful when estimating?

Students detect possible errors by strategically using estimation and other mathematical knowledge.



2. Develop the Math

Sadie goes to a gas station and sees that gas costs $2.32 per gallon. She needs 7.8 gallons to fill up her car. What are some

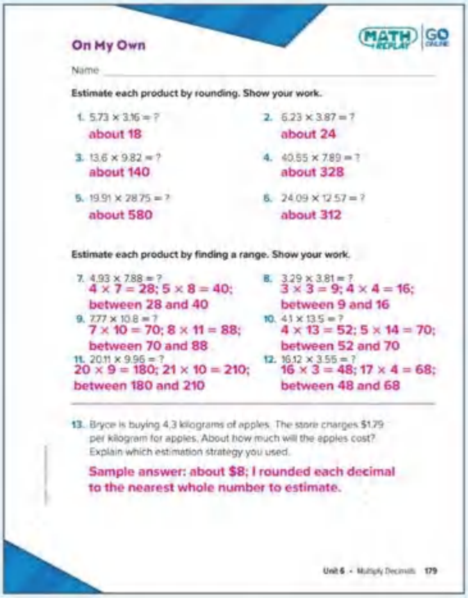
EL English Learner Scaffolds

Entering/Emerging Support students in understanding how to use by + —*ing* by expanding on what students learned using the gerund *using* in Lesson 1. Show students two tens rods. Say, *I can make twenty by connecting two tens rods.* Connect the two rods. Repeat the task twice with new objects, using *by* + *ing*. Finally, put a group of fifteen chips on the table. Write the following two sentences on the board: *I can find out how many by counting the chips. I can find out how many by count the chips.* Ask *Which is correct?* Accept pointing.

Developing/Expanding Support students in understanding how to use *by* + —*ing* by expanding on what students learned using the gerund *using* in Lesson 1. Show students two tens rods. Say, *I can make twenty by connecting two tens rods.* Connect the two rods. Repeat the task twice with new objects, using *by* + *ing*. Next, put a group of fifteen chips on the table. Provide the following sentence frame: *I can find out how many*___ (counting) *the chips*. Finally, have students find an example of this structure on the Learn page. ([*You can*] *estimate by rounding.*)

Bridging/Reaching Instruct students to explain how to do something using *by* + —*ing*. Allow students to interject, pointing out any mistakes that they may catch in structure, meaning or understanding. For example, *No, you forgot to use by.... or No, you didn't use....*

Practice & Reflect 10 min



On My Own

Name ______

Estimate each product by rounding. Show your work.

1. $5.73 \times 3.16 = ?$ about 18
2. $6.23 \times 3.87 = ?$ about 24
3. $13.6 \times 9.82 = ?$ about 140
4. $40.55 \times 7.89 = ?$ about 328
5. $19.91 \times 28.75 = ?$ about 580
6. $24.09 \times 12.57 = ?$ about 312

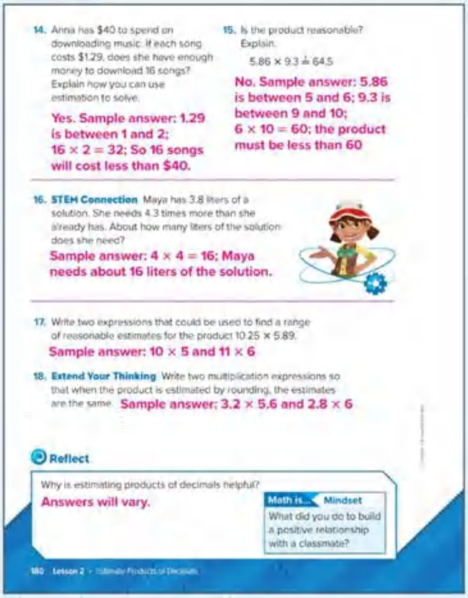
Estimate each product by finding a range. Show your work.

7. $4.93 \times 7.88 = ?$ $4 \times 7 = 28$; $5 \times 8 = 40$; between 28 and 40
8. $3.29 \times 3.81 = ?$ $3 \times 3 = 9$; $4 \times 4 = 16$; between 9 and 16
9. $7.77 \times 10.8 = ?$ $7 \times 10 = 70$; $8 \times 11 = 88$; between 70 and 88
10. $4.1 \times 13.5 = ?$ $4 \times 13 = 52$; $5 \times 14 = 70$; between 52 and 70
11. $20.11 \times 9.96 = ?$ $20 \times 9 = 180$; $21 \times 10 = 210$; between 180 and 210
12. $16.12 \times 3.55 = ?$ $16 \times 3 = 48$; $17 \times 4 = 68$; between 48 and 68

13. Bryce is buying 4.3 kilograms of apples. The store charges $1.79 per kilogram for apples. About how much will the apples cost? Explain which estimation strategy you used.

Sample answer: about $8; I rounded each decimal to the nearest whole number to estimate.

Unit 6 • Multiply Decimals 179



14. Anna has $40 to spend on downloading music. If each song costs $1.29, does she have enough money to download 16 songs? Explain how you can use estimation to solve.

Yes. Sample answer: 1.29 is between 1 and 2; $16 \times 2 = 32$; So 16 songs will cost less than $40.

15. Is the product reasonable? Explain.

$5.86 \times 9.3 \stackrel{?}{=} 64.5$

No. Sample answer: 5.86 is between 5 and 6; 9.3 is between 9 and 10; $6 \times 10 = 60$; the product must be less than 60

16. **STEM Connection** Maya has 3.8 liters of a solution. She needs 4.3 times more than she already has. About how many liters of the solution does she need?

Sample answer: $4 \times 4 = 16$; Maya needs about 16 liters of the solution.

17. Write two expressions that could be used to find a range of reasonable estimates for the product 10.25×5.89.

Sample answer: 10×5 and 11×6

18. **Extend Your Thinking** Write two multiplication expressions so that when the product is estimated by rounding, the estimates are the same. Sample answer: 3.2×5.6 and 2.8×6

Reflect

Why is estimating products of decimals helpful?

Answers will vary.

Math is... Mindset

What did you do to build a positive relationship with a classmate?

180 Lesson 2 • Estimate Products of Decimals

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 7–12 Students may round each factor to the nearest whole number rather than thinking about which two whole numbers the decimals falls between.

Item Analysis

Item	DOK	Rigor
1–12	1	Procedural Skill and Fluency
13–14	2	Application
15	2	Conceptual Understanding
16	2	Application
17–18	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- Why is estimating products of decimals helpful?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you or your classmates contribute to the group today?

Students reflect on how they developed stronger relationship skills.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain how to estimate products of two decimals.
- I can use an estimated product to make predictions about a calculated solution.
- I can estimate products of decimals to assess if calculations are reasonable.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Estimating products of decimals	5.NBT.B.7
2	2	Estimating products of decimals	5.NBT.B.7
3	2	Estimating products of decimals	5.NBT.B.7
4	2	Estimating products of decimals	5.NBT.B.7

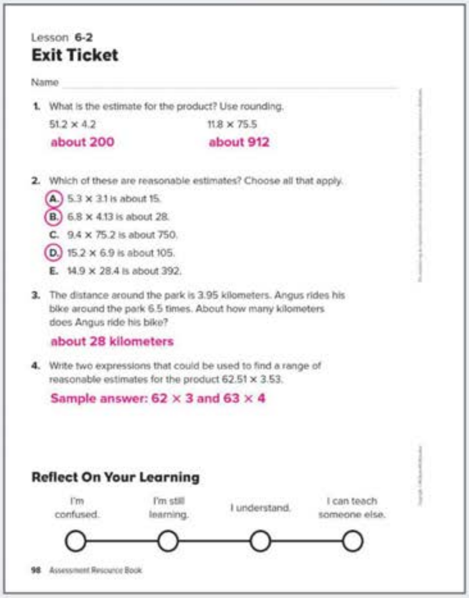
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 6-2

Exit Ticket

Name ____________________

1. What is the estimate for the product? Use rounding.

51.2 × 4.2	11.8 × 75.5
about 200	**about 912**

2. Which of these are reasonable estimates? Choose all that apply.
   - [✓ A.] 5.3 × 3.1 is about 15.
   - [✓ B.] 6.8 × 4.13 is about 28.
   - C. 9.4 × 75.2 is about 750.
   - [✓ D.] 15.2 × 6.9 is about 105.
   - E. 14.9 × 28.4 is about 392.

3. The distance around the park is 3.95 kilometers. Angus rides his bike around the park 6.5 times. About how many kilometers does Angus ride his bike?

   about 28 kilometers

4. Write two expressions that could be used to find a range of reasonable estimates for the product 62.51 × 3.53.

   Sample answer: 62 × 3 and 63 × 4

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

98 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Reasonable Estimates!

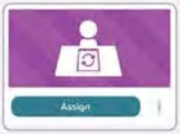
Work with students in small groups. Provide each group with 3 number cubes. One student rolls a number cube to get a whole number. A second student rolls 2 cubes and uses the digits to make a decimal number that is less than 9.9. The numbers are recorded as a multiplication equation (e.g., 6×3.2). The other students estimate the product. Have students explain how they found their estimates.

GO ONLINE

Take Another Look Lesson

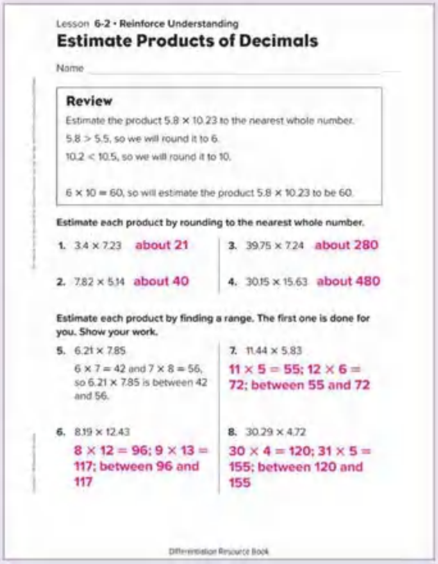
Assign the interactive lesson to reinforce targeted skills.

- Estimate Products (Decimal Number Factors)



INDEPENDENT WORK

Differentiation Resource Book, p. 53



Lesson **6-2 • Reinforce Understanding**

Estimate Products of Decimals

Name ________________

Review

Estimate the product 5.8×10.23 to the nearest whole number.

$5.8 > 5.5$, so we will round it to 6.

$10.2 < 10.5$, so we will round it to 10.

$6 \times 10 = 60$, so will estimate the product 5.8×10.23 to be 60.

Estimate each product by rounding to the nearest whole number.

1. 3.4×7.23 about 21
2. 7.82×5.14 about 40
3. 39.75×7.24 about 280
4. 30.15×15.63 about 480

Estimate each product by finding a range. The first one is done for you. Show your work.

5. 6.21×7.85
   $6 \times 7 = 42$ and $7 \times 8 = 56$, so 6.21×7.85 is between 42 and 56.
6. 8.19×12.43
   $8 \times 12 = 96$; $9 \times 13 = 117$; between 96 and 117
7. 11.44×5.83
   $11 \times 5 = 55$; $12 \times 6 = 72$; between 55 and 72
8. 30.29×4.72
   $30 \times 4 = 120$; $31 \times 5 = 155$; between 120 and 155

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Estimating Decimal Products Bingo

Students practice finding estimated products.

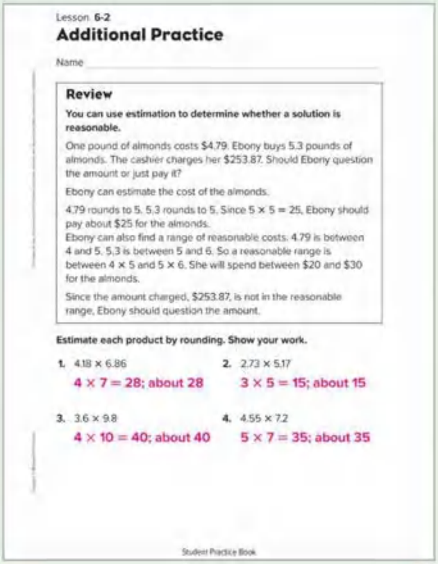
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 53–54



Lesson **6-2**

Additional Practice

Name ________________

Review

You can use estimation to determine whether a solution is reasonable.

One pound of almonds costs \$4.79. Ebony buys 5.3 pounds of almonds. The cashier charges her \$253.87. Should Ebony question the amount or just pay it?

Ebony can estimate the cost of the almonds.

4.79 rounds to 5. 5.3 rounds to 5. Since $5 \times 5 = 25$, Ebony should pay about \$25 for the almonds.
Ebony can also find a range of reasonable costs. 4.79 is between 4 and 5. 5.3 is between 5 and 6. So a reasonable range is between 4×5 and 5×6. She will spend between \$20 and \$30 for the almonds.

Since the amount charged, \$253.87, is not in the reasonable range, Ebony should question the amount.

Estimate each product by rounding. Show your work.

1. 4.18×6.86
   $4 \times 7 = 28$; about 28
2. 2.73×5.17
   $3 \times 5 = 15$; about 15
3. 3.6×9.8
   $4 \times 10 = 40$; about 40
4. 4.55×7.2
   $5 \times 7 = 35$; about 35

Student Practice Book

Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication of multi-digit numbers.

Use It! Application Station

School Spirit Students use area and multiplication to create a school wall mural. *The content of this card has concepts covered later in Lesson 6-4. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

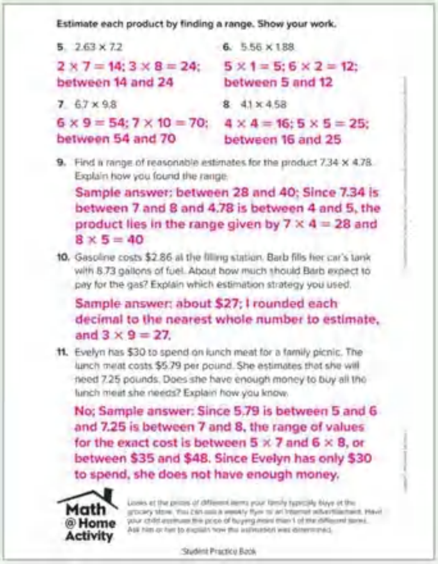
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 53–54



Estimate each product by finding a range. Show your work.

5. 2.63 × 7.2
2 × 7 = 14; 3 × 8 = 24; between 14 and 24

6. 5.56 × 1.88
5 × 1 = 5; 6 × 2 = 12; between 5 and 12

7. 6.7 × 9.8
6 × 9 = 54; 7 × 10 = 70; between 54 and 70

8. 4.1 × 4.58
4 × 4 = 16; 5 × 5 = 25; between 16 and 25

9. Find a range of reasonable estimates for the product 7.34 × 4.78. Explain how you found the range.
Sample answer: between 28 and 40; Since 7.34 is between 7 and 8 and 4.78 is between 4 and 5, the product lies in the range given by 7 × 4 = 28 and 8 × 5 = 40

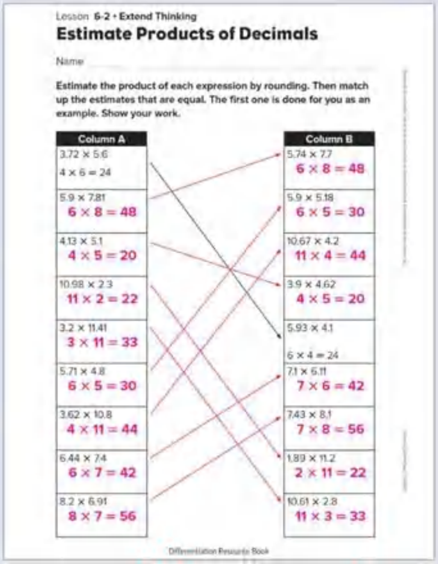
10. Gasoline costs $2.86 at the filling station. Barb fills her car's tank with 8.73 gallons of fuel. About how much should Barb expect to pay for the gas? Explain which estimation strategy you used.
Sample answer: about $27; I rounded each decimal to the nearest whole number to estimate, and 3 × 9 = 27.

11. Evelyn has $30 to spend on lunch meat for a family picnic. The lunch meat costs $5.79 per pound. She estimates that she will need 7.25 pounds. Does she have enough money to buy all the lunch meat she needs? Explain how you know.
No; Sample answer: Since 5.79 is between 5 and 6 and 7.25 is between 7 and 8, the range of values for the exact cost is between 5 × 7 and 6 × 8, or between $35 and $48. Since Evelyn has only $30 to spend, she does not have enough money.

Math @ Home Activity

Student Practice Book

Differentiation Resource Book, p. 54



Lesson 6-2 • Extend Thinking

Estimate Products of Decimals

Name

Estimate the product of each expression by rounding. Then match up the estimates that are equal. The first one is done for you as an example. Show your work.

Column A	Column B
3.72 × 5.6 4 × 6 = 24	5.74 × 7.7 6 × 8 = 48
5.9 × 7.81 6 × 8 = 48	5.9 × 5.18 6 × 5 = 30
4.13 × 5.1 4 × 5 = 20	10.67 × 4.2 11 × 4 = 44
10.98 × 2.3 11 × 2 = 22	3.9 × 4.62 4 × 5 = 20
3.2 × 11.41 3 × 11 = 33	5.93 × 4.1 6 × 4 = 24
5.71 × 4.8 6 × 5 = 30	7.1 × 6.11 7 × 6 = 42
3.62 × 10.8 4 × 11 = 44	7.43 × 8.1 7 × 8 = 56
6.44 × 7.4 6 × 7 = 42	1.89 × 11.2 2 × 11 = 22
8.2 × 6.91 8 × 7 = 56	10.61 × 2.8 11 × 3 = 33

Differentiation Resource Book

LESSON **6-3**

Represent Multiplication of Decimals

Learning Target

- I can use decimal grids to help me represent and solve multiplication equations involving decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Model with mathematics.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
decimal grid	complex
partition	negate

Materials

The materials may be for any part of the lesson.

- *Blank Open Number Lines* Teaching Resource
- *10 × 10 Grids* Teaching Resource
- number cubes

Focus

Content Objective	Language Objectives	SEL Objective
• Students use decimal grids to represent and solve multiplication equations involving decimals.	• Students discuss how to solve multiplication equations using decimal grids while answering *W*hy and Yes/No questions. • To support cultivating conversation and sense-making, ELs participate in MLR8: Discussion Supports and MLR6: Three Reads.	• Students identify personal traits that make them good students, peers, and math learners.

Coherence

Previous	Now	Next
• Students added and subtracted multi-digit whole numbers (Grade 4). • Students estimated products of decimals (Lesson 2).	• Students represent multiplication of decimals using decimal grids.	• Students will use multiplication strategies to multiply decimals to hundredths (Lesson 4). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students develop understanding of multiplication of decimals by representing multiplication using equations and decimal grids.	• Students develop proficiency in multiplying with decimals by using decimal grids.	• Students multiply with decimals to solve problems involving real-world contexts. *Application is not a targeted element of rigor for this standard.*

GO ONLINE

Number Routine
About How Much?

5–7 min

Build Fluency Students build number sense as they estimate the difference of two 2-digit decimal numbers.

These prompts encourage students to talk about their reasoning:

- What did you do first to estimate the differences of each expression?
- What strategy did you use to estimate? How did you choose this strategy?
- What is another strategy to use in estimating the difference?

Launch 5–7 min

Sense-Making Routine

Purpose Students begin thinking of the "fraction of" concept that they will use to model a decimal times a decimal later. The dozen egg containers and the arrangement of the white/brown eggs mimic the grid model used when that is done.

Notice & Wonder

- How are they the same?
- How are they different?

Teaching Tip You may want to have students Think Pair Share to discuss how the eggs are the same and how they are different.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of how to represent multiplication of decimals and are based on possible comments and questions that students may make during the share out.

- What fraction of the dozen eggs is brown?
- If there were 10 eggs instead of 12 in each container, how could you use decimals to describe the number of brown eggs?

Math is… Mindset

- How can creative thinking help you solve a problem?

SEL Self-Awareness: Self-Confidence

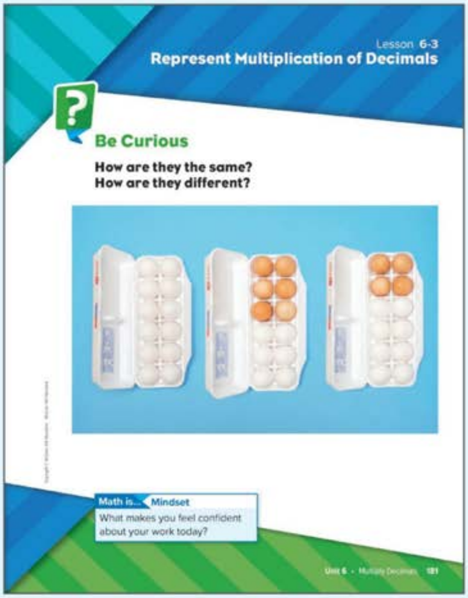
As students work through the Notice & Wonder routine, encourage creative thinking by inviting them to explore and consider alternative representations for multiplication. As a class, discuss some of the options students can use to represent multiplication. Then, have students check their answers using an alternative representation.

Transition to Explore & Develop

Ask questions to get students thinking about ways to represent multiplying decimals. Students might notice that they can use decimal grids in different ways to multiply with decimals.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how we might represent multiplication of decimals.



Lesson 6-3
Represent Multiplication of Decimals

Be Curious

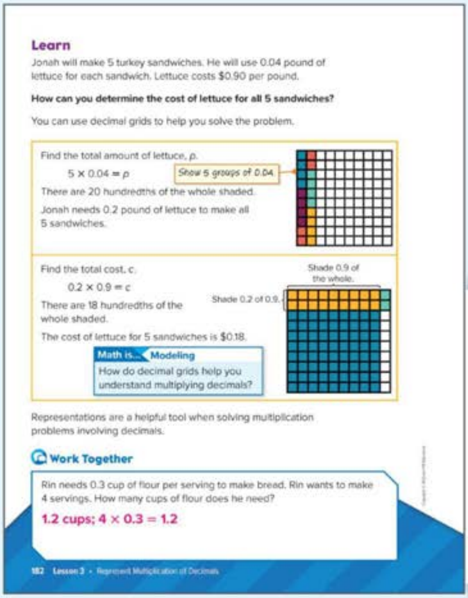
How are they the same?
How are they different?

Math is… Mindset
What makes you feel confident about your work today?

Be Curious

How are they the same?
How are they different?

Explore & Develop 20 min



Learn

Jonah will make 5 turkey sandwiches. He will use 0.04 pound of lettuce for each sandwich. Lettuce costs $0.90 per pound.

How can you determine the cost of lettuce for all 5 sandwiches?

You can use decimal grids to help you solve the problem.

Find the total amount of lettuce, p.

$5 \times 0.04 = p$

There are 20 hundredths of the whole shaded.

Jonah needs 0.2 pound of lettuce to make all 5 sandwiches.

Find the total cost, c.

$0.2 \times 0.9 = c$

There are 18 hundredths of the whole shaded.

The cost of lettuce for 5 sandwiches is $0.18.

Math is... Modeling
How do decimal grids help you understand multiplying decimals?

Representations are a helpful tool when solving multiplication problems involving decimals.

Work Together

Rin needs 0.3 cup of flour per serving to make bread. Rin wants to make 4 servings. How many cups of flour does he need?

1.2 cups; $4 \times 0.3 = 1.2$

182 Lesson 3 • Represent Multiplication of Decimals

❶ Pose the Problem

MLR Discussion Supports

As students engage in discussing the answers to the three questions below, restate statements they make as a question to seek clarification. Encourage students ask useful questions to improve each others' ideas.

ETP Pose Purposeful Questions

- What operation can help you determine how much the lettuce for all five sandwiches will cost?
- How can you represent the information you have?
- What strategy can you use?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Three Reads

1stRead: Have students underline the key number that will be used to solve the problem.

2nd Read: Have students write the meaning of each number in context (numbers, pounds, cost).

3rd Read: Have students work in pairs to create mathematical expressions.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How do decimal grids help you understand multiplication of decimals?
- How do you use decimal grids as a tool that help you multiply decimals?

Key Takeaway

- Multiplication of decimals can be represented using concrete models or drawings, such as decimal grids.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of how to find the product of decimals. Have students work on the activity in pairs before asking them to explain how they found their answers.

Common Misconception Students may think that the product of two factors must be greater than both numbers, but that is not true when one or more factors is between 0 and 1.

LOM Language of Math

Students may have heard of the field American football is played on called a *gridiron*. A gridiron is great for broiling food over a flame, and resembles the lines on a football field. Have the students relate this to the appearance of a decimal *grid*.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students develop strategies for multiplying decimals.

Materials: *10 × 10 Grids* Teaching Resource, *Blank Open Number Lines* Teaching Resource

Directions: Read the first part of the Pose the Problem; ensure that students understand that 5 × 0.04 represents the total amount of lettuce. Encourage students to develop a strategy to solve.

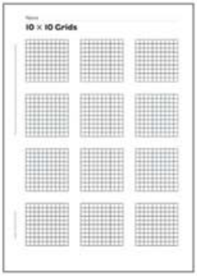
Support Productive Struggle

- Is the answer more than 1 pound? More than 0.5 pound? How do you know?
- How can you use equal groups to help you find the total amount of lettuce?
- What tools can you use to help you find the total amount of lettuce?

Have groups share their products and their strategies for solving. Identify similarities and differences among the strategies and representations. Have students solve the next part of the Pose the Problem; ensure students understand that 0.2 × 0.9 represents the total cost. Encourage students to develop a strategy to solve.

Math is... Modeling

- How do decimal grids help you understand multiplying decimals?



Students assess models to see if they have served their purpose.

Activity Debrief: Facilitate a discussion to ensure students understand multiplication of decimals can be represented as equal groups on a decimal grid. When multiplying two decimals, it is represented as a part of a part.

PDFs of the Teaching Resources are available in the Digital Teacher Center.

Guided Exploration

Students build on their understanding of multiplication to find products of decimals using decimal grids.

Use and Connect Mathematical Representations

Have the students estimate the product of 5 and 0.04. Ask:

- What factors will you use to estimate the solution? Why?
- How can finding a range help you estimate?

- **Think About It:** What is the size of each group? How many groups are there?

Have the students use the model to determine the product of 5 and 0.04. Ask:

- What strategy did you use to find the product?
- Why did you choose that strategy?
- How did you use that strategy to find the product?

Have the students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution of 0.2 reasonable? Why or why not?
- What different ways could you represent 5 × 0.04 using decimal grids?
- Will "tenths times tenths" always result in "hundredths"? Explain why or why not.
- What do you think "tenths times hundredths" will resultin? Why?

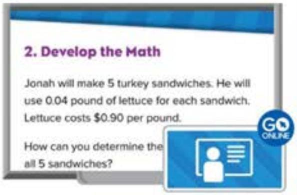
Have the students assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution of 0.18 reasonable? Why or why not?

Math is... Modeling

- How do decimal grids help you understand multiplying decimals?

Students assess models to see if they have served their purpose.



2. Develop the Math

Jonah will make 5 turkey sandwiches. He will use 0.04 pound of lettuce for each sandwich. Lettuce costs $0.90 per pound.

How can you determine the all 5 sandwiches?

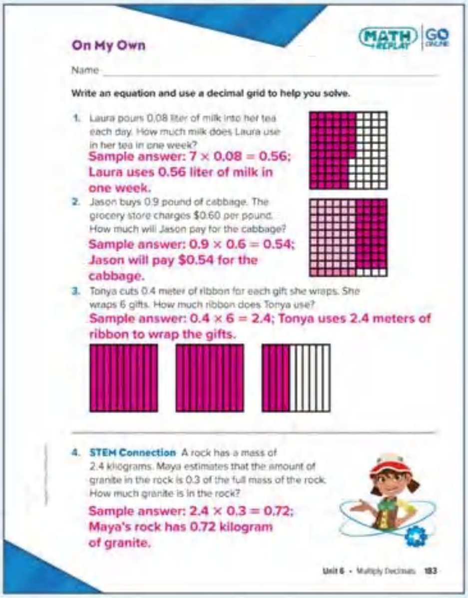
English Learner Scaffolds

Entering/Emerging Support students' understanding of *cost*. First, choose a classroom object, such as a notebook. Write a price on a sticker or piece of paper and put it on the object. Say *The price is [$1.00]. It costs [$1.00].* Repeat the task with a different classroom objects. Say The price is $1.50. Then prompt them to complete the following sentence saying the correct word *(costs)* aloud: It ____ *$1.50.*

Developing/Expanding Support students' understanding of *cost*. First, choose a classroom object, such as a notebook. Write a price on a sticker or piece of paper and put it on the object. Say *The price is [$1.00]. It costs [$1.00].* Repeat the task with a different classroom object. Say *The price is $1.50.* Then prompt them to complete the following sentence saying the correct word (*costs*) aloud: *It* ____ *$1.50.* Finally, ask students to repeat the task, choosing a classroom object, and make a sentence of their own using *cost*.

Bridging/Reaching Ensure comprehension of the meaning of cost, then have students brainstorm words associated with cost; for example, *price, dollars, bucks, cents,* etc.

Practice & Reflect 10 min



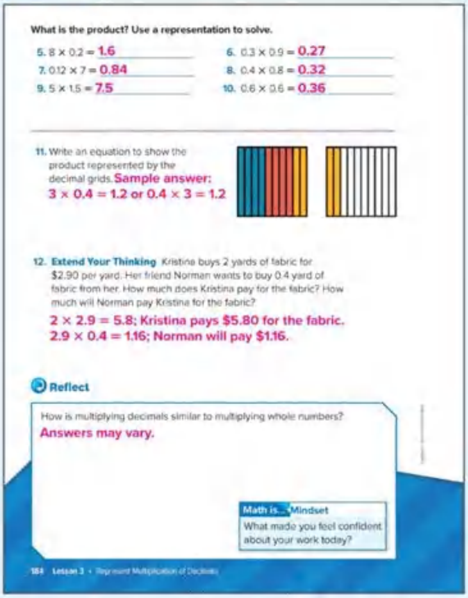
On My Own

Name

Write an equation and use a decimal grid to help you solve.

1. Laura pours 0.08 liter of milk into her tea each day. How much milk does Laura use in her tea in one week?
Sample answer: 7 × 0.08 = 0.56; Laura uses 0.56 liter of milk in one week.
2. Jason buys 0.9 pound of cabbage. The grocery store charges $0.60 per pound. How much will Jason pay for the cabbage?
Sample answer: 0.9 × 0.6 = 0.54; Jason will pay $0.54 for the cabbage.
3. Tonya cuts 0.4 meter of ribbon for each gift she wraps. She wraps 6 gifts. How much ribbon does Tonya use?
Sample answer: 0.4 × 6 = 2.4; Tonya uses 2.4 meters of ribbon to wrap the gifts.
4. **STEM Connection** A rock has a mass of 2.4 kilograms. Maya estimates that the amount of granite in the rock is 0.3 of the full mass of the rock. How much granite is in the rock?
Sample answer: 2.4 × 0.3 = 0.72; Maya's rock has 0.72 kilogram of granite.

Unit 6 • Multiply Decimals 183



What is the product? Use a representation to solve.

5. 8 × 0.2 = **1.6**
6. 0.3 × 0.9 = **0.27**
7. 0.12 × 7 = **0.84**
8. 0.4 × 0.8 = **0.32**
9. 5 × 1.5 = **7.5**
10. 0.6 × 0.6 = **0.36**

11. Write an equation to show the product represented by the decimal grids. **Sample answer: 3 × 0.4 = 1.2 or 0.4 × 3 = 1.2**

12. **Extend Your Thinking** Kristina buys 2 yards of fabric for $2.90 per yard. Her friend Norman wants to buy 0.4 yard of fabric from her. How much does Kristina pay for the fabric? How much will Norman pay Kristina for the fabric?
2 × 2.9 = 5.8; Kristina pays $5.80 for the fabric.
2.9 × 0.4 = 1.16; Norman will pay $1.16.

Reflect

How is multiplying decimals similar to multiplying whole numbers?
Answers may vary.

Math is... Mindset
What made you feel confident about your work today?

184 Lesson 3 • Represent Multiplication of Decimals

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Misconception: Exercise 3 Students might not understand why there are not 6 decimal grids to shade. Explain that they can shade the decimal factor repeatedly in one decimal grid until the grid is full, and then continue shading on the next one to see the number of tenths or hundredths.

Item Analysis

Item	DOK	Rigor
1–4	2	Application
5–10	1	Procedural Skill and Fluency
11–12	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How is multiplying decimals similar to multiplying whole numbers?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did creative thinking help you solve a problem?

Students reflect on how they practiced self-awareness.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can use decimal grids to help me represent and solve multiplication equations involving decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Represent Multiplication of Decimals	5.NBT.B.7
2	2	Represent Multiplication of Decimals	5.NBT.B.7
3	2	Represent Multiplication of Decimals	5.NBT.B.7

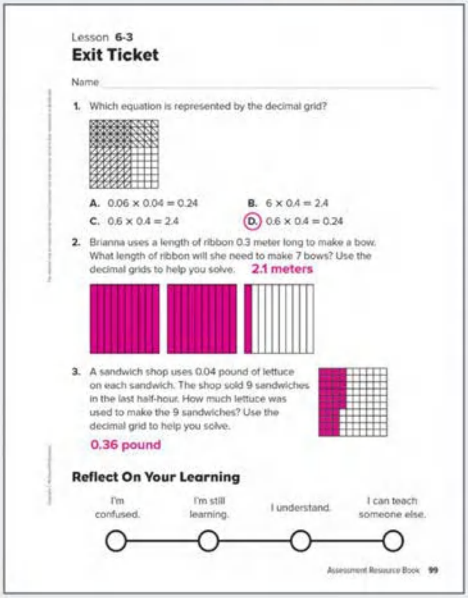
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking



Lesson 6-3

Exit Ticket

Name

1. Which equation is represented by the decimal grid?

A. 0.06 × 0.04 = 0.24
B. 6 × 0.4 = 2.4
C. 0.6 × 0.4 = 2.4
[✓ D.] 0.6 × 0.4 = 0.24

2. Brianna uses a length of ribbon 0.3 meter long to make a bow. What length of ribbon will she need to make 7 bows? Use the decimal grids to help you solve. 2.1 meters

3. A sandwich shop uses 0.04 pound of lettuce on each sandwich. The shop sold 9 sandwiches in the last half-hour. How much lettuce was used to make the 9 sandwiches? Use the decimal grid to help you solve.

0.36 pound

Reflect On Your Learning

○ I'm confused.
○ I'm still learning.
○ I understand.
○ I can teach someone else.

Assessment Resource Book 99

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Multiply Whole Numbers and Decimals

Work with pairs of students. Provide students with 2 number cubes to roll. Tell them that the sum of the number cubes is a number in tenths. Repeat to find the second factor in the multiplication of decimals. Help the students multiply the two numbers, for example 1.2 × 0.5, using decimal grids. Make sure students evaluate their answers for reasonableness. Repeat the activity as time allows.

GO ONLINE

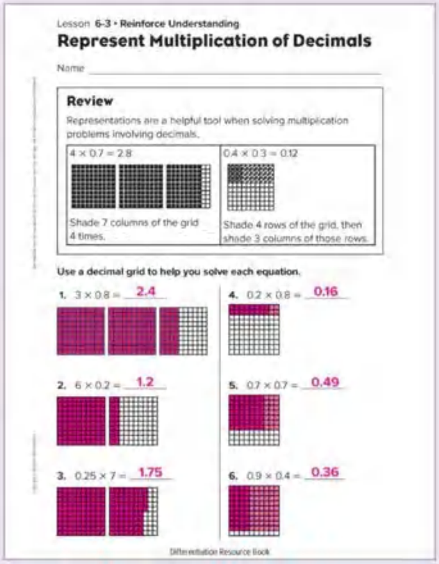
Take Another Look Lessons

Assign the interactive lessons to reinforce targeted skills.

- Multiply Decimals by Whole Numbers-Model
- Multiply Two Decimal Numbers-Model

INDEPENDENT WORK

Differentiation Resource Book, p. 55



Lesson **6-3 • Reinforce Understanding**

Represent Multiplication of Decimals

Name ____________

Review

Representations are a helpful tool when solving multiplication problems involving decimals.

$4 \times 0.7 = 2.8$ Shade 7 columns of the grid 4 times.	$0.4 \times 0.3 = 0.12$ Shade 4 rows of the grid, then shade 3 columns of those rows.

Use a decimal grid to help you solve each equation.

1. $3 \times 0.8 =$ 2.4
2. $6 \times 0.2 =$ 1.2
3. $0.25 \times 7 =$ 1.75
4. $0.2 \times 0.8 =$ 0.16
5. $0.7 \times 0.7 =$ 0.49
6. $0.9 \times 0.4 =$ 0.36

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Decimal Multiplication Task Cards

Students practice decimal multiplication.

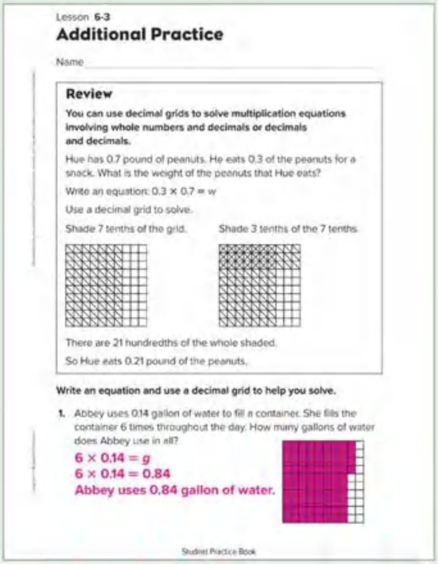
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 55–56



Lesson **6-3**

Additional Practice

Name ____________

Review

You can use decimal grids to solve multiplication equations involving whole numbers and decimals or decimals and decimals.

Hue has 0.7 pound of peanuts. He eats 0.3 of the peanuts for a snack. What is the weight of the peanuts that Hue eats?

Write an equation: $0.3 \times 0.7 = w$

Use a decimal grid to solve.

Shade 7 tenths of the grid. Shade 3 tenths of the 7 tenths.

There are 21 hundredths of the whole shaded.

So Hue eats 0.21 pound of the peanuts.

Write an equation and use a decimal grid to help you solve.

1. Abbey uses 0.14 gallon of water to fill a container. She fills the container 6 times throughout the day. How many gallons of water does Abbey use in all?

$6 \times 0.14 = g$

$6 \times 0.14 = 0.84$

Abbey uses 0.84 gallon of water.

Student Practice Book

Own It! Digital Station

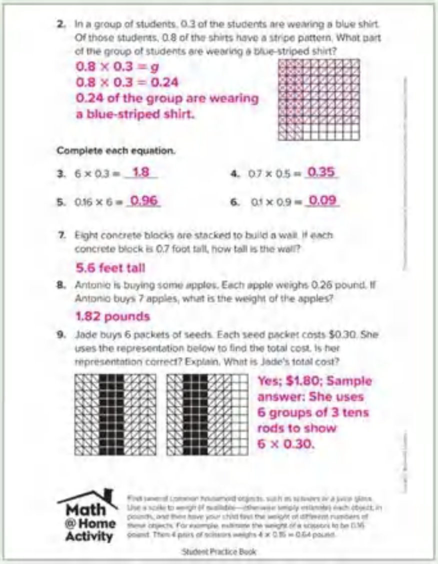
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication of multi-digit numbers.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 55–56



2. In a group of students, 0.3 of the students are wearing a blue shirt. Of those students, 0.8 of the shirts have a stripe pattern. What part of the group of students are wearing a blue-striped shirt?

   $0.8 \times 0.3 = g$

   $0.8 \times 0.3 = 0.24$

   0.24 of the group are wearing a blue-striped shirt.

Complete each equation.

3. $6 \times 0.3 =$ 1.8
4. $0.7 \times 0.5 =$ 0.35
5. $0.16 \times 6 =$ 0.96
6. $0.1 \times 0.9 =$ 0.09
7. Eight concrete blocks are stacked to build a wall. If each concrete block is 0.7 foot tall, how tall is the wall?

   5.6 feet tall

8. Antonio is buying some apples. Each apple weighs 0.26 pound. If Antonio buys 7 apples, what is the weight of the apples?

   1.82 pounds

9. Jade buys 6 packets of seeds. Each seed packet costs $0.30. She uses the representation below to find the total cost. Is her representation correct? Explain. What is Jade's total cost?

   Yes; $1.80; Sample answer: She uses 6 groups of 3 tens rods to show 6×0.30.

Math @ Home Activity Find several common household objects, such as scissors or a juice glass. Use a scale to weigh (if available—otherwise simply estimate) each object, in pounds, and then have your child find the weight of different numbers of these objects. For example, estimate the weight of a scissors to be 0.16 pound. Then 4 pairs of scissors weighs $4 \times 0.16 = 0.64$ pound.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Move to the Left. Now Right! Students create a maze and write step-by-step directions for getting through the maze.

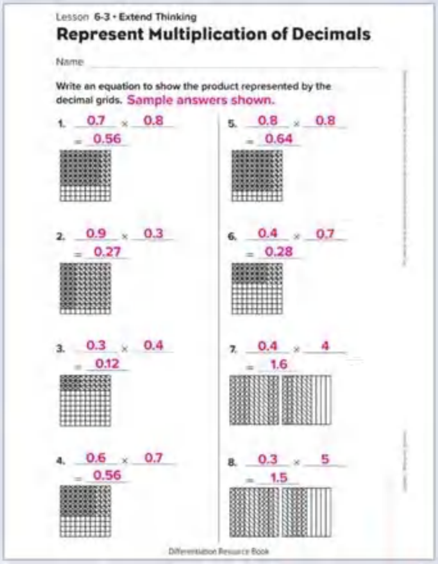
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 56



Lesson 6-3 • Extend Thinking

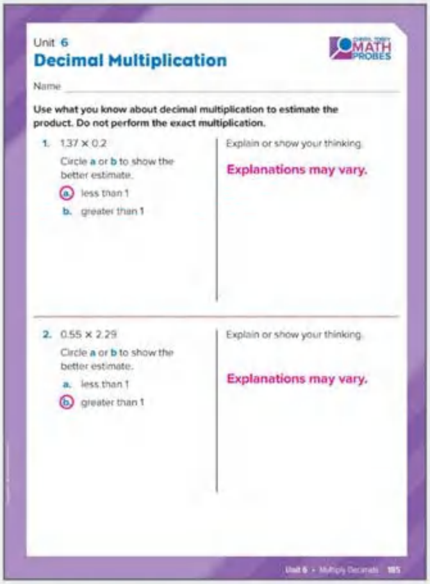
Represent Multiplication of Decimals

Name ______

Write an equation to show the product represented by the decimal grids. Sample answers shown.

1. 0.7 × 0.8 = 0.56
2. 0.9 × 0.3 = 0.27
3. 0.3 × 0.4 = 0.12
4. 0.6 × 0.7 = 0.56
5. 0.8 × 0.8 = 0.64
6. 0.4 × 0.7 = 0.28
7. 0.4 × 4 = 1.6
8. 0.3 × 5 = 1.5

Differentiation Resource Book



Unit 6

Decimal Multiplication

Name

Use what you know about decimal multiplication to estimate the product. Do not perform the exact multiplication.

1. 1.37 × 0.2

Circle **a** or **b** to show the better estimate.

[✓ a.] less than 1

b. greater than 1

Explain or show your thinking.

Explanations may vary.

2. 0.55 × 2.29

Circle **a** or **b** to show the better estimate.

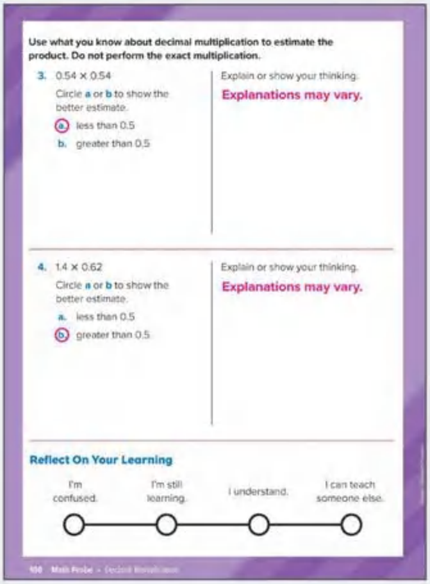
a. less than 1

[✓ b.] greater than 1

Explain or show your thinking.

Explanations may vary.

Unit 6 • Multiply Decimals 185



Use what you know about decimal multiplication to estimate the product. Do not perform the exact multiplication.

3. 0.54 × 0.54

Circle **a** or **b** to show the better estimate.

[✓ a.] less than 0.5

b. greater than 0.5

Explain or show your thinking.

Explanations may vary.

4. 1.4 × 0.62

Circle **a** or **b** to show the better estimate.

a. less than 0.5

[✓ b.] greater than 0.5

Explain or show your thinking.

Explanations may vary.

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

186 Math Probe • Decimal Multiplication

Analyze the Probe Formative Assessment

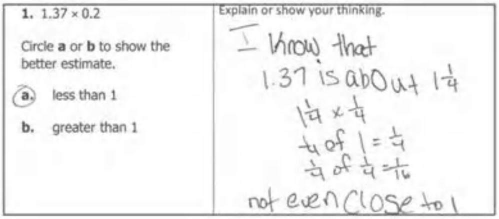
Targeted Concept Reason about the magnitude of decimals and the meaning of multiplication to compare decimal products to common benchmarks.

Targeted Misconceptions Some students think that multiplying always results in a product that is larger than both factors. While this is true when multiplying two whole numbers that are each greater than 1, it is not true when one factor is less than 1. Other students calculate the exact product rather than estimate because they have conceptual difficulty using the meaning of multiplication to estimate the product of two decimals. Some students round each factor to the nearest whole number and then multiply. This may result in an estimate that is not precise enough for the benchmarks that are given.

Sample Student Work

Below are examples of students' explanations.

Sample A



1. 1.37 × 0.2

Circle **a** or **b** to show the better estimate.

[✓ **a.**] less than 1

b. greater than 1

Explain or show your thinking.

I know that

1.37 is about $1\frac{1}{4}$

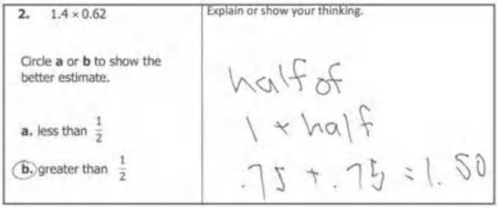
$1\frac{1}{4} \times \frac{1}{4}$

$\frac{1}{4}$ of $1 = \frac{1}{4}$

$\frac{1}{4}$ of $\frac{1}{4} = \frac{1}{16}$

not even close to 1

Sample B



2. 1.4 × 0.62

Circle **a** or **b** to show the better estimate.

a. less than $\frac{1}{2}$

[✓ **b.**] greater than $\frac{1}{2}$

Explain or show your thinking.

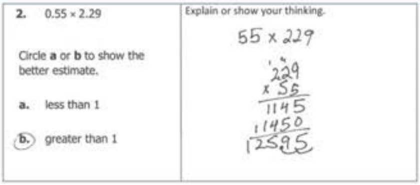
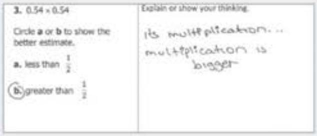
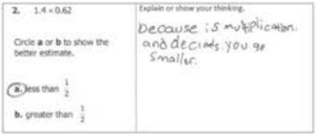
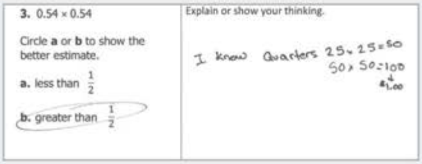
half of

1 + half

.75 + .75 = 1.50

Collect and Assess Student Work

Collect and review student response to determine possible misconceptions. See examples in If-Then chart.

IF incorrect...	THEN the student likely...	Sample Misconceptions
1. b 2. a 3. b 4. a	does not use reasoning to estimate the product. In Exercise 1, the student may not reason that 1.37 × 0.2 represents a little more than 1 group of 0.2 (or a very small portion of 1.37). In Exercise 2, we are looking for about 1 of 2.29. In Exercise 3, we are looking for in Exercise 4. 1.4 × 0.62 represents more than 1 group of 0.62 (or more than 1 of 1.4).	 **2.** 0.55 × 2.29 Circle **a** or **b** to show the better estimate. **a.** less than 1 [✓ **b.**] greater than 1 Explain or show your thinking. 55 x 229 229 x 55 1145 11450 12595
1. b 3. b	overgeneralizes from whole number multiplication that a product is always greater than its factors. Note that this misconception results in correct choices for Exercises 2 and 4.	 **3.** 0.54 × 0.54 Circle **a** or **b** to show the better estimate. **a.** less than $\frac{1}{2}$ [✓ **b.**] greater than $\frac{1}{2}$ Explain or show your thinking. its multiplication.. multiplication is bigger
2. a 4. a	thinks that all decimals are small numbers; therefore, the product of two decimals must be a decimal less than 1 (or less than 1). Note that this misconception results in correct choices for Exercises 1 and 3.	 **2.** 1.4 × 0.62 Circle **a** or **b** to show the better estimate. [✓ **a.**] less than $\frac{1}{2}$ **b.** greater than $\frac{1}{2}$ Explain or show your thinking. Because is multiplication and decimals you ge smaller.
3. b	mistakenly interprets multiplying a number by itself as being the same as doubling the number; OR rounds each factor up to 1 and then multiplies. This results in an estimated product of 1, but this is not the better estimate.	 **3.** 0.54 × 0.54 Circle **a** or **b** to show the better estimate. **a.** less than $\frac{1}{2}$ [✓ **b.**] greater than $\frac{1}{2}$ Explain or show your thinking. I know Quarters 25 + 25 = 50 50 + 50 = 100 4 $1.00

Many of the above difficulties result in a combination of correct and incorrect responses.
For correct responses, be sure to check for sound reasoning.

Take Action

Choose from the following resources or suggestions:

- Revisit activities and representations for whole number multiplication in Lesson 5-4 to underscore the meaning of multiplication with decimals.
- Encourage students to think about multiplication as groups of a quantity. For about $\frac{11}{2}$ groups of 0.62.
- Provide opportunities for students to use concrete materials and drawings to help them build skill in visualizing the magnitude of a decimal quantity.
- Discuss the impact of rounding and ideas about the precision needed for an estimate.
- For example, if 0.55 × 0.75 is rounded to 1 × 1, the estimate will not be precise enough for the benchmarks, "less than $\frac{1}{2}$" or "greater than $\frac{1}{2}$."

Revisit the Probe after additional instruction. Have students review their initial answers to the probe. Use these questions for discussion:

- Are there any answers you would like to change? Explain why you might want to change them.
- Are there any questions that you still have about any of the Exercises on this probe?

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

LESSON **6-4**

Use an Area Model to Multiply Decimals

Learning Targets

- I can use an area model to determine partial products.
- I can add partial products to calculate the product of two decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Model with mathematics.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
area	complement
area model	evaluate
decompose	
partial product	

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- 0.5 cm grid paper

Focus

Content Objective	Language Objectives	SEL Objective
• Students use an area model to determine partial products and add partial products to calculate the product of two decimals.	• Students discuss using area models to solve multiplication problems while answering *Wh-* and Yes/No questions and using the academic term *decompose*. • To support optimizing output, ELs participate in MLR7: Compare and Connect.	• Students discuss and practice strategies for managing stressful situations.

Coherence

Previous	Now	Next
• Students added and subtracted multi-digit whole numbers (Grade 4). • Students represented multiplication of decimals using decimal grids (Lesson 3).	• Students use multiplication strategies to multiply decimals to hundredths.	• Students will use place-value patterns to multiply decimals (Lesson 5). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of partial products and area models to multiply decimals.	• Students use strategies for multiplying whole numbers to proficiently multiply decimals.	• Students multiply decimals to solve problems with real-world contexts. *Application is not a targeted element of rigor for this standard.*

Number Routine

Find the Missing Values

5–7 min

Build Fluency Students build reasoning skills as they are given a set of solved equations and must determine the missing values of in related equations by looking for a pattern.

These prompts encourage students to talk about their reasoning:

- What do you notice about the equations? What pattern do you see in the rows?
- What pattern do you see in the columns?
- How can one equation help you to solve another?

Launch 5–7 min

Sense-Making Routine

Purpose The lesson content introduces that the digits in numbers move one decimal place to the right when multiplied by 0.1. One way to find the "outlier" here is to find the number that is not "237 with the digits moved the same number of decimal places."

Which Doesn't Belong?

- Which doesn't belong?

Teaching Tip You may wish to have students' work in pairs as they explore the relationships between the numbers. Students can present their findings with the class and discuss any common or differing results.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of the movement of digits involved in multiplying decimals and are based on possible comments and questions that students may make during the share out.

- How are 237, 0.237, and 2,730 the same? How are they different?
- How is 273 different from the rest of the numbers?

Math is… Mindset

- What can you do to help yourself work independently?

SEL Self-Management: Manage Stress

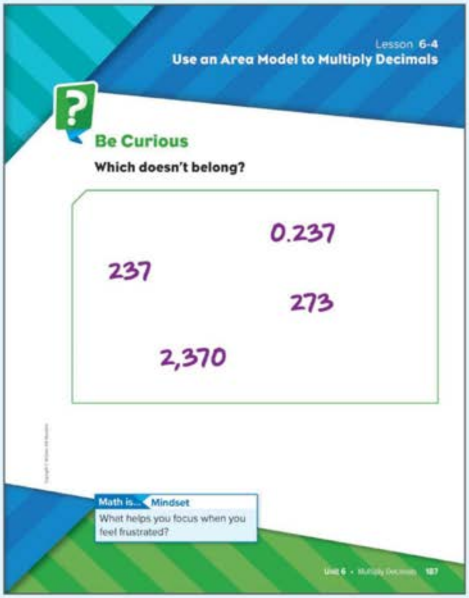
Begin the Which Doesn't Belong? routine with a short timed period, such as 5 minutes, for students to work independently. Invite students to think about strategies that can help them stay on task and work on their own. In addition to developing a sense of independence, students will also be able to practice self-discipline, self-motivation, and focus.

Transition to Explore & Develop

Have students think about multiplication area models involving whole numbers. Guide them to discuss partial products.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about how area models and place-value patterns can help us solve multiplication problems involving decimals.



Lesson 6-4
Use an Area Model to Multiply Decimals

Be Curious

Which doesn't belong?

0.237

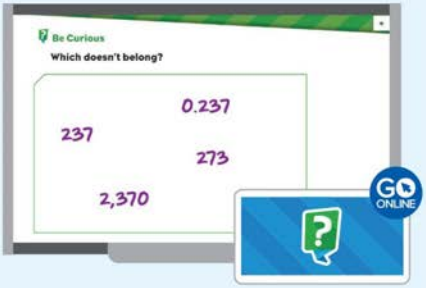
237

273

2,370

Math is… Mindset
What helps you focus when you feel frustrated?

Unit 6 • Multiply Decimals 187



Be Curious

Which doesn't belong?

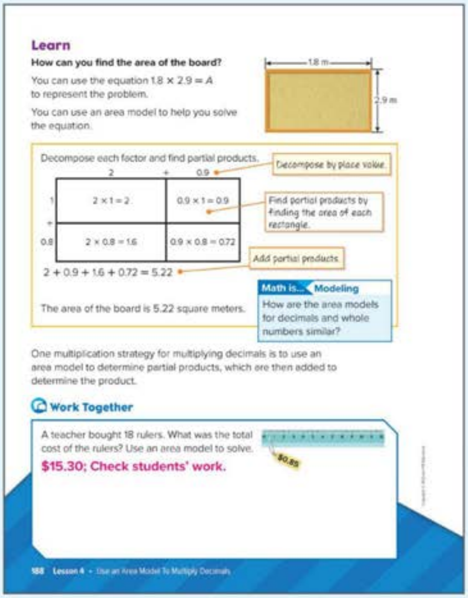
0.237

237

273

2,370

Explore & Develop 20 min



Learn

How can you find the area of the board?

You can use the equation 1.8 × 2.9 = *A* to represent the problem.

You can use an area model to help you solve the equation.

Decompose each factor and find partial products.

2 + 0.9 + 1.6 + 0.72 = 5.22

The area of the board is 5.22 square meters.

Math is... Modeling
How are the area models for decimals and whole numbers similar?

One multiplication strategy for multiplying decimals is to use an area model to determine partial products, which are then added to determine the product.

Work Together

A teacher bought 18 rulers. What was the total cost of the rulers? Use an area model to solve.

$15.30; Check students' work.

188 Lesson 4 • Use an Area Model To Multiply Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- How do you find the area of a rectangle?
- What types of similar problems have you solved in the past?
- How did you solve similar problems previously?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students and assign them a problem to solve. Have one student solve it using a multiplication equation, and the other solve it using an area model. Then have the students compare and contrast the strategies they used to solve it. Revisit this activity throughout the lesson to help students build proficiency.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How would you explain to a friend how to use an area model to multiply decimals?

Key Takeaway

- One multiplication strategy for multiplying decimals is to use an area model to determine partial products, which are then added together to arrive at the product.

Work Together

Students use their knowledge of area models to multiply a whole number and a decimal to find a sales total. Students can work on the activity in pairs before sharing their work.

Common Error Students may use the digits (1 + 8) instead of the place value (10 + 8) in the area model when decomposing 18. Invite students to estimate the solution and use the estimation to check the reasonableness of their solution.

LOM Language of Math

The term *partial product* can be broken down to identify the meaning. The word *partial* means only a part; incomplete. The word *product* represents the answer to a multiplication problem. So, together, the term means part of the answer to a multiplication problem. This may help students remember that they need to combine all of the partial products to completely solve the problem.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore area models to determine different ways to decompose them to form partial products.

Directions: Ask students to write a multiplication problem involving two 2-digit numbers and draw an area model to represent the product. Have students record as many ways as possible to decompose the factors. Invite students to share ways they decomposed the factors, focus attention on similar methods of decomposing, such as decomposing by place value.

- Do you think these methods of decomposing will work for multiplying two decimals?

Have students explore different ways to decompose the factors 1.8 and 2.9 to find their product.

Support Productive Struggle

- How can you apply your method of decomposing whole numbers to decomposing decimals?
- Is your answer reasonable? How do you know?
- How is your area model the same as or different from another student's method?

Math is... Modeling

- How are the area models for decimals and whole numbers similar?

Students use a geometric representation to understand multiplication of decimals.

Activity Debrief: Discuss with students that an area model is one method they can use to multiply decimals. Using this method, they can decompose each factor, find partial products, and add the partial products to calculate the product.

Guided Exploration

Students use an area model to understand and solve a problem.

Use and Connect Mathematical Representations

- **Think About It:** How did you decompose factors when multiplying multi-digit whole numbers?

Have students find 2 × 0.8. Ask:

- How can you rewrite 0.8 as the product of a whole number and 0.1?
- How can you use that to rewrite 2 × 0.8 as the product of a whole number and 0.1?
- How can you use decimal grids, equal groups, or place value to find that product?
- What happened to the digits of 16 when it was multiplied by 0.1?

Have students find 0.9 × 0.8. Ask:

- How can you rewrite 0.9 and 0.8 as the products of a whole number and 0.1?
- How can you use those to rewrite 0.9 × 0.8 as the product of a whole number and 0.1s?
- How can you use decimal grids, equal groups, or place value to find that product?
- What happened to the digits of 72?

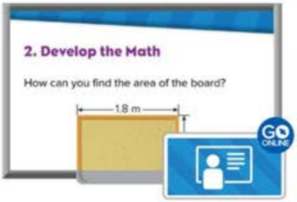
Have the students estimate 1.8 × 2.9 to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is... Modeling

- How are the area models for decimals and whole numbers similar?

Students use a geometric representation to understand multiplication of decimals.



2. Develop the Math

How can you find the area of the board?

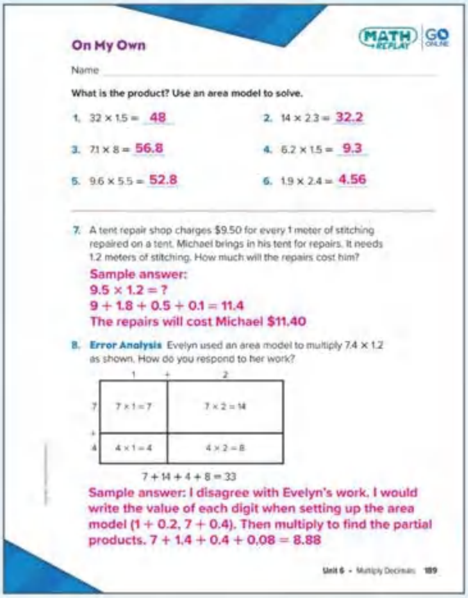
English Learner Scaffolds

Entering/Emerging Support students' understanding of the phrase *similar to* using manipulatives. Show students a pair of *similar* objects. Point to one of the objects and say *This one is similar to that one.* Name key similarities. *They both have/are...* Show two objects that are not similar. Point to one of the objects and say *This one is not similar to that one.* Then, choose two new pairs of objects, one pair being similar, and the other not. Point to the two objects in each pair, and ask *Are they similar to each other?*

Developing/Expanding Support students' understanding of the phrase *similar* to using manipulatives. Show students a pair of similar objects. Point to one of the objects and say *This one is similar to that one.* Name key similarities: *They both have/are...* Show two objects that are not similar. Point to one of the objects and say *This one is not similar to that one.* Then, choose two new pairs of objects, one pair being similar, and the other not. Ask students to choose the pair of objects that is similar and to explain how they are similar.

Bridging/Reaching Ask students to explain the phrase *similar* to, using classroom manipulatives to support their explanations. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, those items are not similar to each other because...* or *No, that's not correct because...*

Practice & Reflect 10 min



On My Own

Name ____________

What is the product? Use an area model to solve.

1. 32 × 1.5 = 48
2. 14 × 2.3 = 32.2
3. 7.1 × 8 = 56.8
4. 6.2 × 1.5 = 9.3
5. 9.6 × 5.5 = 52.8
6. 1.9 × 2.4 = 4.56

7. A tent repair shop charges $9.50 for every 1 meter of stitching repaired on a tent. Michael brings in his tent for repairs. It needs 1.2 meters of stitching. How much will the repairs cost him?

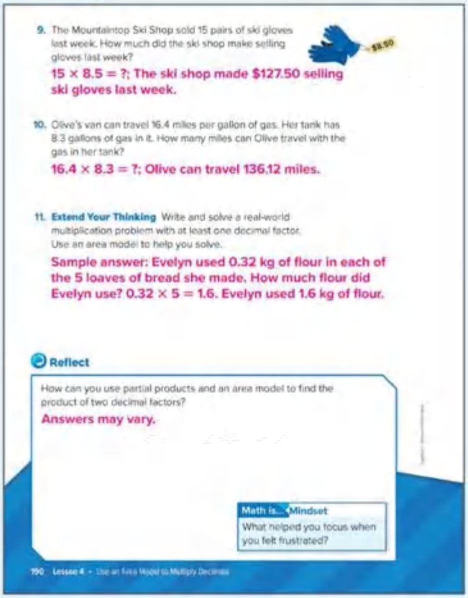
Sample answer:
9.5 × 1.2 = ?
9 + 1.8 + 0.5 + 0.1 = 11.4
The repairs will cost Michael $11.40

8. **Error Analysis** Evelyn used an area model to multiply 7.4 × 1.2 as shown. How do you respond to her work?

	1	2
7	7 × 1 = 7	7 × 2 = 14
4	4 × 1 = 4	4 × 2 = 8

7 + 14 + 4 + 8 = 33

Sample answer: I disagree with Evelyn's work. I would write the value of each digit when setting up the area model (1 + 0.2, 7 + 0.4). Then multiply to find the partial products. 7 + 1.4 + 0.4 + 0,08 = 8.88



9. The Mountaintop Ski Shop sold 15 pairs of ski gloves last week. How much did the ski shop make selling gloves last week?

15 × 8.5 = ?; The ski shop made $127.50 selling ski gloves last week.

10. Olive's van can travel 16.4 miles per gallon of gas. Her tank has 8.3 gallons of gas in it. How many miles can Olive travel with the gas in her tank?

16.4 × 8.3 = ?; Olive can travel 136.12 miles.

11. **Extend Your Thinking** Write and solve a real-world multiplication problem with at least one decimal factor. Use an area model to help you solve.

Sample answer: Evelyn used 0.32 kg of flour in each of the 5 loaves of bread she made. How much flour did Evelyn use? 0.32 × 5 = 1.6. Evelyn used 1.6 kg of flour.

Reflect

How can you use partial products and an area model to find the product of two decimal factors?

Answers may vary.

Math is... Mindset

What helped you focus when you felt frustrated?

Practice

Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 1-7 Students may incorrectly decompose the decimals creating an area model. Remind students to evaluate and decompose the factors by place value. Ask: *Is 15 the same as 1 + 0.5 or 10 + 5?*

Item Analysis

Item	DOK	Rigor
1–6	1	Procedural Skill and Fluency
7	2	Application
8	3	Conceptual Understanding
9–10	2	Application
11	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you use partial products and an area model to find the product of two decimal factors?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What have you done that helped you work independently?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use an area model to determine partial products.
- I can add partial products to calculate the product of two decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Use area models to multiply decimals	5.NBT.B.7
2	2	Use area models to multiply decimals	5.NBT.B.7

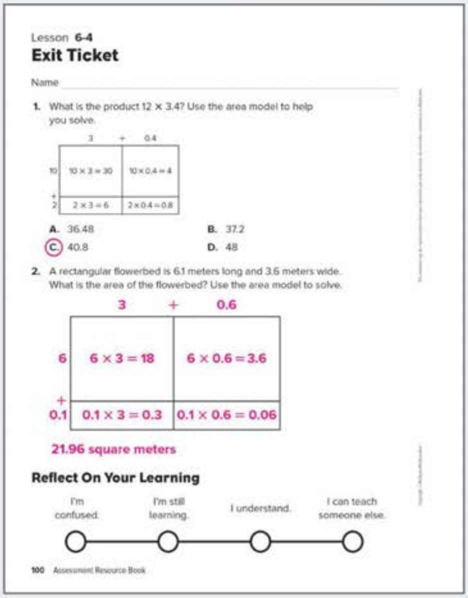
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
2 of 2	Additional Practice or any of the Ⓑ or Ⓔ activities
1 of 2	*Take Another Look* or any of the Ⓑ activities
0 of 2	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson 6-4

Exit Ticket

Name ____________________

1. What is the product 12 × 3.4? Use the area model to help you solve.

	3	+ 0.4
10	10 × 3 = 30	10 × 0.4 = 4
+ 2	2 × 3 = 6	2 × 0.4 = 0.8

A. 36.48 B. 37.2
[✓ C.] 40.8 D. 48

2. A rectangular flowerbed is 6.1 meters long and 3.6 meters wide. What is the area of the flowerbed? Use the area model to solve.

	3	+ 0.6
6	6 × 3 = 18	6 × 0.6 = 3.6
+ 0.1	0.1 × 3 = 0.3	0.1 × 0.6 = 0.06

21.96 square meters

Reflect On Your Learning

○ I'm confused.
○ I'm still learning.
○ I understand.
○ I can teach someone else.

100 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Fill It In

Work with pairs of students. Draw an area model with two rectangles. Students each estimate the product 6 × 0.46. They take turns filling in the area model or the decomposed factors and the partial products. Ask students to identify the value of each partial product. When complete, both students add the partial products and discuss whether the result makes sense based on their estimate.

GO ONLINE

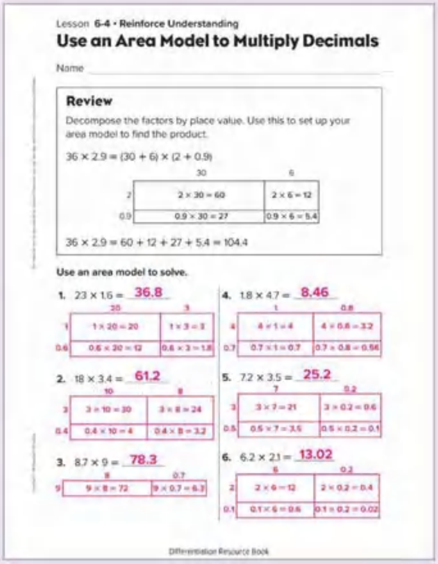
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Multiply Decimal Numbers (Area Model)

INDEPENDENT WORK

Differentiation Resource Book, p. 57



Lesson **6-4 • Reinforce Understanding**

Use an Area Model to Multiply Decimals

Name

Review

Decompose the factors by place value. Use this to set up your area model to find the product.

36 × 2.9 = (30 + 6) × (2 + 0.9)

	30	6
2	2 × 30 = 60	2 × 6 = 12
0.9	0.9 × 30 = 27	0.9 × 6 = 5.4

36 × 2.9 = 60 + 12 + 27 + 5.4 = 104.4

Use an area model to solve.

1. 23 × 1.6 = 36.8

	20	3
1	1 × 20 = 20	1 × 3 = 3
0.6	0.6 × 20 = 12	0.6 × 3 = 1.8

2. 18 × 3.4 = 61.2

	10	8
3	3 × 10 = 30	3 × 8 = 24
0.4	0.4 × 10 = 4	0.4 × 8 = 3.2

3. 8.7 × 9 = 78.3

	8	0.7
9	9 × 8 = 72	9 × 0.7 = 6.3

4. 1.8 × 4.7 = 8.46

	1	0.8
4	4 × 1 = 4	4 × 0.8 = 3.2
0.7	0.7 × 1 = 0.7	0.7 × 0.8 = 0.56

5. 7.2 × 3.5 = 25.2

	7	0.2
3	3 × 7 = 21	3 × 0.2 = 0.6
0.5	0.5 × 7 = 3.5	0.5 × 0.2 = 0.1

6. 6.2 × 2.1 = 13.02

	6	0.2
2	2 × 6 = 12	2 × 0.2 = 0.4
0.1	0.1 × 6 = 0.6	0.1 × 0.2 = 0.02

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Decimal Multiplication Tic Tac Toe

Students practice multiplication of decimals.

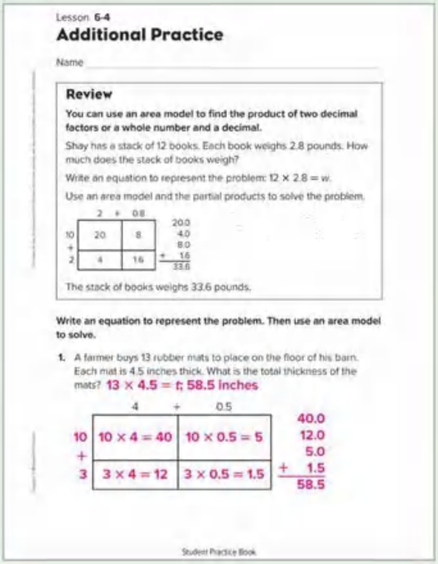
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 57–58



Lesson **6-4**

Additional Practice

Name

Review

You can use an area model to find the product of two decimal factors or a whole number and a decimal.

Shay has a stack of 12 books. Each book weighs 2.8 pounds. How much does the stack of books weigh?

Write an equation to represent the problem: 12 × 2.8 = w.

Use an area model and the partial products to solve the problem.

	2	+	0.8
10	20		8
+			
2	4		16

20.0
4.0
8.0
+ 1.6
33.6

The stack of books weighs 33.6 pounds.

Write an equation to represent the problem. Then use an area model to solve.

1. A farmer buys 13 rubber mats to place on the floor of his barn. Each mat is 4.5 inches thick. What is the total thickness of the mats? 13 × 4.5 = t; 58.5 inches

	4	+	0.5
10	10 × 4 = 40		10 × 0.5 = 5
+			
3	3 × 4 = 12		3 × 0.5 = 1.5

40.0
12.0
5.0
+ 1.5
58.5

Student Practice Book

E Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**
Assign the digital game to develop fluency with multiplication of multi-digit numbers.

Use It! Application Station

School Spirit Students use area and multiplication to create a school wall mural.

GO ONLINE

Spiral Review

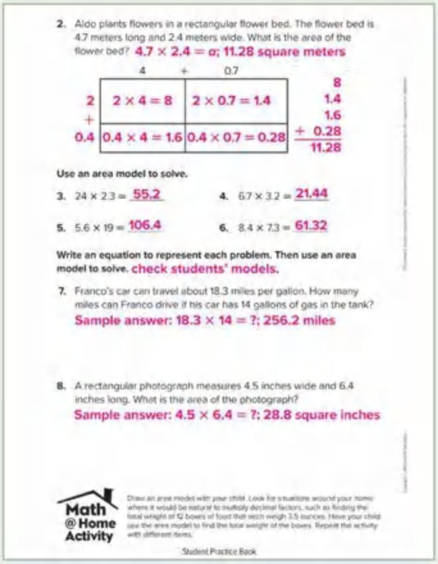
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 57–58



2. Aldo plants flowers in a rectangular flower bed. The flower bed is 4.7 meters long and 2.4 meters wide. What is the area of the flower bed? 4.7 × 2.4 = a; 11.28 square meters

	4	+	0.7
2	2 × 4 = 8		2 × 0.7 = 1.4
+			
0.4	0.4 × 4 = 1.6		0.4 × 0.7 = 0.28

8
1.4
1.6
+ 0.28
11.28

Use an area model to solve.

3. 24 × 2.3 = 55.2
4. 6.7 × 3.2 = 21.44
5. 5.6 × 19 = 106.4
6. 8.4 × 7.3 = 61.32

Write an equation to represent each problem. Then use an area model to solve. check students' models.

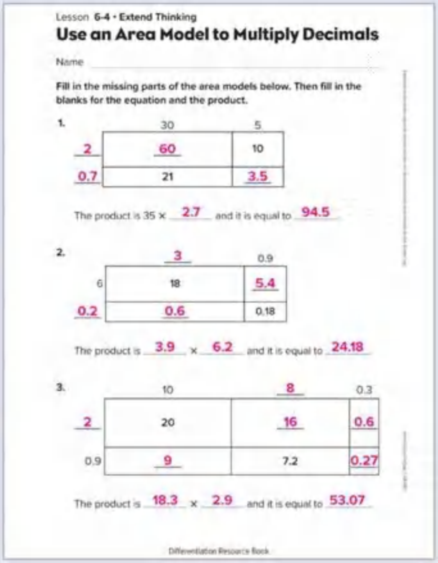
7. Franco's car can travel about 18.3 miles per gallon. How many miles can Franco drive if his car has 14 gallons of gas in the tank?
Sample answer: 18.3 × 14 = ?; 256.2 miles

8. A rectangular photograph measures 4.5 inches wide and 6.4 inches long. What is the area of the photograph?
Sample answer: 4.5 × 6.4 = ?; 28.8 square inches

Math @ Home Activity

Student Practice Book

Differentiation Resource Book, p. 58



Lesson **6-4 • Extend Thinking**

Use an Area Model to Multiply Decimals

Name ______

Fill in the missing parts of the area models below. Then fill in the blanks for the equation and the product.

1.

	30	5
2	60	10
0.7	21	3.5

The product is 35 × 2.7 and it is equal to 94.5

2.

	3	0.9
6	18	5.4
0.2	0.6	0.18

The product is 3.9 × 6.2 and it is equal to 24.18

3.

	10	8	0.3
2	20	16	0.6
0.9	9	7.2	0.27

The product is 18.3 × 2.9 and it is equal to 53.07

Differentiation Resource Book

LESSON **6-5**

Generalizations about Multiplying Decimals

Learning Targets

- I can use patterns based on place value concepts and properties of operations to make generalizations about multiplying decimals.
- I can use those generalizations to determine the placement of digits in a product.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Look for and make use of structure.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	Academic Terms
area model	assert
digit	expand
partial product	

Material

The materials may be for any part of the lesson.

- place-value charts

Focus

Content Objective	Language Objectives	SEL Objective
• Students use patterns based on place-value concepts and properties of operations to determine the placement of digits in a product.	• Students explain how to use patterns in calculations to multiply decimals by making generalizations. • To support sense-making and maximizing meta-awareness, ELs participate in MLR8: Discussion Supports and MLR7: Compare and Connect.	• Students reflect on and describe the logic and reasoning used to make a mathematical decision or conclusion.

Coherence

Previous	Now	Next
• Students added and subtracted multi-digit whole numbers (Grade 4) • Students used multiplication strategies to multiply decimals to hundredths (Lesson 4).	• Students use place-value patterns to multiply decimals.	• Students will choose and use strategies to multiply decimals (Lesson 6). • Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students extend their understanding of place value to determine the product of two decimal factors.	• Students increase proficiency with multiplying decimals by making generalizations about the products of decimal factors.	• Students apply generalizations to solve real-world problems. *Application is not a targeted element of rigor for this standard.*

Number Routine
Find the Missing Value

5–7 min

Build Fluency Students build reasoning skills as they are given a set of solved equations and must determine the missing values in related equations by looking for a pattern.

Remind students that this is a mental math activity.

These prompts encourage students to talk about their reasoning:

- How did a pattern help you evaluate the remaining equations?
- How do the number of zeros in the factors compare to the number of zeros in the products?
- Will the number of zeros in the products always be equal to the number of zeros in the factors? Do the equations after 5 × 6 follow this pattern? What is different about 5 × 6?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about what happens to a product if one of its factors is multiplied by a power of 10 and look for a pattern.

Is It Always True?

- Is the pattern always true?

Teaching Tip You may wish to have students work in small groups to discuss what they notice about the multiplication problems. Invite them to share what they are wondering and how they decide how to analyze the equations. Encourage students to share their observations and to listen respectfully to classmates. Students can build off of each other's ideas in order to fully develop the pattern.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of using place-value patterns to multiply decimals and are based on possible comments and questions students may make during the share out.

- What is happening in each of the equations? What did you do first to find the pattern?
- How can we check a pattern to see if it works?
- What are you wondering about the pattern?

Math is... Mindset

- How can you think about the equations in different ways?

SEL Responsible Decision-Making: Evaluate

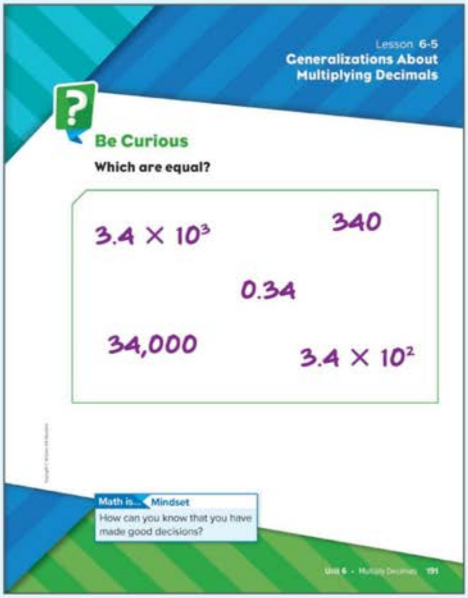
As students begin the Is It Always True? routine, have them think about different ways to analyze or describe the equations. As they analyze the equations, encourage them to think about different attributes or characteristics.

Transition to Explore & Develop

Focus students' attention on what generalizations they can make about what happens to a product if one of its factors is multiplied by a power of 10.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about what happens to a product if one of its factors is multiplied by a power of 10.



Lesson 6-5
Generalizations About Multiplying Decimals

Be Curious

Which are equal?

3.4×10^3

340

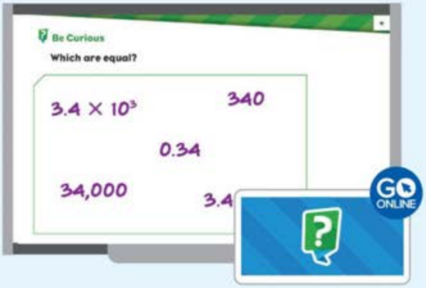
0.34

34,000

3.4×10^2

Math is... Mindset
How can you know that you have made good decisions?

Unit 6 • Multiply Decimals 191



Be Curious

Which are equal?

3.4×10^3

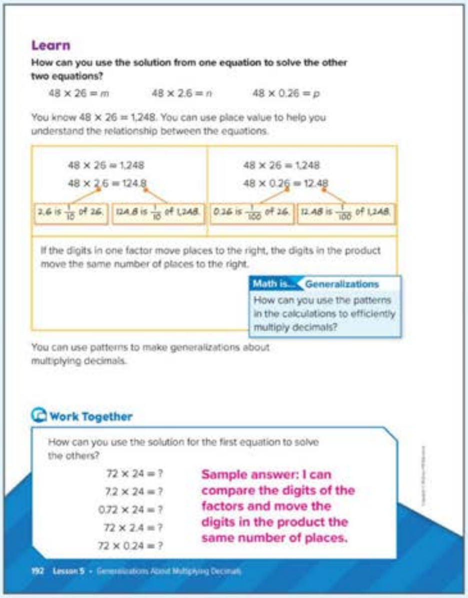
340

0.34

34,000

3.4

Explore & Develop 20 min



Learn

How can you use the solution from one equation to solve the other two equations?

$48 \times 26 = m$ $48 \times 2.6 = n$ $48 \times 0.26 = p$

You know 48 × 26 = 1,248. You can use place value to help you understand the relationship between the equations.

$48 \times 26 = 1{,}248$
$48 \times 2.6 = 124.8$

2.6 is $\frac{1}{10}$ of 26.
124.8 is $\frac{1}{10}$ of 1,248.

$48 \times 26 = 1{,}248$
$48 \times 0.26 = 12.48$

0.26 is $\frac{1}{100}$ of 26.
12.48 is $\frac{1}{100}$ of 1,248.

If the digits in one factor move places to the right, the digits in the product move the same number of places to the right.

Math is... Generalizations
How can you use the patterns in the calculations to efficiently multiply decimals?

You can use patterns to make generalizations about multiplying decimals.

Work Together

How can you use the solution for the first equation to solve the others?

$72 \times 24 = ?$
$7.2 \times 24 = ?$
$0.72 \times 24 = ?$
$72 \times 2.4 = ?$
$72 \times 0.24 = ?$

Sample answer: I can compare the digits of the factors and move the digits in the product the same number of places.

192 Lesson 5 • Generalizations About Multiplying Decimals

❶ Pose the Problem

MLR Discussion Supports

As students engage in discussing the answers to the four questions, restate statements they make as a question to seek clarification. Encourage students to challenge each other's ideas when warranted, as well as to elaborate on their ideas and give examples.

ETP Pose Purposeful Questions

- If the factors in multiplication equations share the same digits in the same order, what do you predict about the digits in their products?
- How can numbers have the same digits in the same order, but different values?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students. Provide them with three equations similar to those on the Learn page. Assign one unsolved equation to each student to work on individually. Then have the students compare and contrast the strategies they used to solve their equation. Revisit this activity throughout the lesson to help students build proficiency.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- How can you use the products of whole numbers to help you multiply decimals?

Key Takeaway

- Place-value concepts and properties of operations can justify patterns in the placement of digits when multiplying two decimal numbers.

Work Together

Students analyze equations with factors that are multiples of powers of ten to determine how the whole number product can be used to find the similar decimal products.

! Common Error Make sure students (especially ones who are moving the decimal point), are careful with left/right. If the digits in a factor move right, the digits in the product move right.

LOM Language of Math

Students need reinforcement in the proper naming of decimals, as errors in pronunciation can lead to confusion, e.g., tens and tenths. Provide opportunities for students to say the names of decimal numbers repeatedly and remind them that Math Is...Precision is about communicating precisely to others in addition to calulating accurately and efficiently.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students analyze products of related decimal factors to identify place value patterns when multiplying decimals.

Directions: Have students work on their own or in small groups. Ask them to write down the equations from the Pose the Problem. Before calculating the products, ask students to predict similarities and differences of the products and discuss how they came to these conclusions.

After students have had time to record their prediction, have them find the products using previously taught strategies. Students should determine whether their prediction was true, and discuss why. Ask each student or group to create a generalization statement about multiplying decimals to share with the class.

ETP Support Productive Struggle

- How are each of the expressions related to the whole-number expression?
- What did you do first to find a pattern?
- How can you check a pattern to see if it works?
- How can you think about the expressions in a different way?

Math is... Generalizations

- How can you use the patterns in the calculations to efficiently multiply decimals?

Students use repeated calculations to create general methods.

Activity Debrief: Facilitate a discussion about patterns in place value when multiplying decimals. Ensure students understand how the relationship between factors impacts the relationship between products.

Have students revisit the Pose the Problem question and discuss answers.

- How can you use the solution from one equation to solve the other two equations?

Guided Exploration

Students extend their understanding of multiplying decimals to make a generalization using place value patterns.

ETP Facilitate Meaningful Mathematical Discourse

- **Think About It:** What do you notice about these equations?

Have the students use area models to solve $48 \times 26 = m$, $48 \times 2.6 = n$, and $48 \times 0.26 = p$. Ask:

- How can you estimate each product?
- How will you decompose each factor? Why?
- How can you find the partial products?
- How can you find each product?
- Are your calculated products reasonable? How do you know?

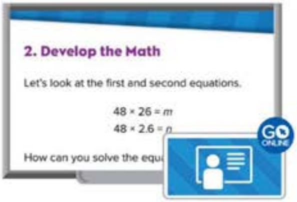
Distribute place-value charts as a tool to assist students answering the following. Ask:

- How do the digits in 26 and 1,248 relate to the digits that are in $\frac{1}{10}$ of 26 and in $\frac{1}{10}$ of 1,248?
- How do the digits in 26 and 1,248 relate to the digits that are in 26×0.1 and in $1{,}248 \times 0.1$?
- How do the digits in 26 and 1,248 relate to the digits that are in $\frac{1}{100}$ of 26 and $\frac{1}{100}$ of 1,248?
- How do the digits in 26 and 1,248 relate to the digits that are in 26×0.01 and $1{,}248 \times 0.01$?

Math is... Generalizations

- How can you use the patterns in the calculations to efficiently multiply decimals?

Students use repeated calculations to create general methods.



2. Develop the Math

Let's look at the first and second equations.

$48 \times 26 = m$

$48 \times 2.6 = n$

How can you solve the equ

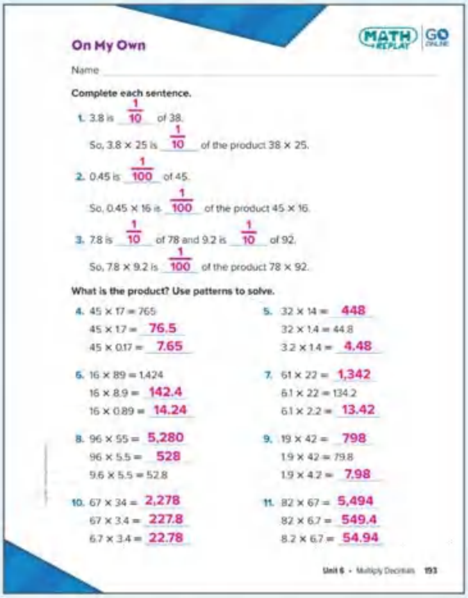
EL English Learner Scaffolds

Entering/Emerging Support students in understanding cause and effect as expressed by *If…, then…* statements. Go to your classroom door. Point at the doorknob, and say, *If I turn this, the door opens,* then demonstrate. Repeat with a new classroom object or manipulative. Then, show students two more examples, one that shows cause and effect, and one that does not. For example, *If I put on my sweater, I won't be so cold. And If I put on my glasses, I won't be so cold.* Ask each time, *Is this true? Yes or No?*

Developing/Expanding Support students in understanding cause and effect as expressed by *If…, then…* statements. Go to your classroom door. Point at the doorknob, and say, *If I turn this, the door opens,* then demonstrate. Repeat with a new classroom object or manipulative. Then, ask students to perform a task of their own, saying their own cause and effect sentence; for example, *if I take this chip away, [two] will be left.* Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to explain what happens if the digits in one factor moves places to the right. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, that's not correct because… or No, if the digits….*

Practice & Reflect 10 min



On My Own

MATH REPLAY | GO ONLINE

Name

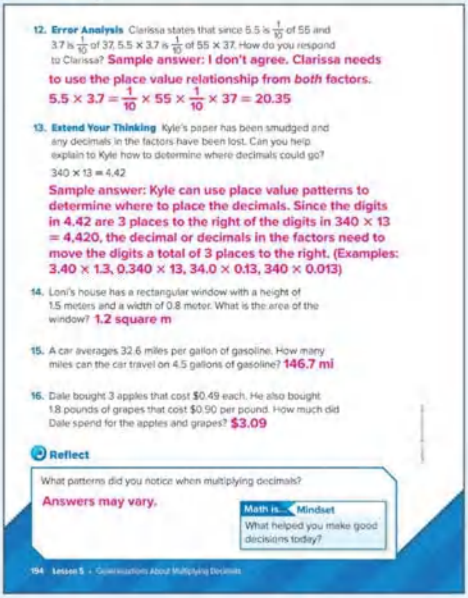
Complete each sentence.

1. 3.8 is $\frac{1}{10}$ of 38.
   So, 3.8 × 25 is $\frac{1}{10}$ of the product 38 × 25.
2. 0.45 is $\frac{1}{100}$ of 45.
   So, 0.45 × 16 is $\frac{1}{100}$ of the product 45 × 16.
3. 7.8 is $\frac{1}{10}$ of 78 and 9.2 is $\frac{1}{10}$ of 92.
   So, 7.8 × 9.2 is $\frac{1}{100}$ of the product 78 × 92.

What is the product? Use patterns to solve.

4. 45 × 17 = 765
   45 × 1.7 = 76.5
   45 × 0.17 = 7.65
5. 32 × 14 = 448
   32 × 1.4 = 44.8
   3.2 × 1.4 = 4.48
6. 16 × 89 = 1,424
   16 × 8.9 = 142.4
   16 × 0.89 = 14.24
7. 61 × 22 = 1,342
   6.1 × 22 = 134.2
   6.1 × 2.2 = 13.42
8. 96 × 55 = 5,280
   96 × 5.5 = 528
   9.6 × 5.5 = 52.8
9. 19 × 42 = 798
   1.9 × 42 = 79.8
   1.9 × 4.2 = 7.98
10. 67 × 34 = 2,278
    67 × 3.4 = 227.8
    6.7 × 3.4 = 22.78
11. 82 × 67 = 5,494
    82 × 6.7 = 549.4
    8.2 × 6.7 = 54.94

Unit 6 • Multiply Decimals 193



12. **Error Analysis** Clarissa states that since 5.5 is $\frac{1}{10}$ of 55 and 3.7 is $\frac{1}{10}$ of 37, 5.5 × 3.7 is $\frac{1}{10}$ of 55 × 37. How do you respond to Clarissa? **Sample answer: I don't agree. Clarissa needs to use the place value relationship from *both* factors.**
    $5.5 \times 3.7 = \frac{1}{10} \times 55 \times \frac{1}{10} \times 37 = 20.35$
13. **Extend Your Thinking** Kyle's paper has been smudged and any decimals in the factors have been lost. Can you help explain to Kyle how to determine where decimals could go?
    340 × 13 = 4.42
    Sample answer: Kyle can use place value patterns to determine where to place the decimals. Since the digits in 4.42 are 3 places to the right of the digits in 340 × 13 = 4,420, the decimal or decimals in the factors need to move the digits a total of 3 places to the right. (Examples: 3.40 × 1.3, 0.340 × 13, 34.0 × 0.13, 340 × 0.013)
14. Loni's house has a rectangular window with a height of 1.5 meters and a width of 0.8 meter. What is the area of the window? **1.2 square m**
15. A car averages 32.6 miles per gallon of gasoline. How many miles can the car travel on 4.5 gallons of gasoline? **146.7 mi**
16. Dale bought 3 apples that cost $0.49 each. He also bought 1.8 pounds of grapes that cost $0.90 per pound. How much did Dale spend for the apples and grapes? **$3.09**

Reflect

What patterns did you notice when multiplying decimals?

Answers may vary.

Math is... Mindset

What helped you make good decisions today?

194 Lesson 5 • Generalizations About Multiplying Decimals

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 10-11 Students may properly decompose and multiply the decimals only to make a mistake when adding. Remind students to add decimals by place value.

Item Analysis

Item	DOK	Rigor
1–3	2	Conceptual Understanding
4–11	2	Procedural Skill and Fluency
12–13	3	Conceptual Understanding
14–16	2	Application

Reflect

Students complete the Reflect question.

- What patterns did you notice when multiplying decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you think about problems in different ways?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can use patterns based on place value concepts and properties of operations to make generalizations about multiplying decimals.
- I can use those generalizations to determine the placement of digits in a product.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

GO ONLINE

MATH REPLAY

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Use patterns to multiply decimals	5.NBT.B.7
2	2	Use patterns to multiply decimals	5.NBT.B.7
3	2	Use patterns to multiply decimals	5.NBT.B.7
4	2	Use patterns to multiply decimals	5.NBT.B.7

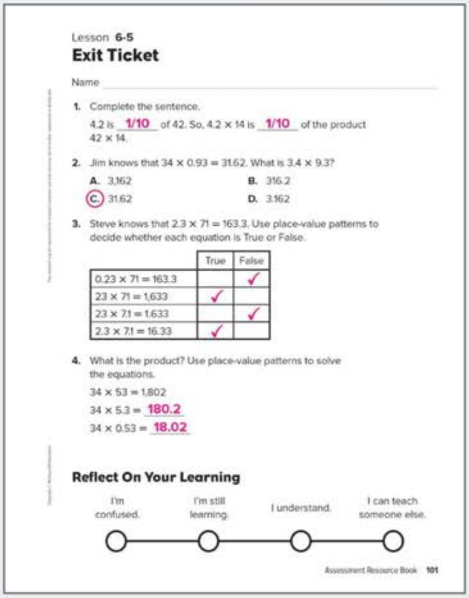
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the Ⓑ or Ⓔ activities
3 of 4	*Take Another Look* or any of the Ⓑ activities
2 or fewer of 4	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking



Lesson 6-5

Exit Ticket

Name

1. Complete the sentence.
4.2 is 1/10 of 42. So, 4.2 × 14 is 1/10 of the product 42 × 14.

2. Jim knows that 34 × 0.93 = 31.62. What is 3.4 × 9.3?

A. 3,162 B. 316.2

[✓ C.] 31.62 D. 3.162

3. Steve knows that 2.3 × 71 = 163.3. Use place-value patterns to decide whether each equation is True or False.

	True	False
0.23 × 71 = 163.3		✓
23 × 71 = 1,633	✓	
23 × 7.1 = 1.633		✓
2.3 × 7.1 = 16.33	✓	

4. What is the product? Use place-value patterns to solve the equations.
34 × 53 = 1,802
34 × 5.3 = 180.2
34 × 0.53 = 18.02

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 101

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Fill It In and Predict

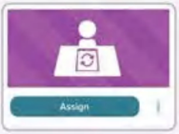
Work with pairs of students. Draw an area model with two rectangles. Students find the product of 6 × 76 by taking turns filling in each empty space in the area model for the decomposed factors and the partial products. Both students add the partial products. Have students predict the products answers for .6 × 76, 6 × 7.6, and .6 × .76 and explain their reasoning.
Assist students in revising their model to show these products before solving.

GO ONLINE

Take Another Look Lesson

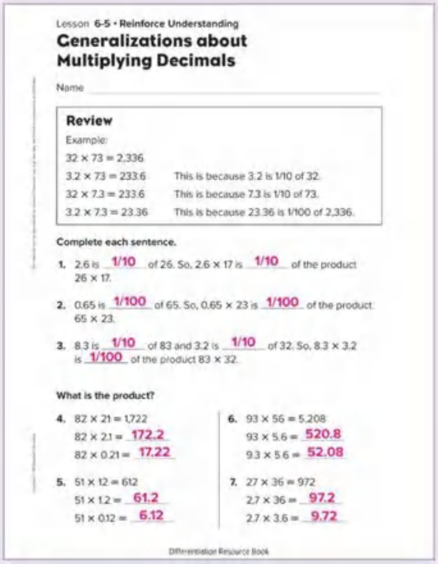
Assign the interactive lesson to reinforce targeted skills.

- Multiply Decimal Numbers (Patterns)



INDEPENDENT WORK

Differentiation Resource Book, p. 59



Lesson 6-5 • Reinforce Understanding

Generalizations about Multiplying Decimals

Name ________

Review

Example:

32 × 73 = 2,336

3.2 × 73 = 233.6 This is because 3.2 is 1/10 of 32.

32 × 7.3 = 233.6 This is because 7.3 is 1/10 of 73.

3.2 × 7.3 = 23.36 This is because 23.36 is 1/100 of 2,336.

Complete each sentence.

1. 2.6 is 1/10 of 26. So, 2.6 × 17 is 1/10 of the product 26 × 17.
2. 0.65 is 1/100 of 65. So, 0.65 × 23 is 1/100 of the product 65 × 23.
3. 8.3 is 1/10 of 83 and 3.2 is 1/10 of 32. So, 8.3 × 3.2 is 1/100 of the product 83 × 32.

What is the product?

4. 82 × 21 = 1,722
82 × 2.1 = 172.2
82 × 0.21 = 17.22

5. 51 × 12 = 612
51 × 1.2 = 61.2
51 × 0.12 = 6.12

6. 93 × 56 = 5,208
93 × 5.6 = 520.8
9.3 × 5.6 = 52.08

7. 27 × 36 = 972
2.7 × 36 = 97.2
2.7 × 3.6 = 9.72

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Related Decimal Multiplication Task Cards

Students practice decimal multiplication.

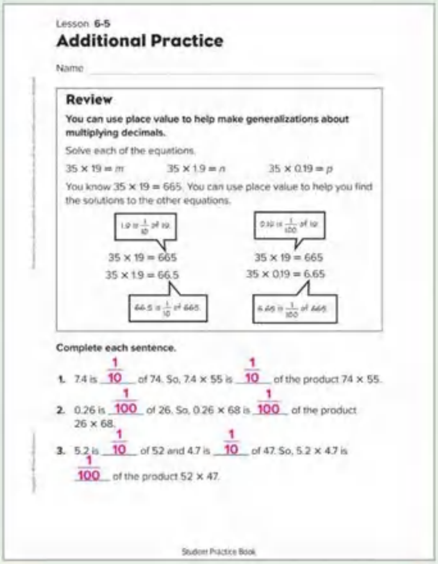
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 59–60



Lesson 6-5

Additional Practice

Name ________

Review

You can use place value to help make generalizations about multiplying decimals.

Solve each of the equations.

35 × 19 = m 35 × 1.9 = n 35 × 0.19 = p

You know 35 × 19 = 665. You can use place value to help you find the solutions to the other equations.

1.9 is $\frac{1}{10}$ of 19.

35 × 19 = 665

35 × 1.9 = 66.5

66.5 is $\frac{1}{10}$ of 665.

0.19 is $\frac{1}{100}$ of 19.

35 × 19 = 665

35 × 0.19 = 6.65

6.65 is $\frac{1}{100}$ of 665.

Complete each sentence.

1. 7.4 is $\frac{1}{10}$ of 74. So, 7.4 × 55 is $\frac{1}{10}$ of the product 74 × 55.
2. 0.26 is $\frac{1}{100}$ of 26. So, 0.26 × 68 is $\frac{1}{100}$ of the product 26 × 68.
3. 5.2 is $\frac{1}{10}$ of 52 and 4.7 is $\frac{1}{10}$ of 47. So, 5.2 × 4.7 is $\frac{1}{100}$ of the product 52 × 47.

Student Practice Book

Own It! Digital Station

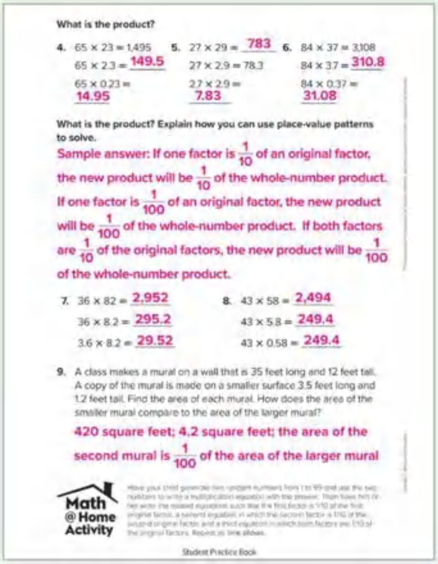
Build Fluency **Games**

Assign the digital game to develop fluency with multiplication of multi-digit numbers.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 59–60



What is the product?

4. 65 × 23 = 1,495
65 × 2.3 = 149.5
65 × 0.23 = 14.95

5. 27 × 29 = 783
27 × 2.9 = 78.3
2.7 × 2.9 = 7.83

6. 84 × 37 = 3,108
84 × 3.7 = 310.8
84 × 0.37 = 31.08

What is the product? Explain how you can use place-value patterns to solve.

Sample answer: If one factor is $\frac{1}{10}$ of an original factor, the new product will be $\frac{1}{10}$ of the whole-number product. If one factor is $\frac{1}{100}$ of an original factor, the new product will be $\frac{1}{100}$ of the whole-number product. If both factors are $\frac{1}{10}$ of the original factors, the new product will be $\frac{1}{100}$ of the whole-number product.

7. 36 × 82 = 2,952
36 × 8.2 = 295.2
3.6 × 8.2 = 29.52

8. 43 × 58 = 2,494
43 × 5.8 = 249.4
43 × 0.58 = 249.4

9. A class makes a mural on a wall that is 35 feet long and 12 feet tall. A copy of the mural is made on a smaller surface 3.5 feet long and 1.2 feet tall. Find the area of each mural. How does the area of the smaller mural compare to the area of the larger mural?

420 square feet; 4.2 square feet; the area of the second mural is $\frac{1}{100}$ of the area of the larger mural

Math @ Home Activity

Student Practice Book

Extend Thinking

WORKSTATIONS

Use It! Application Station

Rock Garden Students use metric measurements to create a model of a rock garden. *The content of this card has concepts covered later in Lesson 6-6. You may want to assign this card to students ready to explore content covered later in this unit.*

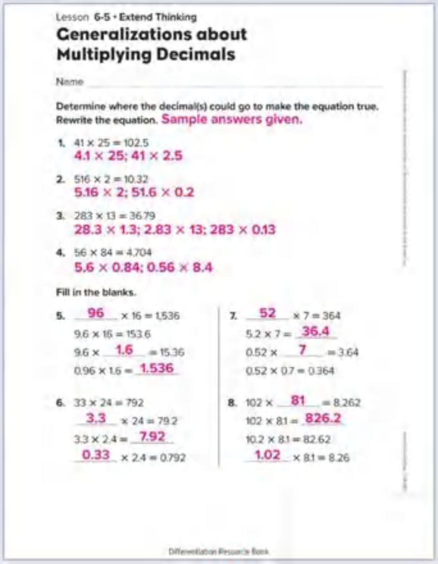
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 60



Lesson 6-5 • Extend Thinking

Generalizations about Multiplying Decimals

Name ______________________

Determine where the decimal(s) could go to make the equation true. Rewrite the equation. Sample answers given.

1. 41 × 25 = 102.5
4.1 × 25; 41 × 2.5

2. 516 × 2 = 10.32
5.16 × 2; 51.6 × 0.2

3. 283 × 13 = 36.79
28.3 × 1.3; 2.83 × 13; 283 × 0.13

4. 56 × 84 = 4.704
5.6 × 0.84; 0.56 × 8.4

Fill in the blanks.

5. 96 × 16 = 1,536
9.6 × 16 = 153.6
9.6 × 1.6 = 15.36
0.96 × 1.6 = 1.536

6. 33 × 24 = 792
3.3 × 24 = 79.2
3.3 × 2.4 = 7.92
0.33 × 2.4 = 0.792

7. 52 × 7 = 364
5.2 × 7 = 36.4
0.52 × 7 = 3.64
0.52 × 0.7 = 0.364

8. 102 × 81 = 8,262
102 × 8.1 = 826.2
10.2 × 8.1 = 82.62
1.02 × 8.1 = 8.26

Differentiation Resource Book

LESSON **6-6**

Explain Strategies to Multiply Decimals

Learning Targets

- I can explain why I chose a strategy to solve multiplication equations involving decimals.
- I can understand other strategies to solve multiplication equations involving decimals.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.7** Add, subtract, multiply, and divide decimals to hundredths, using concrete models or drawings and strategies based on place value, properties of operations, and/or the relationship between addition and subtraction; relate the strategy to a written method and explain the reasoning used.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Construct viable arguments and critique the reasoning of others.

Vocabulary

Math Terms	**Academic Terms**
area model	relevant
decimal grid	suggest
decomposition	
partial product	
unknown	

Materials

The materials may be for any part of the lesson.

- decimal grids
- *Show and Explain Your Reasoning* Teaching Resource

Focus

Content Objectives

- Students can explain their reasoning for using different strategies to solve.
- Students explain different strategies to multiply decimals.

Language Objectives

- Students explain their reasoning for using particular strategies to multiply decimals while answering *Wh-* questions.
- To support cultivating conversation, ELs participate in MLR1: Stronger and Clearer Each Time.

SEL Objective

- Students discuss the value of hearing different viewpoints and approaches to problem solving.

Coherence

Previous

- Students added and subtracted multi-digit whole numbers (Grade 4).
- Students used place-value patterns to multiply decimals (Lesson 5).

Now

- Students choose and use strategies to solve real-world problems involving the product of decimals.

Next

- Students will divide multi-digit whole numbers (Unit 7).
- Students will add, subtract, multiply, and divide using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding

- Students build on their understanding of multiplying decimals as they use representations and models to find the product of decimals.

Procedural Skill & Fluency

- Students build proficiency with choosing and using strategies for multiplying decimals.

Application

- Students apply their understanding of multiplication of decimals to solve problems with real-world contexts.

Application is not a specific element of rigor for this standard.

Number Routine
Where Does It Go? 5–7 min

Build Fluency Students build number sense as they place the same decimal number on number lines with different end points.

These prompts encourage students to talk about their reasoning:

- What did you notice about 16.72?
- What did you notice about each number line?
- How did you decide where to place 16.72 on each number line?
- How could you label the number lines to help with placing the number?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about what the problem represents and how the parts relate to the whole. This is an entry point to choosing one of the strategies they know for mulitplying decimals to solve the problem.

Numberless Word Problem

- What math do you see in this problem?

Teaching Tip You may want to have students work in pairs to discuss what they notice about the word problem.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' noticing and wondering about choosing and using strategies to multiply decimals and are based on possible comments and questions that students may make during the share out.

- What operation would you use to solve this problem? How do you know?
- What kinds of numbers do you think are involved in this problem? Why?

Math is... Mindset

- How can you show others that you value their ideas?

SEL Social Awareness: Appreciate Diversity

As students consider the Numberless Word Problem routine, invite them to discuss different strategies that they might use to solve a problem like this. As students share their unique thought processes and ideas, emphasize the value of the differences as well as the similarities so students can understand the importance of diversity within a math context.

Transition to Explore & Develop

Ask questions that get students thinking about strategies and models used to multiply decimals. Guide students to think about how they can explain strategies used to solve real-world problems involving decimal products.

ETP Establish Mathematics Goals to Focus Learning

- Let's think about choosing and using strategies that can be used to multiply decimals and solve real-world problems.

Lesson 6-6

Explain Strategies to Multiply Decimals

Be Curious

What math do you see in this problem?

Amy rides her bike a certain distance to school each day. Jason rides his bike a portion of the distance that Amy rides. How far does Jason ride his bike to school each day?

Math is... Mindset

How can you show others that you value their ideas?

Unit 6 • Multiply Decimals 195

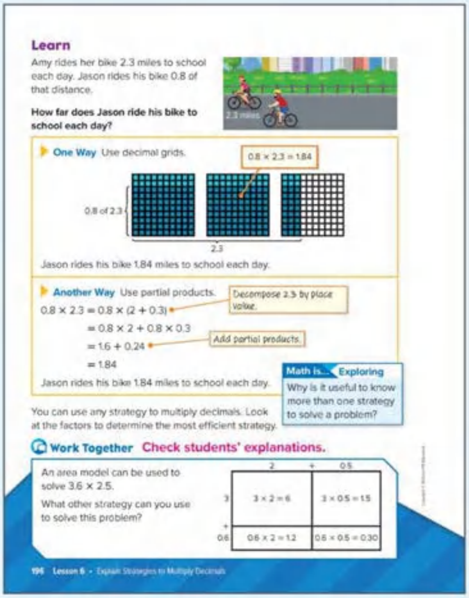
Be Curious

What math do you see in this problem?

Amy rides her bike a certain distance to school each day. Jason rides his bike a portion of the distance that Amy rides. How far does Jason ride his bike to school each day?

Explore & Develop

20 min



Learn

Amy rides her bike 2.3 miles to school each day. Jason rides his bike 0.8 of that distance.

How far does Jason ride his bike to school each day?

One Way Use decimal grids.

Jason rides his bike 1.84 miles to school each day.

Another Way Use partial products.

$0.8 \times 2.3 = 0.8 \times (2 + 0.3)$

$= 0.8 \times 2 + 0.8 \times 0.3$

$= 1.6 + 0.24$

$= 1.84$

Jason rides his bike 1.84 miles to school each day.

Math is... Exploring
Why is it useful to know more than one strategy to solve a problem?

You can use any strategy to multiply decimals. Look at the factors to determine the most efficient strategy.

Work Together **Check students' explanations.**

An area model can be used to solve 3.6 × 2.5.

What other strategy can you use to solve this problem?

196 **Lesson 6** • Explain Strategies to Multiply Decimals

❶ Pose the Problem

ETP Pose Purposeful Questions

- What strategies can you use to solve the problem?
- In what ways can you model this problem?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and give them a multiplication problem. Have them individually write sentences explaining the strategies that can be used to solve the problem. Then have them share their writing with their partner and compare and contrast the strategies they wrote about, choosing by the end of their discussion which strategy they think is the most efficient and why.

❸ Bring It Together

ETP Elicit and Use Evidence of Student Thinking

- What do you consider when deciding on a strategy to use to solve a real-world problem involving products of decimals?

Key Takeaway

- Any of the multiplication strategies that students already know can be used to determine a product.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of using an area model to find the product of a real-world problem involving decimals.

Common Misconception: Students may struggle to find other ways to show this product. Tell them that they could use a set of 12 decimal grids in 4 rows of 3 and shade squares as in the earlier example.

LOM Language of Math

The word *strategy* is from the Greek word *stratēgia*, meaning "generalship," or "the skill or practice of exercising military command." Mathematical strategies are skills or practices allow us to exercise command over problem-solving.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explain strategies used for solving real-world problems involving decimal products.

Materials: *Show and Explain Your Strategies* Teaching Resource

Directions: Provide copies of the *Show and Explain Your Strategies* Teaching Resource. Have students work together to solve the Pose the Problem. Encourage students to solve using more than one strategy.

ETP Support Productive Struggle

- Which strategies or models may be used to solve?
- How did you determine which strategy to use to solve this problem?
- Do you think one strategy is more efficient than another? Explain why.
- Give an example of a multiplication problem that would be most efficient using a representation. An area model? Using patterns in the placement of the decimal?

Math is... Exploring

- Why is it useful to know more than one strategy to solve a problem?

Students strive to understand multiple approaches to problems.

Activity Debrief: Have groups share and compare their strategies for solving. Discuss similarities and differences between the strategies.

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Show and Explain Your Strategies

Show

Explain

Check

Guided Exploration

Students consider which strategy they would use to solve a real-world problem involving decimal products.

ETP Facilitate Meaningful Mathematical Discourse

Have the students estimate the solution. Ask:

- What factors will you use to estimate the solution? Why?

Have students share strategies to determine the total number of squares in the overlapping shaded region. Ask:

- How can you explain how your strategy works?
- How can you explain how someone else's strategy worked?
- How does the decimal grid represent the problem?

Have students use the fact $23 \times 8 = 184$ and patterns based on place value concepts and properties of operations to solve the problem. Ask:

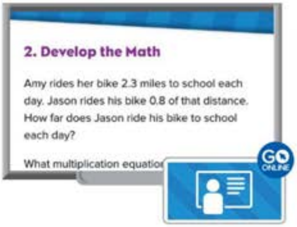
- How many places to the right did each digit in 23 move?
- How many places to the right did each digit in 8 move?
- How many places to the right should each digit in 184 move?
- Use your estimate to assess the reasonableness of your calculated solution. Is your calculated solution reasonable? Why or why not?

- **Think About It:** Which strategies would be less efficient for solving $2.3 \times 0.8 = d$?

Math is... Exploring

- Why is it useful to know more than one strategy to solve a problem?

Students strive to understand multiple approaches to problems.



2. Develop the Math

Amy rides her bike 2.3 miles to school each day. Jason rides his bike 0.8 of that distance. How far does Jason ride his bike to school each day?

What multiplication equatio

EL English Learner Scaffolds

Entering/Emerging Support students in understanding the term *efficient* by completing a task first in an efficient way, and then in an inefficient way. For example, move from point A to point B using the shortest path. Say *This is an efficient way to [get to the door]*. Repeat, this time in an inefficient manner and say *This is not an efficient way to [get to the door]*. Use another example, and ask, *Is this an efficient way to [get to the desk]?*

Developing/Expanding Support students in understanding the term *efficient* by completing a task first in an efficient way, and then in an inefficient way. For example, move from point A to point B using the shortest path. Say *This is an efficient way to [get to the door]*. Repeat, this time in an inefficient manner, and say *This is not an efficient way to [get to the door]*. Ask students use another example, and using the word *efficient*.

Bridging/Reaching Ask students to discuss which patterns they find most efficient for solving the problem. Allow students to interject, pointing out any mistakes that they may catch in meaning or understanding. For example, *No, I disagree because...* or *No, that's not an efficient way because...*

Practice & Reflect

10 min

On My Own

Name

Check students' explanations.

What is the product? Explain the strategy you used to solve.

1. 2.9 × 0.7 = d
2.03

2. 5.6 × 3.2 = b
17.92

3. Each bottle holds the same amount. How much water can these bottles hold? 5.25 L

4. Rebecca cut these ribbons to the same length. How much ribbon did Rebecca use in all? 6.88 m

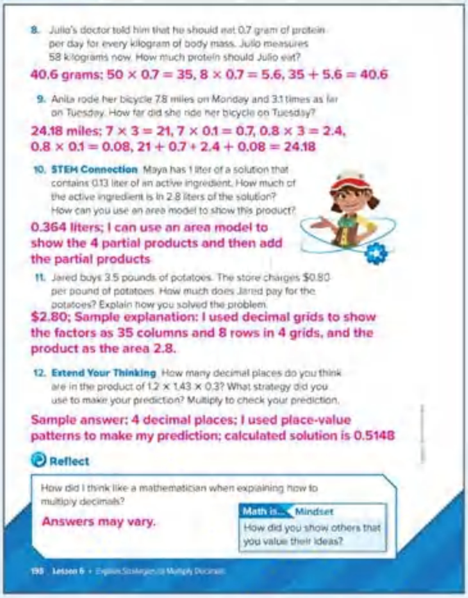
5. Experts recommend that people have 4.7 grams of potassium per day. Last week Marcus averaged 0.9 times as much potassium as the recommendation. How much potassium did Marcus average each day last week? 4.23 g

6. A pitcher has a capacity of 3.9 liters. A cooler has a capacity 9.2 times greater. What is the capacity of the cooler? 35.88 L

Solve. Explain the strategy used to solve.

7. Kara has a bag of apples. Each apple weighs 0.4 pound on average. There are 17 apples in her bag. What is the total weight of her apples?
6.8 pounds; Sample explanation: 10 × 0.4 = 4, 7 × 0.4 = 2.8, 4 + 2.8 = 6.8

Unit 6 • Multiply Decimals 197



8. Julio's doctor told him that he should eat 0.7 gram of protein per day for every kilogram of body mass. Julio measures 58 kilograms now. How much protein should Julio eat?
40.6 grams; 50 × 0.7 = 35, 8 × 0.7 = 5.6, 35 + 5.6 = 40.6

9. Anita rode her bicycle 7.8 miles on Monday and 3.1 times as far on Tuesday. How far did she ride her bicycle on Tuesday?
24.18 miles; 7 × 3 = 21, 7 × 0.1 = 0.7, 0.8 × 3 = 2.4, 0.8 × 0.1 = 0.08, 21 + 0.7 + 2.4 + 0.08 = 24.18

10. **STEM Connection** Maya has 1 liter of a solution that contains 0.13 liter of an active ingredient. How much of the active ingredient is in 2.8 liters of the solution? How can you use an area model to show this product?
0.364 liters; I can use an area model to show the 4 partial products and then add the partial products

11. Jared buys 3.5 pounds of potatoes. The store charges $0.80 per pound of potatoes. How much does Jared pay for the potatoes? Explain how you solved the problem.
$2.80; Sample explanation: I used decimal grids to show the factors as 35 columns and 8 rows in 4 grids, and the product as the area 2.8.

12. **Extend Your Thinking** How many decimal places do you think are in the product of 1.2 × 1.43 × 0.3? What strategy did you use to make your prediction? Multiply to check your prediction.
Sample answer: 4 decimal places; I used place-value patterns to make my prediction; calculated solution is 0.5148

Reflect

How did I think like a mathematician when explaining how to multiply decimals?

Answers may vary.

Math is... Mindset

How did you show others that you value their ideas?

198 Lesson 6 • Explain Strategies to Multiply Decimals

Practice

ETP Build Procedural Fluency from Conceptual Understanding

Common Error: Exercises 1–11 Students may make place value errors when multiplying decimals. Suggest that they estimate the products first.

Practice Item Analysis

Item	DOK	Rigor
1–2	1	Procedural Skill and Fluency
3–11	2	Application
12	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How did I think like a mathematician when explaining how to multiply decimals?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you show others that you value their ideas?

Students reflected on how they practiced social awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain why I chose a strategy to solve multiplication equations involving decimals.
- I can understand other strategies to solve multiplication equations involving decimals.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Explain strategies to multiply decimals	5.NBT.B.7
2	2	Explain strategies to multiply decimals	5.NBT.B.7
3	2	Explain strategies to multiply decimals	5.NBT.B.7

Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the B or E activities
2 of 3	*Take Another Look* or any of the B activities
1 or fewer of 3	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking

Lesson 6-6

Exit Ticket

Name

What is the product? Use a multiplication strategy to solve.

1. Marie's drinking glass has a capacity of 0.2 liters. The bucket she is using has a capacity 22.5 times greater. What is the capacity of the cooler?

   4.5 liters

2. Each block is 7.5 centimeters long. Adam places 9 of these blocks end-to-end to make a train. How long is Adam's train?

   67.5 cm

3. At the apple orchard, apples cost $1.80 per pound. Sally picked two bags of apples that weighed a total of 16 pounds. How much did Sally pay for the apples?

   $28.80

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

102 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

Reinforce Understanding

SMALL GROUP

Apply It!

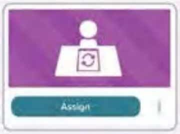
Work with students in small groups. Provide students with decimal grids that represents a decimal product such as 4.2 × 0.9 or 1.1 × 2.7. Each student writes the multiplication equation that goes with the decimal grids and a real-world problem that matches the model. Help students use strategies for finding each product. Students then present the decimal grids, equation, and problem to the group.

GO ONLINE

Take Another Look Lessons

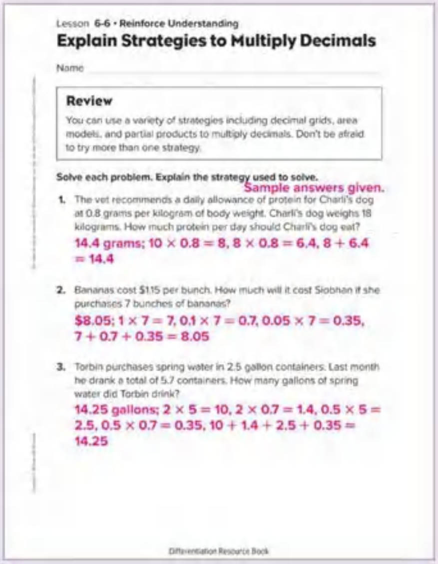
Assign the interactive lessons to reinforce targeted skills.

- Multiply Decimal Numbers (Area Model)
- Multiply Decimal Numbers (Patterns)



INDEPENDENT WORK

Differentiation Resource Book, p. 61



Lesson **6-6 • Reinforce Understanding**

Explain Strategies to Multiply Decimals

Name

Review

You can use a variety of strategies including decimal grids, area models, and partial products to multiply decimals. Don't be afraid to try more than one strategy.

Solve each problem. Explain the strategy used to solve.

Sample answers given.

1. The vet recommends a daily allowance of protein for Charli's dog at 0.8 grams per kilogram of body weight. Charli's dog weighs 18 kilograms. How much protein per day should Charli's dog eat?
   14.4 grams; 10 × 0.8 = 8, 8 × 0.8 = 6.4, 8 + 6.4 = 14.4
2. Bananas cost $1.15 per bunch. How much will it cost Siobhan if she purchases 7 bunches of bananas?
   $8.05; 1 × 7 = 7, 0.1 × 7 = 0.7, 0.05 × 7 = 0.35, 7 + 0.7 + 0.35 = 8.05
3. Torbin purchases spring water in 2.5 gallon containers. Last month he drank a total of 5.7 containers. How many gallons of spring water did Torbin drink?
   14.25 gallons; 2 × 5 = 10, 2 × 0.7 = 1.4, 0.5 × 5 = 2.5, 0.5 × 0.7 = 0.35, 10 + 1.4 + 2.5 + 0.35 = 14.25

Differentiation Resource Book

Build Proficiency

WORKSTATIONS

Practice It! Game Station

Related Decimal Multiplication Task Cards

Students practice decimal multiplication using patterns.

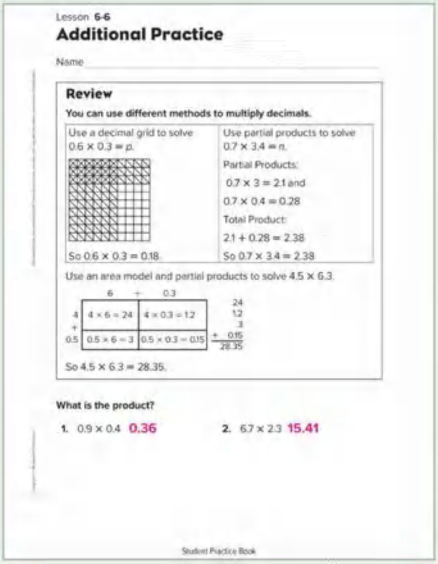
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 61–62



Lesson **6-6**

Additional Practice

Name

Review

You can use different methods to multiply decimals.

Use a decimal grid to solve 0.6 × 0.3 = p. So 0.6 × 0.3 = 0.18.	Use partial products to solve 0.7 × 3.4 = n. Partial Products: 0.7 × 3 = 2.1 and 0.7 × 0.4 = 0.28 Total Product: 2.1 + 0.28 = 2.38 So 0.7 × 3.4 = 2.38

Use an area model and partial products to solve 4.5 × 6.3.

	6	0.3
4	4 × 6 = 24	4 × 0.3 = 1.2
0.5	0.5 × 6 = 3	0.5 × 0.3 = 0.15

24
1.2
3
+ 0.15
28.35

So 4.5 × 6.3 = 28.35.

What is the product?

1. 0.9 × 0.4 0.36
2. 6.7 × 2.3 15.41

Student Practice Book

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with multiplication of multi-digit numbers.

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

INDEPENDENT WORK

Student Practice Book, pp. 61–62

Solve each problem. Explain the strategy used to solve.

3. Ursula walked 0.8 mile yesterday. She walked three times as far today. How far did Ursula walk today?

2.4 miles; Sample answer: I used decimal grids and shaded 3 groups of 8 tenths to show 2 whole grids and 4 tenths of another.

4. Bill jogged 4.8 miles on Saturday. On Monday, he jogged 0.6 of that distance. How many miles did Bill jog on Monday?

2.88 miles; Sample answer: I used partial products: 4 × 0.6 = 2.4 and 0.8 × 0.6 = 0.48, then 2.4 + 0.48 = 2.88

5. A rectangular picture frame measures 2.6 feet long and 1.6 feet tall. What is the area that is enclosed by the frame?

4.16 square feet; Sample answer: I used an area model and partial products: 2 × 1 = 2, 2 × 0.6 = 1.2, 0.6 × 1 = 0.6 and 0.6 × 0.6 = 0.36, then 2 + 1.2 + 0.6 + 0.36 = 4.16

6. Each orange in a bag of oranges weighs about 0.3 pounds. Giselle buys a bag that contains 14 oranges. About how much does the bag of oranges weigh?

about 4.2 pounds; Sample answer: I used partial products: 0.3 × 10 = 3 and 0.3 × 4 = 1.2, then 3 + 1.2 = 4.2

7. A rectangular vegetable garden measures 13 meters long and 9.4 meters wide. What is the area of the vegetable garden?

122.2 square meters; Sample answer: I used an area model and partial products: 10 × 9 = 90, 10 × 0.4 = 4, 3 × 9 = 27 and 3 × 0.4 = 1.2, then 90 + 4 + 27 + 1.2 = 122.2

Math @ Home Activity Have your child weigh or measure different objects around the home. Choose different numbers of objects and have your child find either the total weight of that many objects or the total length of that many objects placed end-to-end.

Student Practice Book

Extend Thinking

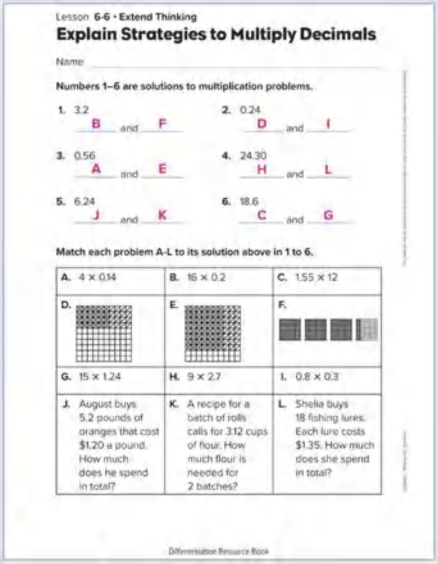
Use It! Application Station

Rock Garden Students use metric measurements to create a model of a rock garden.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

Differentiation Resource Book, p. 62



Lesson **6-6 • Extend Thinking**

Explain Strategies to Multiply Decimals

Name ______________________

Numbers 1–6 are solutions to multiplication problems.

1. 3.2 B and F

2. 0.24 D and I

3. 0.56 A and E

4. 24.30 H and L

5. 6.24 J and K

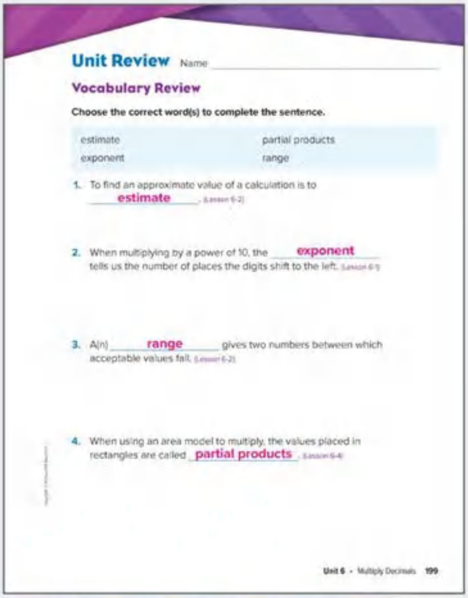
6. 18.6 C and G

Match each problem A-L to its solution above in 1 to 6.

A. 4 × 0.14	**B.** 16 × 0.2	**C.** 1.55 × 12
D.	**E.**	**F.**
G. 15 × 1.24	**H.** 9 × 2.7	**I.** 0.8 × 0.3
J. August buys 5.2 pounds of oranges that cost $1.20 a pound. How much does he spend in total?	**K.** A recipe for a batch of rolls calls for 3.12 cups of flour. How much flour is needed for 2 batches?	**L.** Shelia buys 18 fishing lures. Each lure costs $1.35. How much does she spend in total?

Differentiation Resource Book

Unit Review



Unit Review Name ____________

Vocabulary Review

Choose the correct word(s) to complete the sentence.

estimate	partial products
exponent	range

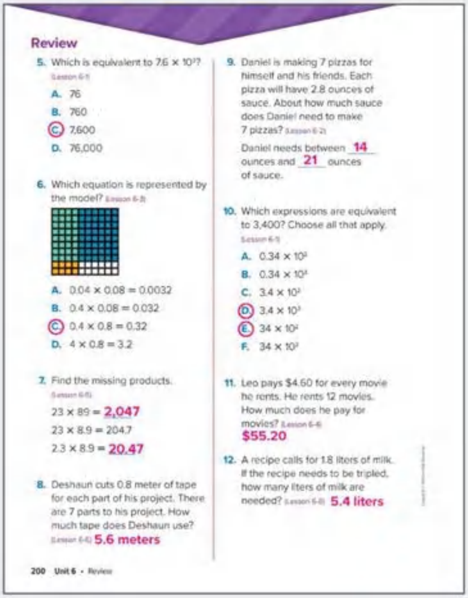
1. To find an approximate value of a calculation is to **estimate**. (Lesson 6-2)

2. When multiplying by a power of 10, the **exponent** tells us the number of places the digits shift to the left. (Lesson 6-1)

3. A(n) **range** gives two numbers between which acceptable values fall. (Lesson 6-2)

4. When using an area model to multiply, the values placed in rectangles are called **partial products**. (Lesson 6-4)

Unit 6 • Multiply Decimals 199



Review

5. Which is equivalent to 7.6×10^3? (Lesson 6-1)
   - A. 76
   - B. 760
   - [✓ C. 7,600]
   - D. 76,000

6. Which equation is represented by the model? (Lesson 6-3)
   - A. $0.04 \times 0.08 = 0.0032$
   - B. $0.4 \times 0.08 = 0.032$
   - [✓ C. $0.4 \times 0.8 = 0.32$]
   - D. $4 \times 0.8 = 3.2$

7. Find the missing products. (Lesson 6-5)

$23 \times 89 =$ **2,047**

$23 \times 8.9 = 204.7$

$2.3 \times 8.9 =$ **20.47**

8. Deshaun cuts 0.8 meter of tape for each part of his project. There are 7 parts to his project. How much tape does Deshaun use? (Lesson 6-2) **5.6 meters**

9. Daniel is making 7 pizzas for himself and his friends. Each pizza will have 2.8 ounces of sauce. About how much sauce does Daniel need to make 7 pizzas? (Lesson 6-6)

Daniel needs between **14** ounces and **21** ounces of sauce.

10. Which expressions are equivalent to 3,400? Choose all that apply. (Lesson 6-1)
    - A. 0.34×10^2
    - B. 0.34×10^4
    - C. 3.4×10^2
    - [✓ D. 3.4×10^3]
    - [✓ E. 34×10^2]
    - F. 34×10^3

11. Leo pays $4.60 for every movie he rents. He rents 12 movies. How much does he pay for movies? (Lesson 6-4)
$55.20

12. A recipe calls for 1.8 liters of milk. If the recipe needs to be tripled, how many liters of milk are needed? (Lesson 6-6) **5.4 liters**

200 Unit 6 • Review

Students can complete the **Unit Review** to prepare for the **Unit Assessment**. Students may complete the Review in their Interactive eBook in the Digital Students Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	6-2
2	6-1
3	6-2
4	6-4

Review

Item Analysis

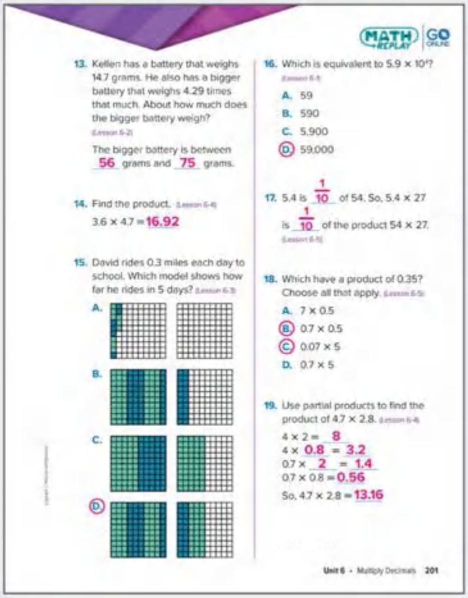
Item	DOK	Lesson	Standard
5	1	6-1	5.NBT.A.2
6	1	6-3	5.NBT.B.7
7	1	6-5	5.NBT.B.7
8	2	6-2	5.NBT.B.7
9	2	6-6	5.NBT.B.7
10	1	6-1	5.NBT.A.2
11	2	6-4	5.NBT.B.7
12	2	6-6	5.NBT.B.7

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

Item Analysis (continued)

Item	DOK	Lesson	Standard
13	2	6-2	5.NBT.B.7
14	1	6-4	5.NBT.B.7
15	2	6-3	5.NBT.B.7
16	1	6-1	5.NBT.A.2
17	1	6-5	5.NBT.B.7
18	1	6-5	5.NBT.B.7
19	1	6-4	5.NBT.B.7



13. Kellen has a battery that weighs 14.7 grams. He also has a bigger battery that weighs 4.29 times that much. About how much does the bigger battery weigh? (Lesson 6-2)

The bigger battery is between 56 grams and 75 grams.

14. Find the product. (Lesson 6-4)

3.6 × 4.7 = 16.92

15. David rides 0.3 miles each day to school. Which model shows how far he rides in 5 days? (Lesson 6-3)

A.

B.

C.

[✓ D.]

16. Which is equivalent to 5.9×10^4? (Lesson 6-1)

A. 59

B. 590

C. 5,900

[✓ D.] 59,000

17. 5.4 is $\frac{1}{10}$ of 54. So, 5.4 × 27 is $\frac{1}{10}$ of the product 54 × 27. (Lesson 6-5)

18. Which have a product of 0.35? Choose all that apply. (Lesson 6-5)

A. 7 × 0.5

[✓ B.] 0.7 × 0.5

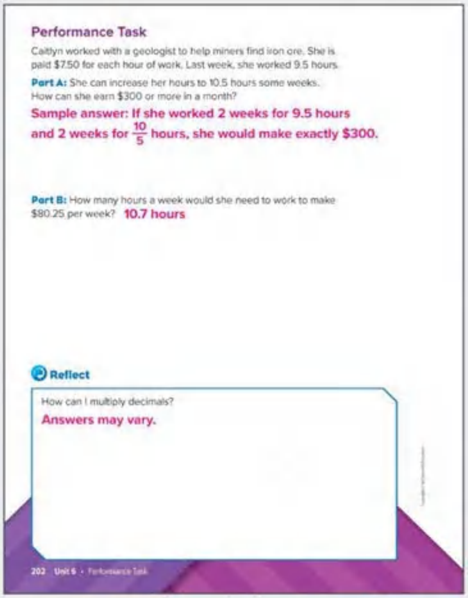
[✓ C.] 0.07 × 5

D. 0.7 × 5

19. Use partial products to find the product of 4.7 × 2.8. (Lesson 6-4)

4 × 2 = 8
4 × 0.8 = 3.2
0.7 × 2 = 1.4
0.7 × 0.8 = 0.56
So, 4.7 × 2.8 = 13.16

Unit 6 • Multiply Decimals 201



Performance Task

Caitlyn worked with a geologist to help miners find iron ore. She is paid $7.50 for each hour of work. Last week, she worked 9.5 hours.

Part A: She can increase her hours to 10.5 hours some weeks. How can she earn $300 or more in a month?

Sample answer: If she worked 2 weeks for 9.5 hours and 2 weeks for $\frac{10}{5}$ hours, she would make exactly $300.

Part B: How many hours a week would she need to work to make $80.25 per week? **10.7 hours**

Reflect

How can I multiply decimals?

Answers may vary.

202 Unit 6 • Performance Task

Performance Task

Standards: 5.NBT.A.2, 5.NBT.B.7

Rubric (4 points)

Part A (DOK 2) – 2 points

2 POINTS	Student's work reflects a proficiency with decimal multiplication. The solution shows a reasonable solution.
1 POINTS	Student's work reflects developing proficiency with decimal multiplication. The solution is not reasonable due to computational errors.
0 POINTS	Student's work reflects a poor understanding of decimal multiplication. The solution is not reasonable.

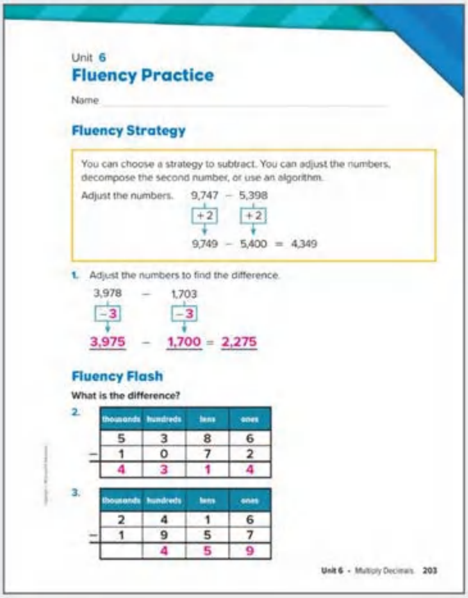
Part B (DOCK 2) – 2 points

2 POINTS	Student's work reflects a proficiency with decimal multiplication. The solution is accurate.
1 POINTS	Student's work reflects developing proficiency with decimal multiplication. The solution is incorrect due to computational errors, not conceptual weakness.
0 POINTS	Student's work reflects a poor understanding of decimal multiplication. The solution is incorrect.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.

Fluency Practice



Unit 6

Fluency Practice

Name

Fluency Strategy

You can choose a strategy to subtract. You can adjust the numbers, decompose the second number, or use an algorithm.

Adjust the numbers. 9,747 − 5,398

$\boxed{+2}$ $\boxed{+2}$

9,749 − 5,400 = 4,349

1. Adjust the numbers to find the difference.

3,978 − 1,703

$\boxed{-3}$ $\boxed{-3}$

3,975 − 1,700 = 2,275

Fluency Flash

What is the difference?

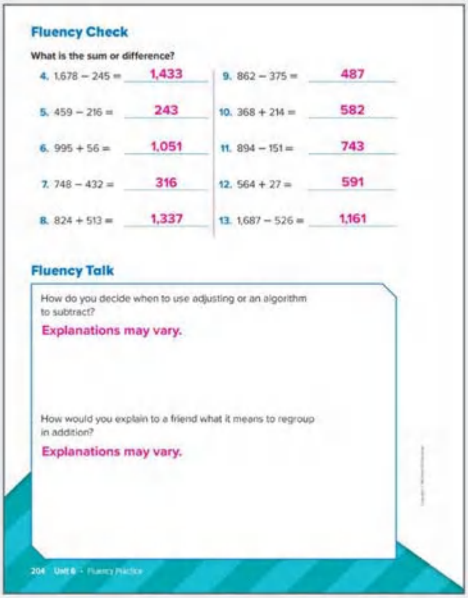
2.

	thousands	hundreds	tens	ones
	5	3	8	6
−	1	0	7	2
	4	3	1	4

3.

	thousands	hundreds	tens	ones
	2	4	1	6
−	1	9	5	7
		4	5	9

Unit 6 • Multiply Decimals 203



Fluency Check

What is the sum or difference?

4. 1,678 − 245 = 1,433
5. 459 − 216 = 243
6. 995 + 56 = 1,051
7. 748 − 432 = 316
8. 824 + 513 = 1,337
9. 862 − 375 = 487
10. 368 + 214 = 582
11. 894 − 151 = 743
12. 564 + 27 = 591
13. 1,687 − 526 = 1,161

Fluency Talk

How do you decide when to use adjusting or an algorithm to subtract?

Explanations may vary.

How would you explain to a friend what it means to regroup in addition?

Explanations may vary.

204 Unit 6 • Fluency Practice

Fluency practice helps students develop procedural fluency, that is, the “ability to apply procedures accurately, efficiently, and flexibly.” Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students choose a strategy to subtract.

Fluency Progression

Unit	Skill
1	Use Partial Sums to Add
2	Decompose by Place Value to Subtract
3	Use an Algorithm to Add
4	Use an Algorithm to Subtract
5	Choose a Strategy to Add
6	**Choose a Strategy to Subtract**
7	Multiply by Multiples of 10
8	Multiply by Multiples of 100
9	Divide Multiples of 10
10	Divide Multiples of 100
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)
13	Choose a Strategy to Multiply
14	Choose a Strategy to Multiply

Fluency Expectations

Grade 4

- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Performance Task

Welcome to the Neighborhood!

Students draw on their understanding of multiplying decimals. Use the rubric shown to evaluate students' work.

Standard: 5.NBT.A.2, 5.NBT.B.7

Rubric (10 points)

Part A (DOK 2) – 2 points	
2 POINTS	Student's work shows proficiency with multiplying a decimal by a power of 10. The student's solutions and explanation are accurate.
1 POINT	Student's work reflects developing proficiency with multiplying a decimal by a power of 10. Either the student's solutions or the explanation is accurate.
0 POINTS	Student's work shows weak proficiency with multiplying a decimal by a power of 10. The student's solution and explanation are both inaccurate.
Parts B & E (DOK 2) – 4 points	
4 POINTS	Student's work shows proficiency with multiplying decimals. The student's solution and explanation of strategy are accurate.
2 POINTS	Student's work shows developing proficiency with multiplying decimals. Either the student's solution or explanation of strategy is inaccurate.
0 POINTS	Student's work shows weak proficiency with multiplying decimals. The student's solution and explanation of strategy are both inaccurate.
Part C (DOK 3) – 2 points	
2 POINTS	Student's work shows proficiency with estimating products of decimals. The student's estimation is correct and the explanation is reasonable.
1 POINT	Student's work shows developing proficiency with estimating products of decimals. Either the student's estimation is incorrect or the explanation is not reasonable.
0 POINTS	Student's work shows weak proficiency with estimating products of decimals. The student's estimation is incorrect and the explanation is not reasonable or is missing.
Part D (DOK 2) – 2 points	
2 POINTS	Student's work shows proficiency with place value concepts. The student's calculations are correct and the explanation is reasonable.
1 POINT	Student's work shows developing proficiency with place value concepts. Either the student's calculations are incorrect or the explanation is not reasonable.
0 POINTS	Student's work shows weak proficiency with place value concepts. The student's calculations are incorrect and the explanation is not reasonable or is missing.

Unit 6

Performance Task

Name

Welcome to the Neighborhood!

The Lin family has just moved into the neighborhood and are making adjustments to their new home as they complete the big move.

Part A

Before selecting their new home, the Lin family looked at a couple of different houses. The size of each of the houses is listed below:

	Size (ft²)	Size (ft²)	Size (ft²)	Size (ft²)
House 1	2,000	2.0×10^3	20×10^2	200×10^1
House 2	1,900	1.9×10^3	19×10^2	190×10^1

For each of the houses, complete the table to express their measurements in three additional forms. Use square feet as decimals multiplied by powers of 10. Explain the pattern when multiplying a decimal by a power of 10.

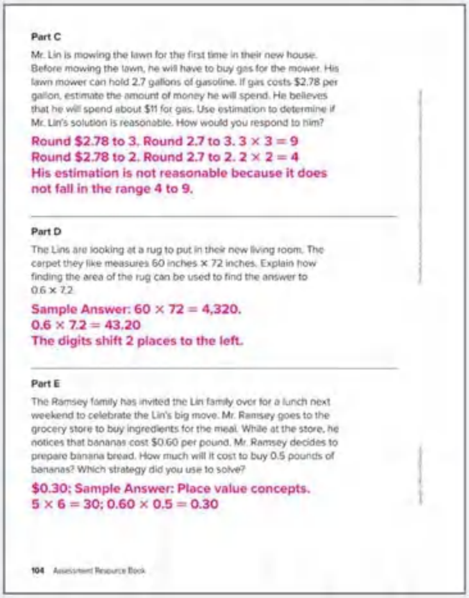
Sample answer: Multiplying a decimal by a power of 10 results in a pattern. The digits of the decimal shift left the same number of places as the power.

Part B

The Lins decide to replace their new house's gravel driveway with a concrete driveway. In order to estimate the cost of the project, Mr. and Mrs. Lin take measurements to find the area of the driveway. They measure the width of the driveway as 11.4 feet. The length of the driveway measures 50.5 feet. What is the area of the driveway? What strategy did you use to solve?

575.7 square feet; Sample answer: I used the partial products strategy to solve. (11 + 0.4) × (50 + 0.5) = 550 + 5.5 + 20 + 0.2 = 575.7 sq. ft.

Assessment Resource Book 103



Part C

Mr. Lin is mowing the lawn for the first time in their new house. Before mowing the lawn, he will have to buy gas for the mower. His lawn mower can hold 2.7 gallons of gasoline. If gas costs $2.78 per gallon, estimate the amount of money he will spend. He believes that he will spend about $11 for gas. Use estimation to determine if Mr. Lin's solution is reasonable. How would you respond to him?

Round $2.78 to 3. Round 2.7 to 3. 3 × 3 = 9
Round $2.78 to 2. Round 2.7 to 2. 2 × 2 = 4
His estimation is not reasonable because it does not fall in the range 4 to 9.

Part D

The Lins are looking at a rug to put in their new living room. The carpet they like measures 60 inches × 72 inches. Explain how finding the area of the rug can be used to find the answer to 0.6 × 7.2

Sample Answer: 60 × 72 = 4,320.
0.6 × 7.2 = 43.20
The digits shift 2 places to the left.

Part E

The Ramsey family has invited the Lin family over for a lunch next weekend to celebrate the Lin's big move. Mr. Ramsey goes to the grocery store to buy ingredients for the meal. While at the store, he notices that bananas cost $0.60 per pound. Mr. Ramsey decides to prepare banana bread. How much will it cost to buy 0.5 pounds of bananas? Which strategy did you use to solve?

$0.30; Sample Answer: Place value concepts.
5 × 6 = 30; 0.60 × 0.5 = 0.30

104 Assessment Resource Book

Unit Assessments

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

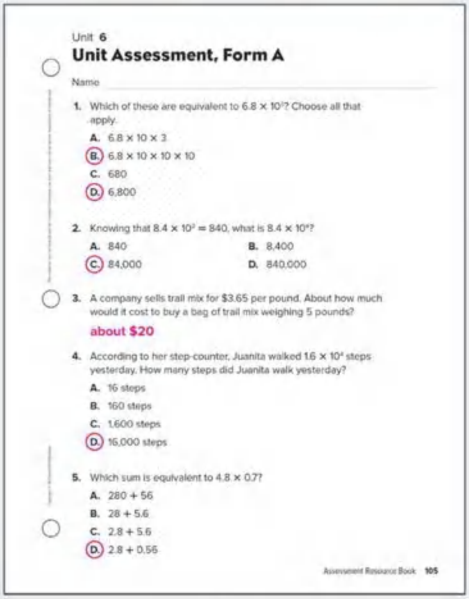
Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	2	6-1	Multiply by Powers of 10 (Decimal Point)	5.NBT.A.2
2	2	6-1	Multiply by Powers of 10 (Decimal Point)	5.NBT.A.2
3	2	6-2	Estimate Products (Decimal Number Factors)	5.NBT.B.7
4	2	6-1	Multiply by Powers of 10 (Decimal Point)	5.NBT.A.2
5	2	6-4	Multiply Decimal Numbers (Area Model)	5.NBT.B.7
6	2	6-3	Multiply Two Decimal Numbers-Model	5.NBT.B.7
7	2	6-3	Multiply Decimals by Whole Numbers-Model	5.NBT.B.7
8	2	6-4	Multiply Decimal Numbers (Area Model)	5.NBT.B.7
9	2	6-5	Multiply Decimal Numbers (Patterns)	5.NBT.B.7
10	2	6-5	Multiply Decimal Numbers (Patterns)	5.NBT.B.7
11	2	6-2	Estimate Products (Decimal Number Factors)	5.NBT.B.7
12	2	6-5	Multiply Decimal Numbers (Patterns)	5.NBT.B.7
13	3	6-6	Multiply Decimal Numbers (Patterns)	5.NBT.B.7
14	3	6-6	Multiply Decimal Numbers (Patterns)	5.NBT.B.7
15	2	6-2	Estimate Products (Decimal Number Factors)	5.NBT.B.7

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.



Unit 6

Unit Assessment, Form A

Name

1. Which of these are equivalent to 6.8×10^3? Choose all that apply.
   - A. $6.8 \times 10 \times 3$
   - [✓ B.] $6.8 \times 10 \times 10 \times 10$
   - C. 680
   - [✓ D.] 6,800

2. Knowing that $8.4 \times 10^2 = 840$, what is 8.4×10^4?
   - A. 840
   - B. 8,400
   - [✓ C.] 84,000
   - D. 840,000

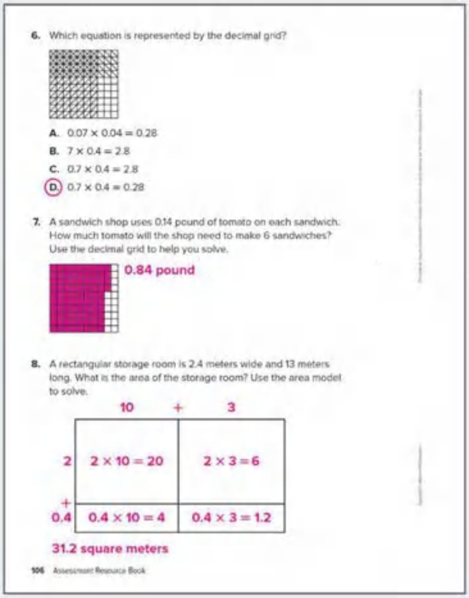
3. A company sells trail mix for \$3.65 per pound. About how much would it cost to buy a bag of trail mix weighing 5 pounds?

   about \$20

4. According to her step-counter, Juanita walked 1.6×10^4 steps yesterday. How many steps did Juanita walk yesterday?
   - A. 16 steps
   - B. 160 steps
   - C. 1,600 steps
   - [✓ D.] 16,000 steps

5. Which sum is equivalent to 4.8×0.7?
   - A. $280 + 56$
   - B. $28 + 5.6$
   - C. $2.8 + 5.6$
   - [✓ D.] $2.8 + 0.56$

Assessment Resource Book 105



6. Which equation is represented by the decimal grid?
   - A. $0.07 \times 0.04 = 0.28$
   - B. $7 \times 0.4 = 2.8$
   - C. $0.7 \times 0.4 = 2.8$
   - [✓ D.] $0.7 \times 0.4 = 0.28$

7. A sandwich shop uses 0.14 pound of tomato on each sandwich. How much tomato will the shop need to make 6 sandwiches? Use the decimal grid to help you solve.

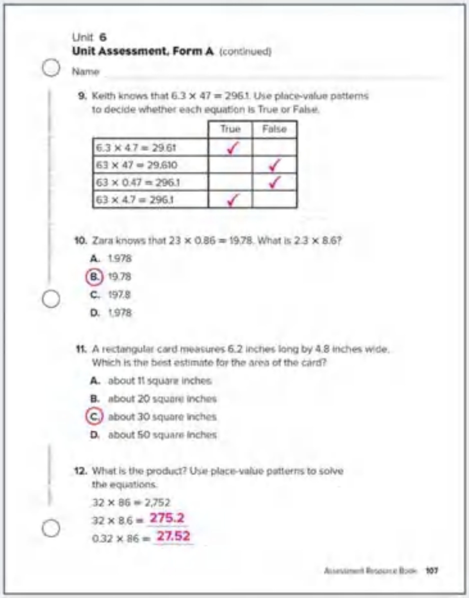
   0.84 pound

8. A rectangular storage room is 2.4 meters wide and 13 meters long. What is the area of the storage room? Use the area model to solve.

	10 +	3
2 +	$2 \times 10 = 20$	$2 \times 3 = 6$
0.4	$0.4 \times 10 = 4$	$0.4 \times 3 = 1.2$

31.2 square meters

106 Assessment Resource Book



Unit 6
Unit Assessment, Form A (continued)

Name

9. Keith knows that 6.3 × 47 = 296.1. Use place-value patterns to decide whether each equation is True or False.

	True	False
6.3 × 4.7 = 29.61	✓	
63 × 47 = 29,610		✓
63 × 0.47 = 296.1		✓
63 × 4.7 = 296.1	✓	

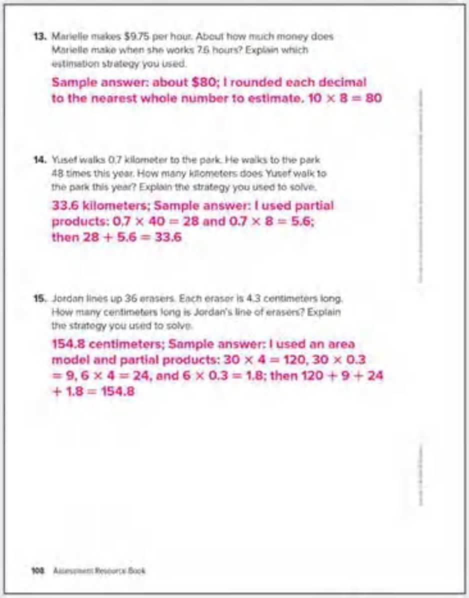
10. Zara knows that 23 × 0.86 = 19.78. What is 2.3 × 8.6?
   - A. 1.978
   - [✓ B.] 19.78
   - C. 197.8
   - D. 1,978

11. A rectangular card measures 6.2 inches long by 4.8 inches wide. Which is the best estimate for the area of the card?
   - A. about 11 square inches
   - B. about 20 square inches
   - [✓ C.] about 30 square inches
   - D. about 50 square inches

12. What is the product? Use place-value patterns to solve the equations.

32 × 86 = 2,752
32 × 8.6 = 275.2
0.32 × 86 = 27.52

Assessment Resource Book 107



13. Marielle makes $9.75 per hour. About how much money does Marielle make when she works 7.6 hours? Explain which estimation strategy you used.

Sample answer: about $80; I rounded each decimal to the nearest whole number to estimate. 10 × 8 = 80

14. Yusef walks 0.7 kilometer to the park. He walks to the park 48 times this year. How many kilometers does Yusef walk to the park this year? Explain the strategy you used to solve.

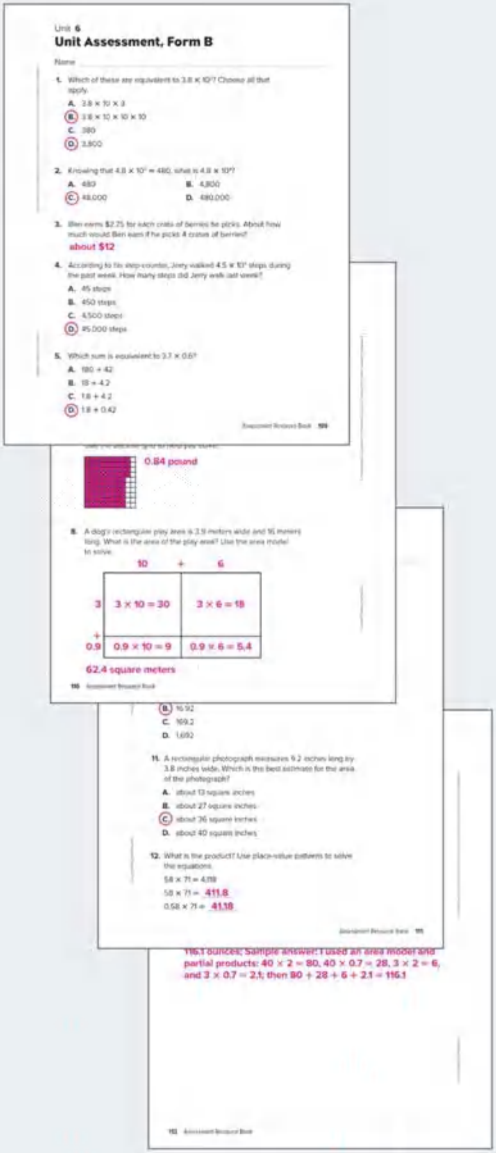
33.6 kilometers; Sample answer: I used partial products: 0.7 × 40 = 28 and 0.7 × 8 = 5.6; then 28 + 5.6 = 33.6

15. Jordan lines up 36 erasers. Each eraser is 4.3 centimeters long. How many centimeters long is Jordan's line of erasers? Explain the strategy you used to solve.

154.8 centimeters; Sample answer: I used an area model and partial products: 30 × 4 = 120, 30 × 0.3 = 9, 6 × 4 = 24, and 6 × 0.3 = 1.8; then 120 + 9 + 24 + 1.8 = 154.8

108 Assessment Resource Book

Form B



Unit 6
Unit Assessment, Form B

Name

1. Which of these are equivalent to 3.8 × 10³? Choose all that apply.
   - A. 3.8 × 10 × 3
   - [✓ B.] 3.8 × 10 × 10 × 10
   - C. 380
   - [✓ D.] 3,800

2. Knowing that 4.8 × 10² = 480, what is 4.8 × 10⁴?
   - A. 480
   - B. 4,800
   - [✓ C.] 48,000
   - D. 480,000

3. Ben earns $2.75 for each crate of berries he picks. About how much would Ben earn if he picks 4 crates of berries?

about $12

4. According to his step-counter, Jerry walked 4.5 × 10⁴ steps during the past week. How many steps did Jerry walk last week?
   - A. 45 steps
   - B. 450 steps
   - C. 4,500 steps
   - [✓ D.] 45,000 steps

5. Which sum is equivalent to 3.7 × 0.6?
   - A. 180 + 42
   - B. 18 + 4.2
   - C. 1.8 + 4.2
   - [✓ D.] 1.8 + 0.42

0.84 pound

8. A dog's rectangular play area is 3.9 meters wide and 16 meters long. What is the area of the play area? Use the area model to solve.

	10	6
3	3 × 10 = 30	3 × 6 = 18
0.9	0.9 × 10 = 9	0.9 × 6 = 5.4

62.4 square meters

   - [✓ B.] 16.92
   - C. 169.2
   - D. 1,692

11. A rectangular photograph measures 9.2 inches long by 3.8 inches wide. Which is the best estimate for the area of the photograph?
   - A. about 13 square inches
   - B. about 27 square inches
   - [✓ C.] about 36 square inches
   - D. about 40 square inches

12. What is the product? Use place-value patterns to solve the equations.

58 × 71 = 4,118
5.8 × 71 = 411.8
0.58 × 71 = 41.18

116.1 ounces; Sample answer: I used an area model and partial products: 40 × 2 = 80, 40 × 0.7 = 28, 3 × 2 = 6, and 3 × 0.7 = 2.1; then 80 + 28 + 6 + 2.1 = 116.1

Divide Whole Numbers

PACING: 11 days

LESSON	MATH OBJECTIVE	LANGUAGE OBJECTIVE	SOCIAL AND EMOTIONAL LEARNING OBJECTIVE
Unit Opener IGNITE! Division Puzzles Solve 3 by 3 number puzzles using division facts.			
7-1 Division Patterns with Multi-Digit Numbers	Students use place-value patterns and basic facts to divide a whole number by a multiple of 10.	Students talk about how to use place-value patterns and basic facts to divide a whole number by a multiple of 10 using the modal verb *can*.	Students recognize personal strengths through thoughtful self-reflection.
7-2 Estimate Quotients	Students estimate quotients of multi-digit numbers using the same strategies used to estimate quotients of lesser numbers. Students use estimated quotients to make predictions about a calculated solution. Students use estimated quotients to assess the reasonableness of a calculated solution.	Students talk about estimating quotients, using the terms *greater than*, *less than*, and *about*.	Students set learning goals and initiate work on tasks to accomplish their goals.
7-3 Relate Multiplication and Division of Multi-Digit Numbers	Students use the relationship between multiplication and division to determine the quotient of multi-digit numbers.	Students describe the relationship between multiplication and division that helps them to find the quotient when dividing by a multiple of 10 using the verb *determine* and the adjectives *same* and *different*.	Students collaborate with peers and contribute to group effort to achieve a collective mathematical goal.
7-4 Represent Division of 2-Digit Divisors	Students use an area model to determine partial quotients and add partial quotients to calculate the quotient.	Students explain how to use an area model to determine and add partial quotients using comparatives *more useful*, *less useful*, *more helpful*, and *less helpful*.	Students discuss how a rule or routine can help develop mathematical skills and knowledge and be responsible contributors.
7-5 Use Partial Quotients to Divide	Students record partial quotients using an algorithm.	Students discuss recording partial quotients while using the verb *relate*.	Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing thoughtful and constructive feedback.
7-6 Divide Multi-Digit Whole Numbers	Students solve division problems using partial quotients, which sometimes include remainders.	Students explain how to solve division problems using partial quotients, which sometimes include remainders, using *If... then*.	Students set a focused mathematical goal and make a plan for achieving that goal.
7-7 Solve Problems Involving Division	Students solve word problems involving division. Students interpret the remainder, when necessary, to solve problems.	Students talk about solving word problems involving division while using the modals *can* and *could*.	Students break down a situation to identify the problem at hand.
Math Probe Solving Division Word Problems Solve a division word problem.			
Unit Review **Fluency Practice**			
Unit Assessment **Performance Task**			

FOCUS QUESTION:
How can I divide multi-digit numbers?

LESSON	KEY VOCABULARY		MATERIALS TO GATHER	RIGOR FOCUS	STANDARD
	Math Terms	Academic Terms			
7-1	dividend divisor quotient	accurate evaluate	• base-ten blocks • index cards • number cubes	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-2	estimate	suggest variation	• digit cards	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-3	dividend divisor	analyze establish	• base-ten blocks • number cubes	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-4	partial quotient	reflect speculate	• base-ten blocks • calculators	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-5	partial quotient	condition drawback	• *Blank Partial Quotients* Teaching Resource	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-6	partial quotient remainder	address advantage	• base-ten blocks	Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6
7-7	remainder	note transition		Conceptual Understanding, Procedural Skill & Fluency	5.NBT.B.6

Unit Overview

Focus

Dividing Multi-Digit Whole Numbers

In this unit, students build on their understanding of multiplication and division from Grade 4. Students have previously worked with division of up to four-digit dividends and one-digit divisors, including situations involving remainders. They continue to use equations, rectangular arrays, and area models to extend their knowledge of division to include up to four-digit dividends and two-digit divisors. They use estimation techniques to determine the reasonableness of solutions.

Students apply their understanding of dividing multi-digit whole numbers to solve problems in real-world contexts.

When possible, students use area models to represent and solve a problem. By reasoning with the blocks for multiple cases, they develop a general process for approaching problems, which they know as the *partial quotients algorithm*.

Students discover that place value and division strategies work the same way with multi-digit whole number divisors as they do with division by one-digit divisors.

- **Use place-value patterns:** Students can identify and use place-value patterns to divide multi-digit whole numbers.
- **Use models:** Students use models to represent division problems and relate the problem to multiplication. They use their understanding of place-value and multiplication to decompose an area model by factors and use partial quotients to identify the quotient.
- **Solve word problems:** Students use their understanding of equations and models to solve word problems involving division.

Coherence

What Students Have Learned

- Students divided 4-digit dividends by 1-digit divisors and made sense of remainders. (Grade 4)
- Students used partial-quotient strategies to divide multi-digit numbers with single-digit divisors. (Grade 4)
- Students illustrated and explained calculations using equations, rectangular arrays, and/or area models. (Grade 4)

What Students Are Learning

- Students use strategies based on place value to divide multi-digit whole numbers.
- Students estimate quotients of multi-digit whole numbers.
- Student use partial quotients and the standard algorithm to divide multi-digit whole numbers.
- Students solve real-world division problems with multi-digit whole numbers.

What Students Will Learn

- Students fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding

- Students build on their understanding of division by using place value patterns to calculate quotients.
- Students build their understanding of multiplication and division using basic facts to divide multi-digit numbers.
- Students build on their understanding of division as they begin to divide with 2-digit divisors using area models and partial quotients.

Procedural Skill and Fluency

- Students develop proficiency with dividing whole numbers by multiples of 10.
- Students use estimation strategies to begin to build proficiency with division.
- Students build proficiency with multi-digit division using basic multiplication facts.
- Students build proficiency by using area models and partial quotients to represent division with or without remainders.

Application

- Students apply estimated quotients to successfully solve contextual, real-world problems.
- Students apply their understanding of dividing multi-digit whole numbers to solve problems with real-world contexts.

Application is not a targeted element of rigor for this standard.

ETP Effective Teaching Practices

Build Procedural Fluency from Conceptual Understanding

Procedural fluency is the ability to perform mathematics tasks flexibly, efficiently, and accurately. A common misconception is that math is about knowing mathematical procedures. However, math begins with concepts, and procedures are just tools for applying them.

Conceptual understanding is best achieved by way of exploration, discovery, and making connections to prior knowledge. In this way, learning is more meaningful and interesting to students than mere memorization of procedures. When a student's knowledge is built on conceptual understanding, they can more readily reason through new situations. It is important for students to develop strategic thinking and the ability to find a course of action specific to the situation at hand.

This unit involves computation. Be sure instruction makes strong connections to conceptual understanding.

- Have students recognize that it doesn't matter if they don't maximize the number (of thousands, hundreds, and so on) that they distribute at each step of the algorithm. The result will be the same in the end despite the increased number of steps.
- Ask students to make connections to the area models and to whether they are finding the number of groups or the size of each group.
- It might be cumbersome to represent 4-digit numbers and the division process with area models, but it is a useful step in building the conceptual understanding that will support students' work with the algorithm and vertical format. Consider using smaller numbers if time or availability of materials is an issue.
- Have students spend time explaining connections.

MPP Math Practices and Processes

Attend to Precision

Attending to precision refers to any action or habit of being accurate, clear, and on point. For example, when students attend to precision, they use care in computations and check their answers, pay attention to units while reasoning about problems, use the clearest possible language to explain ideas, label representations accurately to connect them to the quantities and relationships in problems. Teachers help students develop the habit of attending to precision by being accurate themselves in their discussions and by requiring it of them in all discourse and classroom activity.

To help students develop the habit of attending to precision, assign tasks that require precision and set clear expectations and have students think purposefully about precision in their work and discourse.

For example:

- Have students discuss how they estimate quotients using rounding and compatible numbers. Have them recognize and talk about how estimation is connected to the idea of precision and accuracy.
- Have students talk about their area models and connect them to place value concepts using appropriate and precise language.
- Have students describe the units of the quotient and any remainder that results. Have them explain why the context affects the units of the quotient.

SEL Social and Emotional Learning

- **Self-Awareness – Recognize Strengths** (Lesson 7-1): When students recognize their own strengths, they can see themselves as resourceful and may be more willing to attempt to problem solve and help others.
- **Self-Management – Self-Motivation** (Lesson 7-2): Students who self-motivate can take initiative and persevere through challenging tasks.
- **Relationship Skills – Teamwork** (Lesson 7-3): When students work effectively as a team, they establish a stronger learning community.
- **Responsible Decision-Making – Ethical Responsibility** (Lesson 7-4): Understanding rules and routines of the classroom environment can help students be responsible contributors to the learning community.
- **Social Awareness – Respect Others** (Lesson 7-5): When students are respectful of one another, they strengthen their class community.
- **Self-Management – Goal Setting** (Lesson 7-6): Setting goals can help motivate students to take initiative and stay focused.
- **Responsible Decision-Making – Identify Problems** (Lesson 7-7): A key step in problem solving is analyzing information to identify the task.

Unit Overview

Language of Math

Vocabulary

Students will be using these key terms in this unit.

- **Dividend –** (Lesson 7-1): Students were introduced to this term in the context of division fluency. It is the number that gets divided in a division problem.
- **Divisor–** (Lesson 7-1): Students were introduced to this term in the context of division fluency. It is the number that divides another number in a division problem.
- **Quotient –** (Lesson 7-1): Students were introduced to this term in the context of division. This is the result of dividing one number by another number.
- **Estimate –** (Lesson 7-2): Students were introduced to this term in the context of solving word problems involving all four operations. Have students discuss how estimation can help them evaluate the reasonableness of a solution.
- **Partial quotient –** (Lesson 7-4): Students were introduced to this term with the strategy of breaking a dividend into parts and dividing each part by the divisor separately. Each separate quotient generated by this process is called a partial quotient. The total quotient is the sum of the partial quotients. The process is called the partial quotients algorithm. Students use the process repeatedly throughout the unit and refer to it simply as using partial quotients.
- **Remainder –** (Lesson 7-6): Students were introduced to this term in the context of division strategies. A remainder is an amount left over after one whole number is divided by another.

Math Language Development

A Focus on Listening

We start learning our first language by listening. At an early age we are able to begin connecting what we hear with what is happening around us and with how others are interacting with us. Listening to a fluent speaker is the most efficient way to start learning our first language.

Similarly, our earliest encounters with math most likely involve listening. We recite the count sequence and learn to name shapes by listening to and copying a fluent speaker.

Instruction in the math classroom should include plenty of speaking and listening. Such discourse engages students—with you and with each other. It promotes thinking and shared learning. Speakers must dig into their thoughts and process their own understanding, and listeners must also dig into their thoughts as they process the speakers' ideas and compare them to their own.

Promote listening in the classroom by eliciting responses from students during whole-class discussions. Responses may be written or spoken. The purpose is simply to promote listening. Also, engage students in discussions with each other and have them paraphrase and record each other's ideas.

- Have students work in pairs. Give them quotients to estimate— including problems for which both rounding and compatible numbers can be used. Students take turns explaining estimates to each other. The listener makes the estimate as described by the speaker and explains the process back to the speaker.
- For a chosen division problem, explain to the class your process for finding the quotient using an area model. Have students write a description of the process.
- Have students explain the reasoning they use to determine the units of a quotient. One student explains the case of the quotient being the number of groups, and the other explains the case of the quotient being the size of each group.

English Language Learner

In this unit, students are provided with a number of scaffolds to support their comprehension of the language used to present and explain strategies related to dividing whole numbers. Because many of the words (*needed, hold, solution, none, saved*) and phrases (*as much, as great as, left over*) used in this unit could prove challenging to ELs, they are supported in understanding and using them so that the instruction is more accessible.

Lesson 7-1 – *(10×, etc.) as much*
Lesson 7-2 –*needed*
Lesson 7-3 – *hold*
Lesson 7-4 – *solution*
Lesson 7-5 – *(24×, etc.) as great as*
Lesson 7-6 – *(none) left over*
Lesson 7-7 – *saved*

Unit Routines

Number Routines

Build Fluency The number routines found at the beginning of each lesson help students build number sense and operational fluency. They also help students develop the thinking habits of mind that are important for proficient doers of math.

Where Does It Go?

Purpose: Build estimating skills using benchmarks.

Overview: Students place a target number on number lines with different endpoints and justify their placement. In some instances, as a challenge, the target number may not actually belong on one of the number lines.

Which Benchmark Is It Closest To?

Purpose: Enhance rounding and reasoning skills.

Overview: Students determine to which benchmark the given number is closest and explain their reasoning.

Find the Pattern, Make a Pattern

Purpose: Build efficiency with recognizing and building patterns.

Overview: Students determine the rule(s) for a given pattern, then use the rule(s) to create a new pattern. The teacher records students' new patterns and facilitates a discussion to validate the pattern and its rules.

Decompose It

Purpose: Build flexibility with numbers.

Overview: Students generate multiple (at least 3) ways to decompose given numbers and share their thinking for each decomposition. The teacher records decompositions and then facilitates a discussion of patterns in the decompositions.

Sense-Making Routines

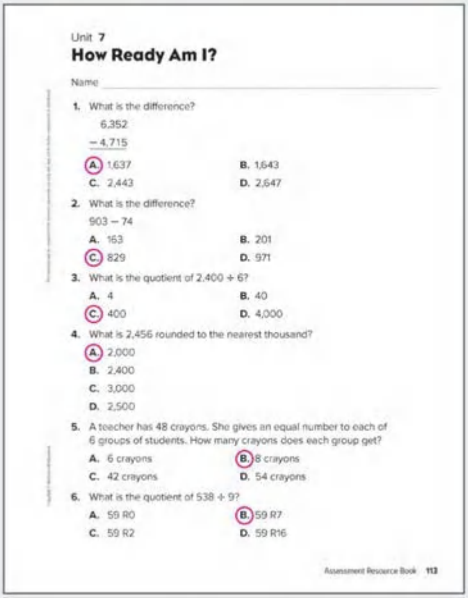
- **Notice & Wonder: What question could you ask?** (Lesson 7-1) Students are presented with images of grouped items. Students might ask about the total number of items, the number of groups of items, or the number of items in each group.
- **Notice & Wonder: What do you notice? What do you wonder?** (Lessons 7-2 and 7-3) Students are presented with images of grouped items. Students might notice the objects are in groups and wonder about the total number of objects or the number of groups.
- **Notice & Wonder: Tell me everything you can.** (Lesson 7-4) Students are presented with a rectangular image with one dimension labeled. Students might ask about the parts or the whole area.
- **Numberless Word Problem** (Lessons 7-5 and 7-6) Students are given problems containing no numerical information, and asked to identify the math they see.
- **Numberless Word Problem** (Lesson 7-7) Students are presented with a situation in which no numerical information or question is provided, and asked to predict what the question could be.

MLR Math Language Routines

The Mathematical Language Routines used in this unit give teachers a structured, yet adaptable format for amplifying and developing students' social and academic language. These routines can also be used as formative assessment opportunities as students develop proficiency in English and mathematical language. They can be used in ways that support real-time-, peer-, and self-assessment. For more information on the Math Language Routines, see the Appendix.

- Lesson 7-1 – Students participate in MLR8: Discussion Supports.
- Lesson 7-2 – Students participate in MLR7: Compare and Connect.
- Lesson 7-3 – Students participate in MLR2: Collect and Display.
- Lesson 7-4 – Students participate in MLR1: Stronger and Clearer Each Time.
- Lesson 7-5 – Students participate in MLR4: Information Gap.
- Lesson 7-6 – Students participate in MLR5: Co-Craft Questions and Problems.
- Lesson 7-7 – Students participate in MLR6: Three Reads.

Readiness Diagnostic



Unit 7

How Ready Am I?

Name ____________________

1. What is the difference?

$$\begin{array}{r} 6{,}352 \\ -\,4{,}715 \\ \hline \end{array}$$

[✓ A.] 1,637 B. 1,643
C. 2,443 D. 2,647

2. What is the difference?

903 − 74

A. 163 B. 201
[✓ C.] 829 D. 971

3. What is the quotient of 2,400 ÷ 6?

A. 4 B. 40
[✓ C.] 400 D. 4,000

4. What is 2,456 rounded to the nearest thousand?

[✓ A.] 2,000
B. 2,400
C. 3,000
D. 2,500

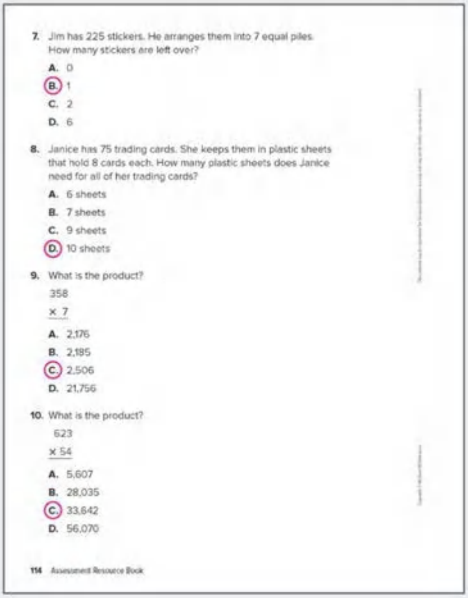
5. A teacher has 48 crayons. She gives an equal number to each of 6 groups of students. How many crayons does each group get?

A. 6 crayons [✓ B.] 8 crayons
C. 42 crayons D. 54 crayons

6. What is the quotient of 538 ÷ 9?

A. 59 R0 [✓ B.] 59 R7
C. 59 R2 D. 59 R16

Assessment Resource Book 113



7. Jim has 225 stickers. He arranges them into 7 equal piles. How many stickers are left over?

A. 0
[✓ B.] 1
C. 2
D. 6

8. Janice has 75 trading cards. She keeps them in plastic sheets that hold 8 cards each. How many plastic sheets does Janice need for all of her trading cards?

A. 6 sheets
B. 7 sheets
C. 9 sheets
[✓ D.] 10 sheets

9. What is the product?

$$\begin{array}{r} 358 \\ \times\ 7 \\ \hline \end{array}$$

A. 2,176
B. 2,185
[✓ C.] 2,506
D. 21,756

10. What is the product?

$$\begin{array}{r} 623 \\ \times\ 54 \\ \hline \end{array}$$

A. 5,607
B. 28,035
[✓ C.] 33,642
D. 56,070

114 Assessment Resource Book

Administer the Readiness Diagnostic to determine your students' readiness for this unit.

Targeted Intervention

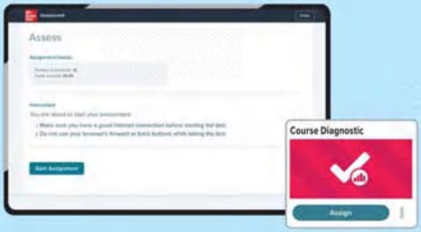
Use Guided Support intervention lessons available in the Digital Teacher Center to provide targeted intervention.

Item Analysis

Item	DOK	Skill	Guided Support Intervention Lesson	Standard
1	1	Subtract whole numbers	Subtract Multi-Digit Numbers	4.NBT.B.4
2	1	Subtract whole numbers	Subtract Multi-Digit Numbers	4.NBT.B.4
3	1	Division of 4-digit number by 1-digit number	Four-Digit Dividends (Area Models)	4.NBT.B.6
4	2	Rounding to the thousands	Round to Nearest 10, 100, or 1,000	4.NBT.A.3
5	2	Division as equal groups	Two-Digit Dividends (Partial Quotients)	4.NBT.B.6
6	2	Division of 3-digit number by 1-digit number with remainders	Three-Digit Dividends (Partial Quotients)	4.NBT.B.6
7	2	Interpret remainders in division	Interpret Remainders in Word Problems	4.OA.A.3
8	2	Interpret remainders in division	Interpret Remainders in Word Problems	4.OA.A.3
9	1	Multiply 3-digit number by 1-digit number	Multiply 3- by 1-Digit Numbers	5.NBT.B.5
10	1	Multiply 3-digit number by 2-digit number	Multiply 3- by 1-Digit Numbers	5.NBT.B.5

GO ONLINE

Assign the digital Readiness Diagnostic to students or download and print PDFs from the Digital Teacher Center.



Unit Opener

Focus Question

Introduce the Focus Question: *How can I divide multi-digit numbers?*

Ask students to think about what they know about division.

- What do you already know about division?
- What do you know about representing division?
- How does knowing multiplication facts help you divide?

Remind students that at the end of the unit, they will reflect back on what they learned in this unit.

Family Letter

Each letter presents an overview of the math in the unit and home activities to support student learning.

STEM in Action

Videos

Students can watch the two STEM videos.

STEM Career: Computer Programmer Grace talks about her aspirations to be a computer programmer.

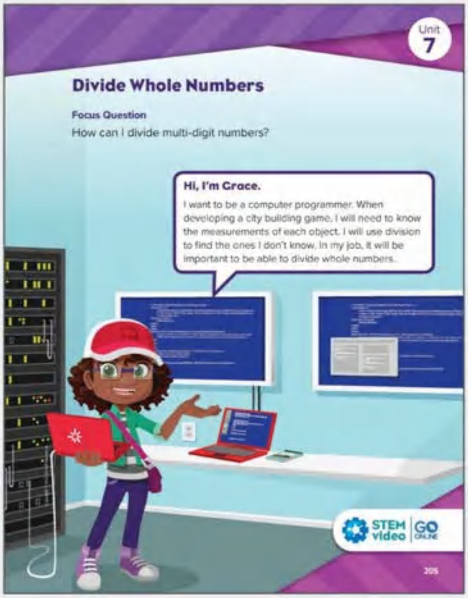
Grace Designs a Game: Grace uses division to determine the length of a sports field in her computer game.

STEM Project Card

Students can complete the STEM project during their workstation time.

STEM Adventure

Students can complete the STEM Adventure during their workstation time.



Unit 7

Divide Whole Numbers

Focus Question

How can I divide multi-digit numbers?

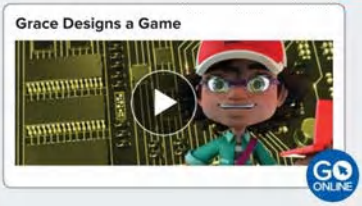
Hi, I'm Grace.

I want to be a computer programmer. When developing a city building game, I will need to know the measurements of each object. I will use division to find the ones I don't know. In my job, it will be important to be able to divide whole numbers.

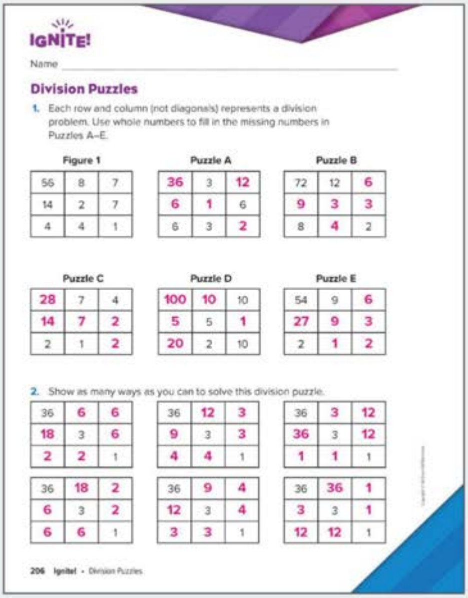
STEM video GO ONLINE

205

STEM Career: Computer Programmer



Grace Designs a Game



IGNITE!

Name ______________________

Division Puzzles

1. Each row and column (not diagonals) represents a division problem. Use whole numbers to fill in the missing numbers in Puzzles A–E.

Figure 1

56	8	7
14	2	7
4	4	1

Puzzle A

36	3	12
6	1	6
6	3	2

Puzzle B

72	12	6
9	3	3
8	4	2

Puzzle C

28	7	4
14	7	2
2	1	2

Puzzle D

100	10	10
5	5	1
20	2	10

Puzzle E

54	9	6
27	9	3
2	1	2

2. Show as many ways as you can to solve this division puzzle.

36	6	6
18	3	6
2	2	1

36	12	3
9	3	3
4	4	1

36	3	12
36	3	12
1	1	1

36	18	2
6	3	2
6	6	1

36	9	4
12	3	4
3	3	1

36	36	1
3	3	1
12	12	1

206 Ignite! • Division Puzzles

Ignite!

Division Puzzles

Students use their knowledge of division and factors to solve the puzzles.

1. Have students work in pairs to examine Figure 1 and share their thoughts.
   - What do you notice about the numbers in Figure 1?
2. Encourage students to look for other division relationships in Figure 1. The class should conclude that each row and column (but not the diagonals) could represent a division problem.
3. In Part 1, have students work in pairs to solve Puzzles A–E. Remind them that every row and column in Puzzles A–E represents a division equation as discussed for Figure 1. Advise students to check all computations before concluding that a puzzle is solved.
4. Have students share their strategies.
   - How did you approach solving the puzzles?
5. Now have students draw attention to Part 2 at the bottom of the page. Have them find as many ways as they can to solve the puzzle.
   - What patterns did you notice in your solutions?

Extensions

6. If you multiply the numbers in all nine squares in a puzzle by the same nonzero number, will the division puzzle still be valid? Explain.
7. If you multiply the numbers in the four squares in the top left of a puzzle by the same nonzero number, will the division puzzle still be valid?

Unit Resources At-A-Glance

Workstations

Reveal Math offers rich and varied resources that teachers can use to differentiate and enrich students' instructional experiences with the unit content. The table presents an overview of the resources available for the unit with recommendations for when to use.

	Activity	Description	Use After Lesson
Game Station	Game Station	Students build proficiency with dividing multi-digit numbers by 2-digit numbers.	
		• **Multi-Digit Division Tic Tac Toe**	7-1
		• **Estimating Quotients Showdown**	7-2
		• **Multi-Digit Division Tic Tac Toe**	7-3
		• **Division with 2-Digit Divisors Task Cards**	7-4
		• **Division with 2-Digit Divisors Race**	7-5
		• **Remainder Showdown**	7-6
		• **Dividing with Remainders Bump**	7-7
Digital Station	Digital Game	**Batting Practice** Students add and subtract decimals.	7-1
Application Station	**Have students complete at least one of the Use It! activities for this unit.**		
	STEM Project Card	**That Is Astronomical** Students practice finding quotients, rounding, and writing equations by researching the hours in a day for each planet.	7-7
	Connection Card	**Estimate High School Density** Students research the density of schools in 10 U.S. states.	7-2
	Real World Card	**Online Learning: Is It Safe?** Students write rules for safely using electronic devices and practice their rules by researching how to divide multi-digit numbers.	7-6

Additional Resources

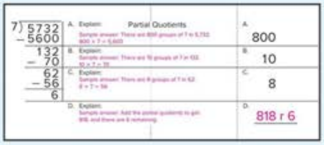
Use the resources below to provide additional support for this unit.

Vocabulary

Use the vocabulary cards to help students learn the vocabulary in this unit. Encourage students to write their own definitions of the new terms on the front side of the card.

Foldables

Use the unit foldables with Lesson 7-5.



Spiral Review

Students can complete the Spiral Review at any point during the unit as either a paper-and-pencil or digital activity.

Lesson	Standard
7-1	5.MD.C.5
7-2	5.NBT.A.3
7-3	5.NBT.B.5
7-4	5.NBT.B.7
7-5	5.NBT.A.4
7-6	5.NBT.A.2
7-7	5.NBT.B.6

LESSON **7-1**

Division Patterns with Multi-Digit Numbers

Learning Targets

- I can explain patterns when dividing by a multiple of 10.
- I can use patterns to determine the quotient when dividing by a multiple of 10.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Look for and make use of structure.

Vocabulary

Math Terms	Academic Terms
dividend	accurate
divisor	evaluate
quotient	

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- index cards
- number cubes

Focus

Content Objective	Language Objectives	SEL Objective
• Students use place-value patterns and basic facts to divide a whole number by a multiple of 10.	• Students talk about how to use place-value patterns and basic facts to divide a whole number by a multiple of 10 using the modal verb *can*. • To support maximizing cognitive and linguistic meta-awareness, ELs participate in MLR8: Discussion Supports.	• Students recognize personal strengths through thoughtful self-reflection.

Coherence

Previous	Now	Next
• Students found whole-number quotients and remainders with up to four-digit dividends and one-digit divisor (Grade 4). • Students multiplied decimals to hundredths (Unit 6).	• Students use place-value patterns to determine quotients when dividing by multiples of 10.	• Students will use compatible numbers to estimate quotients (Lesson 2). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of division by using place-value patterns to calculate quotients.	• Students develop proficiency with dividing whole numbers by multiples of 10.	• Students apply their understanding of division to solve real-world problems *Application is not a targeted element of rigor for this standard.*

Number Routine
Where Does It Go?

5–7 min

Build Fluency Students build number sense as they place 0.485 on a number line between 0 and 1 and then on a second number line between 0 and 0.5.

These prompts encourage students to talk about their reasoning:

- What do you think about first when trying to place 0.485 on a number line?
- Which labeled value is 0.485 closer to? How do you know?
- How can breaking up the number line into smaller intervals help you place 0.485?
- How can you be sure your answer is correct?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about how objects are grouped in different ways and how they might determine the number of groups.

Notice & Wonder

- What question could you ask?

Teaching Tip Ask students to draw on their prior knowledge of how many pennies, nickels, dimes, and quarters are in a dollar. Have them determine how many of each type of coin are in each roll.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of using place-value patterns and basic facts to divide by multiples of 10 and are based on possible comments and questions that students may make during the share out.

- How can you determine how many coins are in each type of roll?
- What do you notice about how many are in each type of roll?
- How can you figure out if any of the coins are grouped in a similar way?
- If you knew how many of a type of coin you had, how do you think you could find how many rolls you would need to use?

Math is... Mindset

- How can your strengths in other areas help you in math?

SEL Self-Awareness: Recognize Strengths

Before students begin the Notice and Wonder routine, invite them to think about their personal areas of strength in math. In addition to specific math skills, students may also acknowledge personal strengths that can help them with their learning, such as listening, staying focused, or explaining. As students work with division patterns throughout the lesson, model giving positive feedback to help them acknowledge their personal strengths. Encourage students to recognize and acknowledge the strengths of their peers.

Transition to Explore & Develop

Ask questions that get students thinking about using place-value patterns and basic facts to divide.

ETP Establish Goals to Focus Learning

- Let's think about how we can use place-value patterns and basic facts to divide whole numbers by multiples of 10.

Lesson 7-1
Division Patterns with Multi-Digit Numbers

Be Curious

What question could you ask?

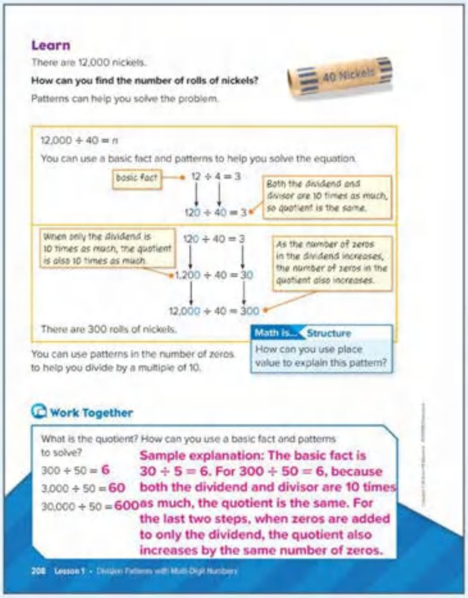
Math is... Mindset
How can your strengths in other areas help you in math?

Unit 7 • Divide Whole Numbers 207

Be Curious

What question could you ask?

Explore & Develop
20 min



Learn

There are 12,000 nickels.

How can you find the number of rolls of nickels?

Patterns can help you solve the problem.

$12{,}000 \div 40 = n$

You can use a basic fact and patterns to help you solve the equation.

basic fact → $12 \div 4 = 3$

$120 \div 40 = 3$

Both the dividend and divisor are 10 times as much, so quotient is the same.

When only the dividend is 10 times as much, the quotient is also 10 times as much.

$120 \div 40 = 3$

$1{,}200 \div 40 = 30$

$12{,}000 \div 40 = 300$

As the number of zeros in the dividend increases, the number of zeros in the quotient also increases.

There are 300 rolls of nickels.

Math is... Structure

How can you use place value to explain this pattern?

You can use patterns in the number of zeros to help you divide by a multiple of 10.

Work Together

What is the quotient? How can you use a basic fact and patterns to solve?

$300 \div 50 = 6$

$3{,}000 \div 50 = 60$

$30{,}000 \div 50 = 600$

Sample explanation: The basic fact is $30 \div 5 = 6$. For $300 \div 50 = 6$, because both the dividend and divisor are 10 times as much, the quotient is the same. For the last two steps, when zeros are added to only the dividend, the quotient also increases by the same number of zeros.

208 Lesson 1 • Division Patterns with Multi-Digit Numbers

❶ Pose the Problem

MLR Discussion Supports

As students talk about what they know, have them pay attention to others' understandings in order to increase their ability to work through division patterns with multi-digit numbers. Restate statements they make as a question to seek clarification and provide vocabulary or grammar prompts for students who need more guidance.

ETP Pose Purposeful Questions

- How can you determine which operation you will use to solve this problem?
- Should the number of rolls be more or less than the number of nickels? How do you know?

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How do basic facts help you divide multi-digit numbers?
- How do place-value patterns help you find the quotient when dividing by multiples of 10?

Key Takeaway

- One way to divide a whole number by a multiple of 10 is to use place-value patterns and basic facts.

Work Together

As students work together to solve the problem, make sure they start with a basic fact rather than jumping into the first equation. Have students discuss how the basic fact helps them solve the other equations.

Common Error When determining the basic fact, students may think they should use the most basic numbers, in this case, $3 \div 5$. Remind students that, in a basic division fact, the dividend is greater than the divisor.

LOM Language of Math

The word *quotient* comes from the Latin word *quotiens* meaning "how many times." The quotient is how many times the divisor is in the dividend.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore patterns in division equations involving multiples of ten.

Materials: base-ten blocks

Directions: Display a basic fact, such as 15 ÷ 3 and a problem in which the *dividend* and *divisor* are 10 times as much, such as 150 ÷ 30. Have students model the division using base-ten blocks. Repeat with different problems. Encourage students to look for patterns as they represent and solve the various problems. After students have discovered and discussed patterns when both the dividend and divisor are 10 times as much. Display division problems in which the dividend is 10 times as much and the divisor stays the same, such as 1,500 ÷ 30. Encourage students to look for patterns as they solve these equations.

Implement Tasks That Promote Reasoning and Problem Solving

- How did you determine how to represent the dividends and divisors using base-ten blocks?
- What happens to the quotient when both the dividend and divisor are 10 times as much? How can you show this?
- How does the quotient change when only the dividend is 10 times as much? How can you show this?

Math is... Structure

- How can you use place value to justify the pattern of zeros in the dividends and quotients?

Students explain a pattern that arises as a result of the structure of place value.

Activity Debrief: Have groups share their solutions and the patterns. Facilitate a discussion to ensure students understand that when both the dividend and divisor are 10 times as much, the quotient is the same as the basic fact. When only the dividend is 10 times as much, the quotient is also 10 times as much.

Have students revisit the Pose the Problem question and discuss answers.

- There are 12,000 nickels. How can you find the number of rolls of nickels?

Guided Exploration

Students use what they know about place value to use patterns that will help them divide multi-digit numbers that are multiples of ten.

Facilitate Meaningful Discourse

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

- How does the basic fact relate to the original equation?
- How do you think the basic fact might help you solve the equation?

Have students use base-ten blocks to determine how many groups of 40 can be made by 120. Ask:

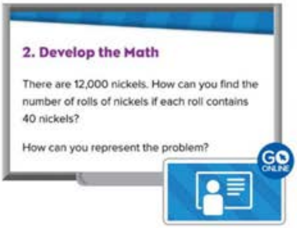
- How do the base-ten blocks help you understand and find how many groups of 40 you can make?

- **Think About It:** How can thinking of 1,200 as 120 tens and 40 as 4 tens help you determine the quotient?

Math is... Structure

- How can you use place value to justify the pattern of zeros in the dividends and quotients?

Students explain a pattern that arises as a result of the structure of place value.



2. Develop the Math

There are 12,000 nickels. How can you find the number of rolls of nickels if each roll contains 40 nickels?

How can you represent the problem?

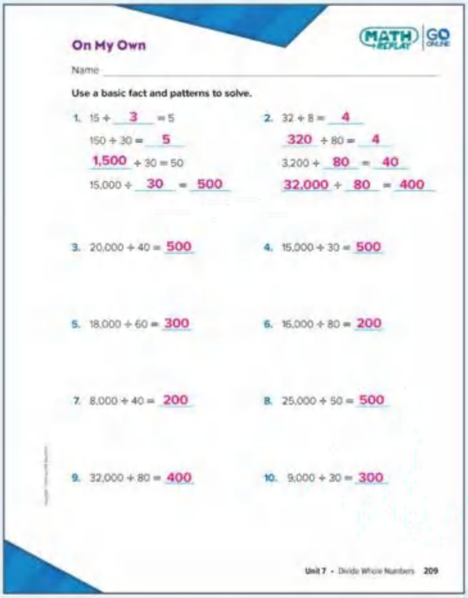
English Learner Scaffolds

Entering/Emerging Ensure understanding of *(10 ×) as much*. Write the number 10 on the board and say it aloud. Then write *× 10 = 100* next to it. Point to the 100 and say *This is ten times as much as 10*. Repeat with another number, such as 40. Ask students *Is 40 ten times as much as 400?* (no) *Is 400 ten times as much as 40?* (yes)

Developing/Expanding Ensure understanding of *(10×) as much*. Write the number 10 on the board and say it aloud. Then write *× 10 = 100* next to it. Point to the 100 and say *This is ten times as much as 10. Times 10 is ten times as much*. Repeat with another number, such as 60. Then ask students to demonstrate the same task with a new number, such as 80, and to use *10× as much* in their sentence.

Bridging/Reaching Ask students to use *(10×) as much* in a sentence, focusing on its usage on the Learn page. Then ask students to think of other words that could be used in place of it in their sentences (*(10×) more, (10×) greater*, etc.). Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min



On My Own

Name

Use a basic fact and patterns to solve.

1. 15 ÷ 3 = 5
150 ÷ 30 = 5
1,500 ÷ 30 = 50
15,000 ÷ 30 = 500

2. 32 ÷ 8 = 4
320 ÷ 80 = 4
3,200 ÷ 80 = 40
32,000 ÷ 80 = 400

3. 20,000 ÷ 40 = 500

4. 15,000 ÷ 30 = 500

5. 18,000 ÷ 60 = 300

6. 16,000 ÷ 80 = 200

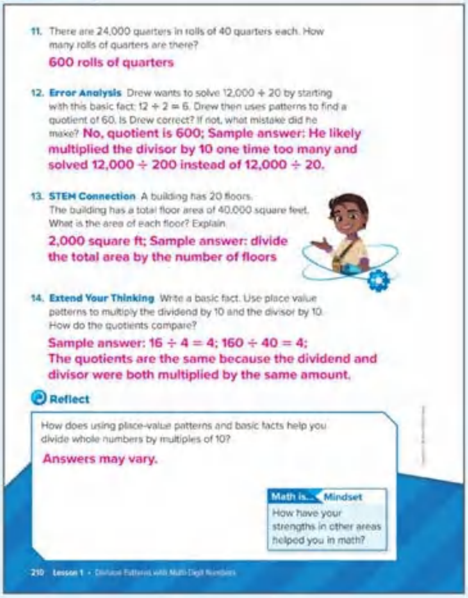
7. 8,000 ÷ 40 = 200

8. 25,000 ÷ 50 = 500

9. 32,000 ÷ 80 = 400

10. 9,000 ÷ 30 = 300

Unit 7 • Divide Whole Numbers 209



11. There are 24,000 quarters in rolls of 40 quarters each. How many rolls of quarters are there?
600 rolls of quarters

12. **Error Analysis** Drew wants to solve 12,000 ÷ 20 by starting with this basic fact: 12 ÷ 2 = 6. Drew then uses patterns to find a quotient of 60. Is Drew correct? If not, what mistake did he make? No, quotient is 600; Sample answer: He likely multiplied the divisor by 10 one time too many and solved 12,000 ÷ 200 instead of 12,000 ÷ 20.

13. **STEM Connection** A building has 20 floors. The building has a total floor area of 40,000 square feet. What is the area of each floor? Explain.
2,000 square ft; Sample answer: divide the total area by the number of floors

14. **Extend Your Thinking** Write a basic fact. Use place value patterns to multiply the dividend by 10 and the divisor by 10. How do the quotients compare?
Sample answer: 16 ÷ 4 = 4; 160 ÷ 40 = 4; The quotients are the same because the dividend and divisor were both multiplied by the same amount.

Reflect

How does using place-value patterns and basic facts help you divide whole numbers by multiples of 10?

Answers may vary.

Math is... Mindset

How have your strengths in other areas helped you in math?

210 Lesson 1 • Division Patterns with Multi-Digit Numbers

Practice

ETP Build Fluency from Understanding

Common Error: Exercises 7–10 Remind students who determine quotients with the incorrect place value what the pattern in terms of the number of zeroes in the quotient looks like.

Practice Item Analysis

Item	DOK	Rigor
1–10	1	Procedural Skill and Fluency
11–13	2	Application
14	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How does using place-value patterns and basic facts help you divide whole numbers by multiples of 10?

Ask students to share their reflections with their classmates.

Math is... Mindset

- When might you use math outside of class?

Students reflect on how they practiced self-awareness.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain patterns when dividing by a multiple of 10.
- I can use patterns to determine the quotient when dividing by a multiple of 10.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Divide by multiples of 10	5.NBT.B.6
2	1	Divide by multiples of 10	5.NBT.B.6
3	2	Divide by multiples of 10	5.NBT.B.6
4	2	Divide by multiples of 10	5.NBT.B.6

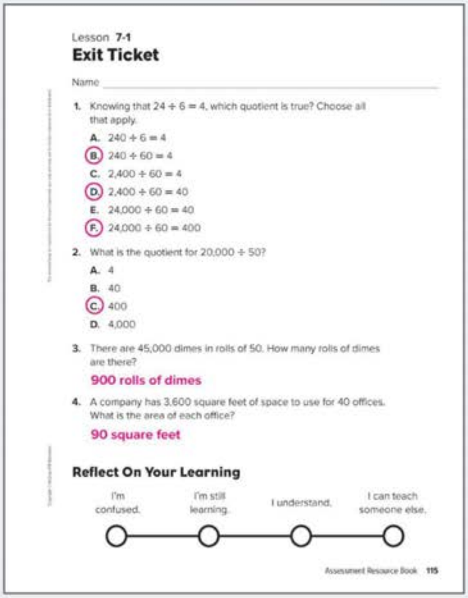
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 7-1

Exit Ticket

Name

1. Knowing that 24 ÷ 6 = 4, which quotient is true? Choose all that apply.
   - A. 240 ÷ 6 = 4
   - [✓ B.] 240 ÷ 60 = 4
   - C. 2,400 ÷ 60 = 4
   - [✓ D.] 2,400 ÷ 60 = 40
   - E. 24,000 ÷ 60 = 40
   - [✓ F.] 24,000 ÷ 60 = 400
2. What is the quotient for 20,000 ÷ 50?
   - A. 4
   - B. 40
   - [✓ C.] 400
   - D. 4,000
3. There are 45,000 dimes in rolls of 50. How many rolls of dimes are there?

   900 rolls of dimes
4. A company has 3,600 square feet of space to use for 40 offices. What is the area of each office?

   90 square feet

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 115

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Ten and Hundred Patterns

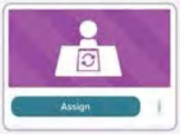
Work with students in small groups. Prepare index cards showing basic division facts. Have students draw a card. Students should use the basic fact and multiply the divisor and dividend by 10 and find the quotient. Then have them multiply only the dividend by 10 and find the quotient. Repeat with 100. Have students discuss the patterns they recognize in the different divisions.

GO ONLINE

Take Another Look Lesson

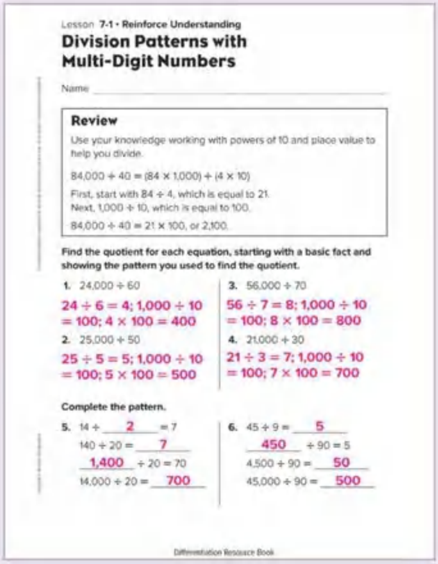
Assign the interactive lesson to reinforce targeted skills.

- Divide by Multiples of 10



INDEPENDENT WORK

Differentiation Resource Book, p. 63



Lesson **7-1 • Reinforce Understanding**

Division Patterns with Multi-Digit Numbers

Name ____________________

Review

Use your knowledge working with powers of 10 and place value to help you divide.

$84{,}000 \div 40 = (84 \times 1{,}000) \div (4 \times 10)$

First, start with $84 \div 4$, which is equal to 21.
Next, $1{,}000 \div 10$, which is equal to 100.

$84{,}000 \div 40 = 21 \times 100$, or 2,100.

Find the quotient for each equation, starting with a basic fact and showing the pattern you used to find the quotient.

1. $24{,}000 \div 60$
$24 \div 6 = 4; 1{,}000 \div 10 = 100; 4 \times 100 = 400$

2. $25{,}000 \div 50$
$25 \div 5 = 5; 1{,}000 \div 10 = 100; 5 \times 100 = 500$

3. $56{,}000 \div 70$
$56 \div 7 = 8; 1{,}000 \div 10 = 100; 8 \times 100 = 800$

4. $21{,}000 \div 30$
$21 \div 3 = 7; 1{,}000 \div 10 = 100; 7 \times 100 = 700$

Complete the pattern.

5. $14 \div$ __2__ $= 7$
$140 \div 20 =$ __7__
__1,400__ $\div 20 = 70$
$14{,}000 \div 20 =$ __700__

6. $45 \div 9 =$ __5__
__450__ $\div 90 = 5$
$4{,}500 \div 90 =$ __50__
$45{,}000 \div 90 =$ __500__

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multi-Digit Division Tic Tac Toe

Students find quotients of expressions that include multiples of 10 and 100.

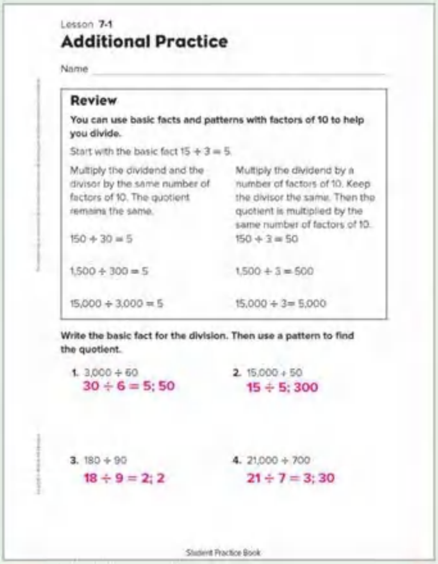
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 63–64



Lesson **7-1**

Additional Practice

Name ____________________

Review

You can use basic facts and patterns with factors of 10 to help you divide.

Start with the basic fact $15 \div 3 = 5$.

Multiply the dividend and the divisor by the same number of factors of 10. The quotient remains the same.	Multiply the dividend by a number of factors of 10. Keep the divisor the same. Then the quotient is multiplied by the same number of factors of 10.
$150 \div 30 = 5$	$150 \div 3 = 50$
$1{,}500 \div 300 = 5$	$1{,}500 \div 3 = 500$
$15{,}000 \div 3{,}000 = 5$	$15{,}000 \div 3 = 5{,}000$

Write the basic fact for the division. Then use a pattern to find the quotient.

1. $3{,}000 \div 60$
$30 \div 6 = 5; 50$

2. $15{,}000 \div 50$
$15 \div 5; 300$

3. $180 \div 90$
$18 \div 9 = 2; 2$

4. $21{,}000 \div 700$
$21 \div 7 = 3; 30$

Student Practice Book

Own It! Digital Station

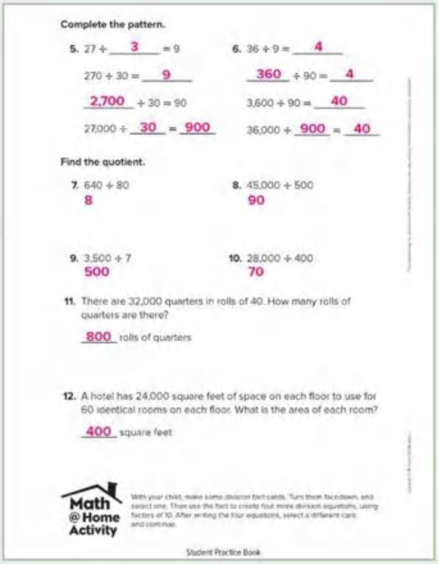
Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 63–64



Complete the pattern.

5. 27 ÷ 3 = 9
270 ÷ 30 = 9
2,700 ÷ 30 = 90
27,000 ÷ 30 = 900

6. 36 ÷ 9 = 4
360 ÷ 90 = 4
3,600 ÷ 90 = 40
36,000 ÷ 900 = 40

Find the quotient.

7. 640 ÷ 80
8

8. 45,000 ÷ 500
90

9. 3,500 ÷ 7
500

10. 28,000 ÷ 400
70

11. There are 32,000 quarters in rolls of 40. How many rolls of quarters are there?

800 rolls of quarters

12. A hotel has 24,000 square feet of space on each floor to use for 60 identical rooms on each floor. What is the area of each room?

400 square feet

Math @Home Activity With your child, make some division fact cards. Turn them facedown, and select one. Then use the fact to create four more division equations, using factors of 10. After writing the four equations, select a different card and continue.

Student Practice Book

WORKSTATIONS

GO ONLINE

INDEPENDENT WORK

E Extend Thinking

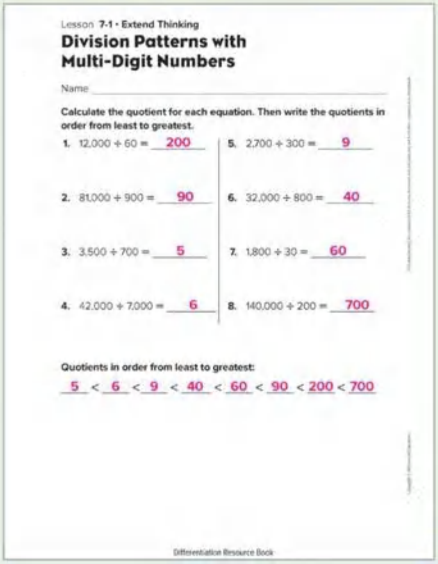
Use it! Application Station

Online Learning: Is It Safe? Students write rules for safely using electronic devices and practice their rules by researching how to divide multi-digit numbers. *The content of this card has concepts covered later in Lesson 7-6. You may want to assign this card to students ready to explore content covered later in this unit.*

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

Differentiation Resource Book, p. 64



Lesson 7-1 • Extend Thinking

Division Patterns with Multi-Digit Numbers

Name ______

Calculate the quotient for each equation. Then write the quotients in order from least to greatest.

1. 12,000 ÷ 60 = 200
2. 81,000 ÷ 900 = 90
3. 3,500 ÷ 700 = 5
4. 42,000 ÷ 7,000 = 6
5. 2,700 ÷ 300 = 9
6. 32,000 ÷ 800 = 40
7. 1,800 ÷ 30 = 60
8. 140,000 ÷ 200 = 700

Quotients in order from least to greatest:

5 < 6 < 9 < 40 < 60 < 90 < 200 < 700

Differentiation Resource Book

LESSON **7-2**

Estimate Quotients

Learning Targets

- I can explain how to estimate quotients of multi-digit numbers.
- I can estimate quotients of multi-digit numbers to determine if calculations are reasonable.
- I can use an estimated quotient to make predictions about a calculated solution.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Math Practices and Processes

MPP Reason abstractly and quantitatively.

MPP Use appropriate tools strategically.

Vocabulary

Math Term	**Academic Terms**
estimate	suggest
	variation

Materials

The materials may be for any part of the lesson.

- digit cards

Focus

Content Objectives	**Language Objectives**	**SEL Objective**
• Students estimate quotients of multi-digit numbers using strategies they used to estimate quotients of lesser numbers. • Students use estimated quotients to make predictions and asses the reasonableness of a calculated solution.	• Students talk about estimating quotients, using the terms *greater than, less than,* and *about.* • To support optimizing output, ELs participate in MLR7: Compare and Connect.	• Students set learning goals and initiate work on tasks to accomplish their goals.

Coherence

Previous	**Now**	**Next**
• Students used place-value strategies to find quotients quotients (Grade 4). • Students used place-value patterns to determine quotients when dividing by multiples of 10 (Lesson 1).	• Students use compatible numbers to estimate quotients of two whole numbers.	• Students wiil use the relationship between mulipication and division to divide (Lesson 3). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build their understanding of division through estimating quotients.	• Students use estimation strategies to begin to build proficiency with division.	• Students apply their understanding of estimating quotients to solve problems. *Application is not a specific element of rigor for this standard.*

GO ONLINE

Number Routine

Which Benchmark Is It Closest To?

5–7 min

Build Fluency Students build number sense as they determine which of three benchmarks is closest to given decimal numbers.

These prompts encourage students to talk about their reasoning:

- What do you notice about the numbers?
- How did you compare each value to the benchmark numbers?
- Why is 1.075 closer to 1 than to 2?
- Which numbers were easiest to place?
- What other numbers are close to that benchmark?
- How could you adjust the number so that it is closer to a different benchmark?

Launch 5–7 min

Sense-Making Routine

Purpose Students look at large numbers of groups and start to think about how they could figure out the number of groups.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may want to have students work on their own as they notice and wonder. Encourage students to notice the groupings in each picture and wonder about how the water bottles are grouped rather than the number of water bottles in all.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of estimating quotients using compatible numbers and are based on possible comments and questions that students may make during the share out.

- How are the water bottles grouped?
- How could you figure out how many bottles there are?
- How could you figure out how many groups there are?

Math is... Mindset

- What helps you be motivated to do your best work?

SEL Self-Regulation: Initiative

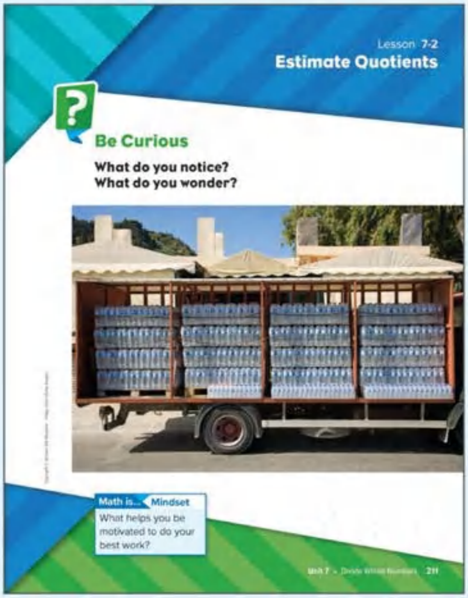
Before beginning the Notice & Wonder routine, guide students to make their own specific and attainable goal for the day. Goals may be centered around estimating quotients or may be focused on strong behaviors, such as active listening or staying on task. Creating a personal goal can allow students to practice self-motivation as they work toward achieving that goal.

Transition to Explore & Develop

Encourage students to understand that it would be more efficient for them to estimate how many groups of water bottles there are rather than to try counting each one.

ETP Establish Goals to Focus Learning

- Let's think about how we can use compatible numbers to estimate quotients.



Lesson 7-2

Estimate Quotients

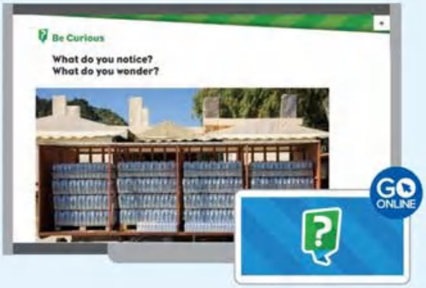
Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

What helps you be motivated to do your best work?

Unit 7 • Divide Whole Numbers 211

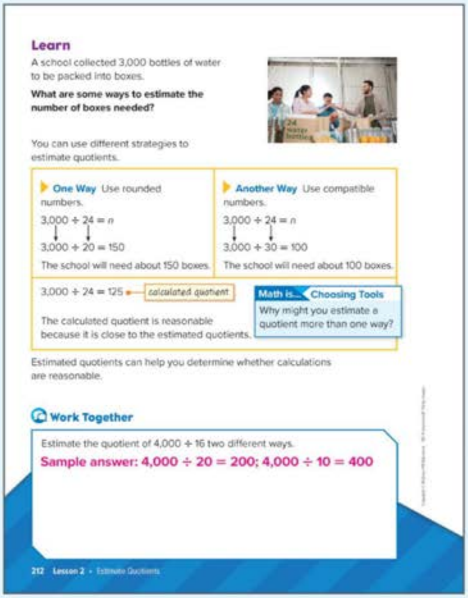


Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

A school collected 3,000 bottles of water to be packed into boxes.

What are some ways to estimate the number of boxes needed?

You can use different strategies to estimate quotients.

One Way Use rounded numbers.

$$3{,}000 \div 24 = n$$
$$3{,}000 \div 20 = 150$$

The school will need about 150 boxes.

Another Way Use compatible numbers.

$$3{,}000 \div 24 = n$$
$$3{,}000 \div 30 = 100$$

The school will need about 100 boxes.

$3{,}000 \div 24 = 125$ calculated quotient

The calculated quotient is reasonable because it is close to the estimated quotients.

Math is... Choosing Tools
Why might you estimate a quotient more than one way?

Estimated quotients can help you determine whether calculations are reasonable.

Work Together

Estimate the quotient of 4,000 ÷ 16 two different ways.

Sample answer: 4,000 ÷ 20 = 200; 4,000 ÷ 10 = 400

212 Lesson 2 • Estimate Quotients

1 Pose the Problem

ETP Pose Purposeful Questions

- What are you trying to figure out?
- Do you need an exact answer? How do you know?

2 Develop the Math

Choose the option that best meets your instructional goals.

MLR Compare and Connect

Pair students and have them both work on the same problem, similar to the one on the Learn page. Have them solve using different compatible numbers, and then have them compare their work with their partner. Revisit this routine throughout the lesson to help students build proficiency.

3 Bring It Together

ETP Elicit Evidence of Student Thinking

- How is estimating quotients useful?
- How would you explain to a classmate how to estimate a quotient?

Key Takeaways

- Estimating quotients can help make predictions about a calculated solution.
- Estimating quotients helps assess the reasonableness of a calculated solution.
- Strategies used to estimate quotients of lesser numbers, such as compatible numbers, can also be used to estimate quotients of multi-digit numbers.

Work Together

As students determine what numbers to use for estimating with compatible numbers, ask them to predict whether the calculated quotient will be greater than or less than each estimated quotient.

Common Error Remind students to make sure their estimate has the correct number of zeroes, especially if they used what they know about place value patterns to estimate. For example, they may have used the numbers 4,000 ÷ 20 to estimate.

LOM Language of Math

Remind students that *compatible* means “working well together.” Compatible numbers are easy to divide mentally because they are related to a basic division fact. For example, while 3,000 ÷ 24 is not easy to calculate mentally, 3,000 ÷ 30 is because it is related to 30 ÷ 3.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore strategies for estimating quotients.

Materials: *Show and Explain Your Strategies* Teaching Resource

Directions: Distribute copies of the *Show and Explain Your Strategies* Teaching Resource. Have students solve the Pose the Problem using two different estimation strategies. Students should complete the Show and Explain boxes on the Teaching Resource. For the Check box, tell students that the calculated quotient is 125. Have students use their estimates to assess the reasonableness of the calculated quotient.

Support Productive Struggle

- How could you make the dividend and the divisor easier to divide mentally?
- How can you use what you know about strategies for estimating products to estimate quotients?
- How can you use what you know about basic division facts and place-value patterns to estimate the quotient?

Math is... Choosing Tools

- Why might you estimate a quotient more than one way?

Students strategically use estimation as a tool to help them solve problems. For example, they might use several estimates to get a range of reasonable calculated quotients.

Activity Debrief: Invite volunteers to share the estimated quotients and the strategy they used to determine their estimate. Have students compare the different strategies by identifying similarities and differences.

A PDF of the Teaching Resource is available in the Digital Teacher Center.

Guided Exploration

Students estimate quotients and compare the estimates to a calculated quotient to assess if it is reasonable.

Facilitate Meaningful Discourse

- **Think About It:** Why is 20 used to estimate the quotient?
- How can basic facts and place-value patterns help you determine 3,000 ÷ 20?

Discuss why rounding and front-end estimation are not viable strategies for estimating quotients. Ask:

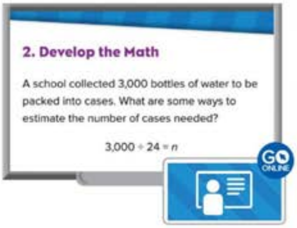
- Why wouldn't rounding work to estimate 3,000 ÷ 44?
- Why wouldn't front-end estimation work to estimate 5,000 ÷ 37?

Have students work in pairs or small groups to determine how the estimated quotient relates to the actual quotient. Students should use the meaning of division to help explain their reasoning, such as since both have the same total number of objects (3,000) and we are dividing them into a greater number of groups (30 > 24), the number in each group will be less.

Math is... Choosing Tools

- Why might you estimate a quotient more than one way?

Students strategically use estimation as a tool to help them solve problems. For example, they might use several estimates to get a range of reasonable calculated quotients.



2. Develop the Math

A school collected 3,000 bottles of water to be packed into cases. What are some ways to estimate the number of cases needed?

$3{,}000 \div 24 = n$

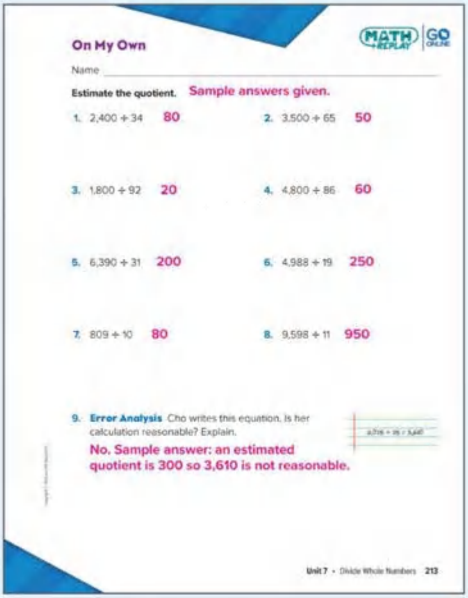
English Learner Scaffolds

Entering/Emerging Support students' understanding of the adjective *needed*. Use crayons to color a picture. Say *I colored this picture*. Point to the crayons you used. Say *These were needed to color the picture*. Repeat with a new task using new materials. Then repeat again with another task, and ask two questions, one prompting a Yes answer and one a No. Ask *Were these / Was this needed to [task]?*

Developing/Expanding Ensure understanding of the adjective needed. Say *I want to color a picture*. Ask *What do I need?* Students respond with something needed (paper, markers, etc.) Say *That's right. [Markers] are needed*. Repeat with a new task using new materials. Then instruct students to think about the last school or home task they worked on. Ask *What materials were needed to complete it?*

Bridging/Reaching Ask students to talk about the last school or home task they worked on, and to discuss what materials were needed to complete it. Then have them brainstorm and list similar words to *needed* and share their list with the class (*required, necessary*, etc.). Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min



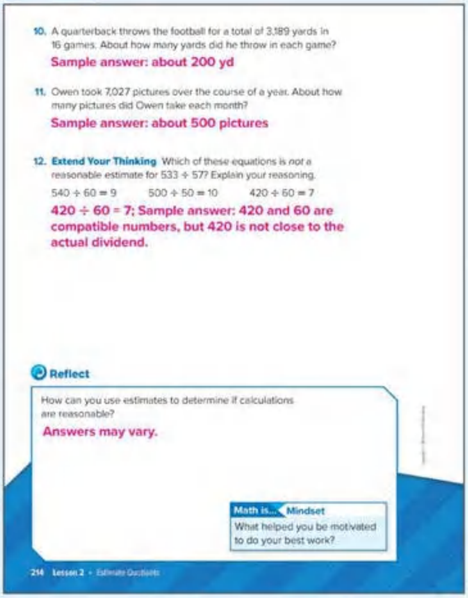
On My Own

Name

Estimate the quotient. Sample answers given.

1. 2,400 ÷ 34 80
2. 3,500 ÷ 65 50
3. 1,800 ÷ 92 20
4. 4,800 ÷ 86 60
5. 6,390 ÷ 31 200
6. 4,988 ÷ 19 250
7. 809 ÷ 10 80
8. 9,598 ÷ 11 950
9. **Error Analysis** Cho writes this equation. Is her calculation reasonable? Explain.
   No. Sample answer: an estimated quotient is 300 so 3,610 is not reasonable.

Unit 7 • Divide Whole Numbers 213



10. A quarterback throws the football for a total of 3,189 yards in 16 games. About how many yards did he throw in each game?
    Sample answer: about 200 yd
11. Owen took 7,027 pictures over the course of a year. About how many pictures did Owen take each month?
    Sample answer: about 500 pictures
12. **Extend Your Thinking** Which of these equations is *not* a reasonable estimate for 533 ÷ 57? Explain your reasoning.
    540 ÷ 60 = 9 500 ÷ 50 = 10 420 ÷ 60 = 7
    420 ÷ 60 = 7; Sample answer: 420 and 60 are compatible numbers, but 420 is not close to the actual dividend.

Reflect

How can you use estimates to determine if calculations are reasonable?

Answers may vary.

Math is... Mindset

What helped you be motivated to do your best work?

214 Lesson 2 • Estimate Quotients

Practice

Build Fluency from Understanding

Common Error: Exercises 1–8 Students may attempt rounding or front-end estimation to estimate quotients but doing so may not result in compatible numbers. While rounding and front-end estimation are strategies that work well for other operations such as adding and multiplication, they are not useful strategies for division.

Practice Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9	2	Conceptual Understanding
10–11	2	Application
12	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you use estimates to determine if calculations are reasonable?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How can you help yourself to start your work independently?

Students reflect on how they practiced self-management.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can explain how to estimate quotients of multi-digit numbers.
- I can estimate quotients of multi-digit numbers to determine if calculations are reasonable.
- I can use an estimated quotient to make predictions about a calculated solution.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Estimate quotients	5.NBT.B.6
2	1	Estimate quotients	5.NBT.B.6
3	2	Estimate quotients	5.NBT.B.6
4	2	Estimate quotients	5.NBT.B.6

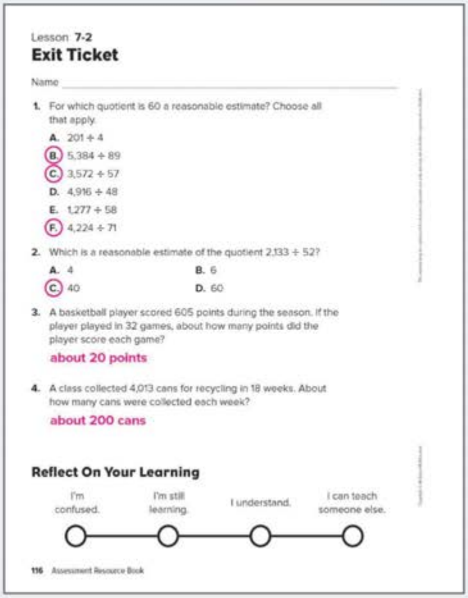
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the Ⓑ or Ⓔ activities
3 of 4	*Take Another Look* or any of the Ⓑ activities
2 or fewer of 4	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking



Lesson 7-2

Exit Ticket

Name ____________________

1. For which quotient is 60 a reasonable estimate? Choose all that apply.
   A. 201 ÷ 4
   [✓ B.] 5,384 ÷ 89
   [✓ C.] 3,572 ÷ 57
   D. 4,916 ÷ 48
   E. 1,277 ÷ 58
   [✓ F.] 4,224 ÷ 71

2. Which is a reasonable estimate of the quotient 2,133 ÷ 52?
   A. 4 B. 6
   [✓ C.] 40 D. 60

3. A basketball player scored 605 points during the season. If the player played in 32 games, about how many points did the player score each game?
   about 20 points

4. A class collected 4,013 cans for recycling in 18 weeks. About how many cans were collected each week?
   about 200 cans

Reflect On Your Learning

I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else. ○

116 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Flip It

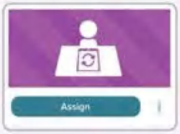
Work with students in pairs. Have students flip over digit cards and work together to create a division equation with a 3-digit dividend and a 2-digit divisor. Have one student estimate a quotient using rounding and the other students estimate an answer using compatible numbers. Discuss with students whether each estimate is greater than or less than the solution and which they expect to be closer to the actual quotient.

GO ONLINE

Take Another Look Lesson

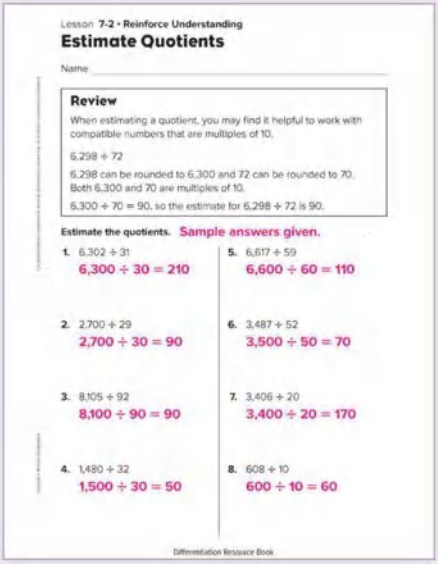
Assign the interactive lesson to reinforce targeted skills.

- Estimate Quotients (Whole Number)



INDEPENDENT WORK

Differentiation Resource Book, p. 65



Lesson 7-2 • Reinforce Understanding

Estimate Quotients

Name ______________________

Review

When estimating a quotient, you may find it helpful to work with compatible numbers that are multiples of 10.

6,298 ÷ 72

6,298 can be rounded to 6,300 and 72 can be rounded to 70. Both 6,300 and 70 are multiples of 10.

6,300 ÷ 70 = 90, so the estimate for 6,298 ÷ 72 is 90.

Estimate the quotients. Sample answers given.

1. 6,302 ÷ 31
   6,300 ÷ 30 = 210
2. 2,700 ÷ 29
   2,700 ÷ 30 = 90
3. 8,105 ÷ 92
   8,100 ÷ 90 = 90
4. 1,480 ÷ 32
   1,500 ÷ 30 = 50
5. 6,617 ÷ 59
   6,600 ÷ 60 = 110
6. 3,487 ÷ 52
   3,500 ÷ 50 = 70
7. 3,406 ÷ 20
   3,400 ÷ 20 = 170
8. 608 ÷ 10
   600 ÷ 10 = 60

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Estimating Quotients Showdown

Students practice estimating quotients.

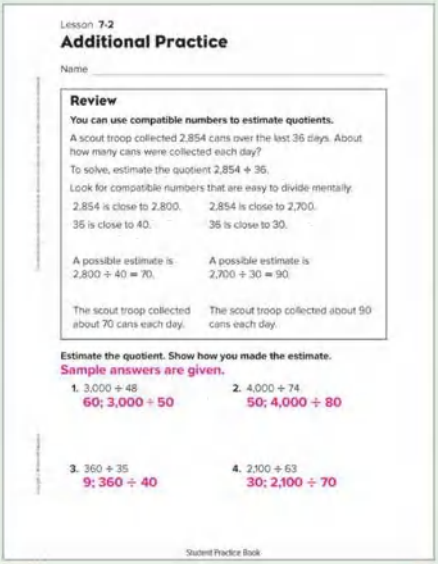
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 65–66



Lesson 7-2

Additional Practice

Name ______________________

Review

You can use compatible numbers to estimate quotients.

A scout troop collected 2,854 cans over the last 36 days. About how many cans were collected each day?

To solve, estimate the quotient 2,854 ÷ 36.

Look for compatible numbers that are easy to divide mentally.

2,854 is close to 2,800. 36 is close to 40.	2,854 is close to 2,700. 36 is close to 30.
A possible estimate is 2,800 ÷ 40 = 70.	A possible estimate is 2,700 ÷ 30 = 90.
The scout troop collected about 70 cans each day.	The scout troop collected about 90 cans each day.

Estimate the quotient. Show how you made the estimate.
Sample answers are given.

1. 3,000 ÷ 48
   60; 3,000 ÷ 50
2. 4,000 ÷ 74
   50; 4,000 ÷ 80
3. 360 ÷ 35
   9; 360 ÷ 40
4. 2,100 ÷ 63
   30; 2,100 ÷ 70

Student Practice Book

Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

Use It! Application Station

Estimate High School Density

Students research the density of schools in 10 U.S. states.

GO ONLINE

Spiral Review

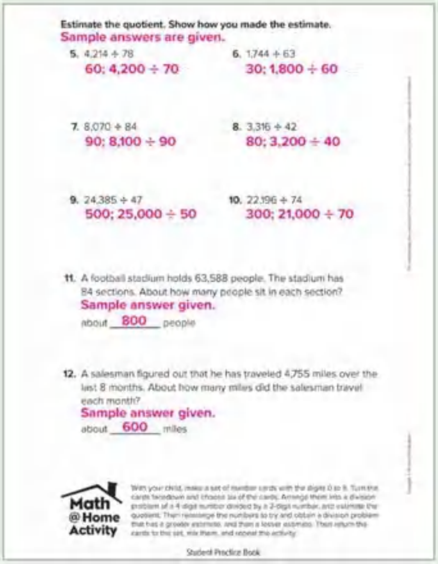
Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 65–66



Estimate the quotient. Show how you made the estimate.
Sample answers are given.

5. 4,214 ÷ 78
60; 4,200 ÷ 70

6. 1,744 ÷ 63
30; 1,800 ÷ 60

7. 8,070 ÷ 84
90; 8,100 ÷ 90

8. 3,316 ÷ 42
80; 3,200 ÷ 40

9. 24,385 ÷ 47
500; 25,000 ÷ 50

10. 22,196 ÷ 74
300; 21,000 ÷ 70

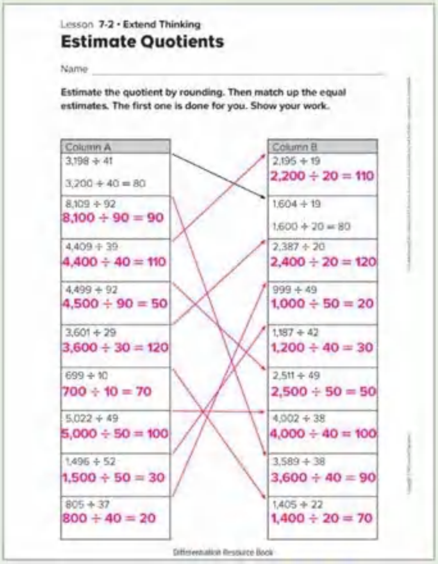
11. A football stadium holds 63,588 people. The stadium has 84 sections. About how many people sit in each section?
Sample answer given.
about 800 people

12. A salesman figured out that he has traveled 4,755 miles over the last 8 months. About how many miles did the salesman travel each month?
Sample answer given.
about 600 miles

Math @Home Activity

Student Practice Book

Differentiation Resource Book, p. 66



Lesson 7-2 • Extend Thinking

Estimate Quotients

Name ____________________

Estimate the quotient by rounding. Then match up the equal estimates. The first one is done for you. Show your work.

Column A	Column B
3,198 ÷ 41 3,200 ÷ 40 = 80	2,195 ÷ 19 2,200 ÷ 20 = 110
8,109 ÷ 92 8,100 ÷ 90 = 90	1,604 ÷ 19 1,600 ÷ 20 = 80
4,409 ÷ 39 4,400 ÷ 40 = 110	2,387 ÷ 20 2,400 ÷ 20 = 120
4,499 ÷ 92 4,500 ÷ 90 = 50	999 ÷ 49 1,000 ÷ 50 = 20
3,601 ÷ 29 3,600 ÷ 30 = 120	1,187 ÷ 42 1,200 ÷ 40 = 30
699 ÷ 10 700 ÷ 10 = 70	2,511 ÷ 49 2,500 ÷ 50 = 50
5,022 ÷ 49 5,000 ÷ 50 = 100	4,002 ÷ 38 4,000 ÷ 40 = 100
1,496 ÷ 52 1,500 ÷ 50 = 30	3,589 ÷ 38 3,600 ÷ 40 = 90
805 ÷ 37 800 ÷ 40 = 20	1,405 ÷ 22 1,400 ÷ 20 = 70

Differentiation Resource Book

LESSON **7-3**

Relate Multiplication and Division of Multi-Digit Numbers

Learning Target

- I can use the relationship between multiplication and division to determine the quotient when dividing by a 2-digit divisor.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Math Practices and Processes

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Terms	**Academic Terms**
dividend	analyze
divisor	establish

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- number cubes

Focus

Content Objective	**Language Objective**	**SEL Objective**
• Students use the relationship between multiplication and division to determine the quotient when dividing by a 2-digit divisor.	• Students describe the relationship between multiplication and division that helps them to find the quotient when dividing by a multiple of 10 using the verb *determine* and the adjectives *same* and *different*. • To support sense-making, ELs participate in MLR2: Collect and Display.	• Students collaborate with peers and contribute to group effort to achieve a collective mathematical goal.

Coherence

Previous	**Now**	**Next**
• Students used place value strategies to find quotients with up to 4-digit dividends and 1-digit divisors (Grade 4). • Students estimated quotients using rounding (Lesson 3).	• Students use the relationship between multiplication and division to divide multi-digit numbers.	• Students will extend their understanding to divide using an area model using partial quotients (Lesson 4). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build their understanding of multiplication and division using basic facts to divide multi-digit numbers.	• Students build proficiency with multi-digit division using basic multiplication facts.	• Students solve real-world division problems. *Application is not a specific element of rigor for this standard.*

GO ONLINE

Number Routine

Which Benchmark Is It Closest To?

5–7 min

Build Fluency Students build number sense as they determine which of four benchmarks is closest to given decimal numbers.

These prompts encourage students to talk about their reasoning:

- What do you notice about the numbers?
- How did you compare each value to the benchmark numbers?
- How do you know if 2.035 closer to 2 or 2.25?
- Were some numbers easier to compare than others? Explain.

Launch 5–7 min

Sense-Making Routine

Purpose Students study a picture of groups of objects to think about how they might use multiplication to determine how many objects there are, or division to determine how many groups there are.

Notice & Wonder

- What do you notice?
- What do you wonder?

Teaching Tip You may have students work in pairs or small groups as they discuss the image. Hearing other students' thinking may give students more insight into what they notice and wonder about the image.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of how the relationship between multiplication and division can help us divide and are based on possible comments and questions that students may make during the share out.

- How could you find the total number of pieces of fruit?
- If you knew the total number of pieces of fruit, how could you find the number of pieces in each crate?

Math is... Mindset

- What are some ways you can conribute to your group today?

SEL Relationship Skills: Teamwork

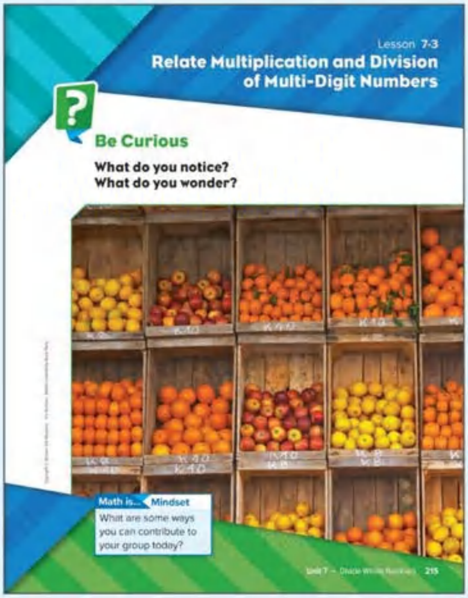
Establish a positive classroom culture by providing students opportunities to work together to complete collective tasks. As students notice and wonder, encourage them to work together and build off the ideas of their peers. Invite students to participate in different ways so that each student can actively contribute to the team effort.

Transition to Explore & Develop

Ask questions to encourage students to think about the relationship between mutiplication and division.

ETP Establish Goals to Focus Learning

- Let's think about how our knowledge of the relationship between multiplication and division can help us solve division equations.



Lesson 7-3

Relate Multiplication and Division of Multi-Digit Numbers

Be Curious

What do you notice?
What do you wonder?

Math is... Mindset

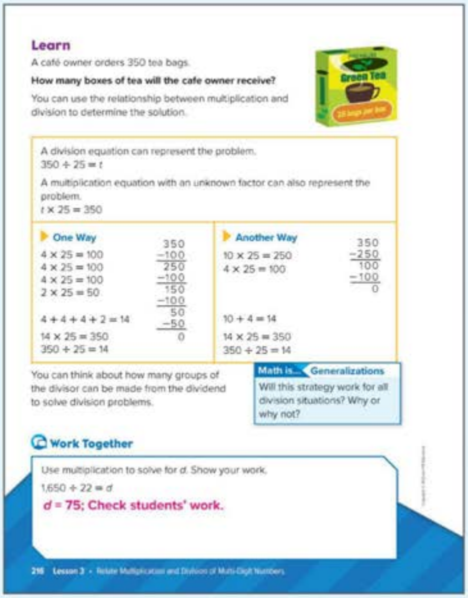
What are some ways you can contribute to your group today?

Be Curious

What do you notice?
What do you wonder?

Explore & Develop

20 min



Learn

A café owner orders 350 tea bags.

How many boxes of tea will the cafe owner receive?

You can use the relationship between multiplication and division to determine the solution.

A division equation can represent the problem.
$350 \div 25 = t$

A multiplication equation with an unknown factor can also represent the problem.
$t \times 25 = 350$

One Way

$4 \times 25 = 100$
$4 \times 25 = 100$
$4 \times 25 = 100$
$2 \times 25 = 50$

$$\begin{array}{r} 350 \\ -100 \\ \hline 250 \\ -100 \\ \hline 150 \\ -100 \\ \hline 50 \\ -50 \\ \hline 0 \end{array}$$

$4 + 4 + 4 + 2 = 14$

$14 \times 25 = 350$
$350 \div 25 = 14$

Another Way

$10 \times 25 = 250$
$4 \times 25 = 100$

$$\begin{array}{r} 350 \\ -250 \\ \hline 100 \\ -100 \\ \hline 0 \end{array}$$

$10 + 4 = 14$

$14 \times 25 = 350$
$350 \div 25 = 14$

You can think about how many groups of the divisor can be made from the dividend to solve division problems.

Math is... Generalizations
Will this strategy work for all division situations? Why or why not?

Work Together

Use multiplication to solve for d. Show your work.

$1{,}650 \div 22 = d$

$d = 75$; Check students' work.

216 Lesson 3 • Relate Multiplication and Division of Multi-Digit Numbers

❶ Pose the Problem

MLR Collect and Display

As students discuss the questions, record relevant words and phrases they may use such as *operations, unknown factor, same*, and *groups* of. Display the words for student reference. Use the student-generated expressions to help students make connections between student language and math vocabulary.

ETP Pose Purposeful Questions

- What is happening in the problem?
- What are you trying to find? How do you know?
- What operations can you use to solve the problem?

❷ Develop the Math

Choose the option that best meets your instructional goals.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How can your knowledge of multiplication help you solve division equations?
- What are some different ways you can use multiplication to solve division equations?
- How is the quotient of a division equation related to a multiplication equation?

Key Takeaway

- One way to determine the quotient of a whole number divided by a 2-digit divisor is using the relationship between multiplication and division.

Work Together

Students work together to solve a division equation using multiplication. Have them multiply 22 by different factors to see if they find any patterns.

Common Error Students may be confused initially as 22 does not seem as simple a factor to multiply by as 25. However, remind them that they can use patterns of multiplication to more easily find the products.

LOM Language of Math

Remind students that while two numbers being multiplied can both be called factors, in a division equation there is a specific *dividend* and *divisor*. The terms are not "commutative."

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using multiplication concepts, such as equal groups, to solve a division equation.

Materials: number cube

Directions: Before having students start the activity, facilitate a discussion to ensure students understand that both $350 \div 25 = t$ and $t \times 25 = 350$ can be used to represent the problem. Provide each pair or small group a number cube. Explain that their goal is to be the first person to reach 350. Students will roll the number cube. This is the number of groups of 25. Students should use multiplication to determine the total number and subtraction to determine how much is left. If a student rolls a number that creates a total number that is too many, they loose their turn. Have students record how many groups of 25 it takes to reach 350.

ETP Implement Tasks That Promote Reasoning and Problem Solving

- How does making groups of 25 help you solve for t?
- How is your answer is the same as your classmates' answer? How is it different?
- Is your solution reasonable? How do you know?

Math is... Generalizations

- Will this strategy work for all division situations? Why or why not?

Students consider using multiplication as a general method to divide.

Activity Debrief: Have students share their recorded solutions. Facilitate a discussion to ensure students understand that there are multiple strategies for solving $350 \div 25 = t$, but that all strategies result in a total number of 14 groups of 25 to make 350. Discuss the benefits of starting with a greater number of groups of 25, such as 10 groups of 25, in that 10×25 is easy to multiply mentally.

Guided Exploration

Students solve a division problem using the relationship between multiplication and division.

ETP Facilitate Meaningful Discourse

Have the students create the division equation. Ask:

- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- What compatible numbers will you use to estimate the solution? Why?
- How will basic facts and place-value patterns help you estimate the solution?

- Why might writing a related multiplication equation be helpful?
- **Think About It:** What numbers are compatible with 25? Why?
- Why is 4 a good choice to start with?

Have students use their estimate to assess the reasonableness of the calculated solution. Ask:

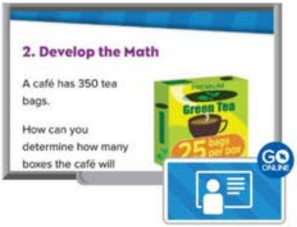
- Is the calculated solution reasonable? Why or why not?

- Why is 10 a good choice to start with?
- Which way do you think is more efficient? Why?

Math is... Generalizations

- Will this strategy work for all division stiuations? Why or why not?

Students consider using multiplication as a general method to divide.



2. Develop the Math

A café has 350 tea bags.

How can you determine how many boxes the café will

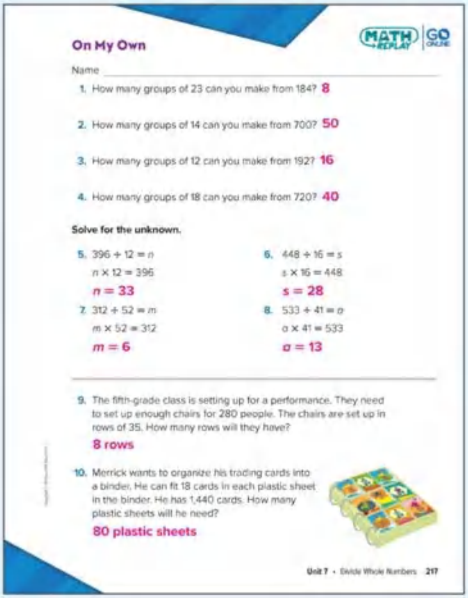
EL English Learner Scaffolds

Entering/Emerging Ensure understanding of *hold*. Try to put objects into a container that isn't big enough. Say *This [box] can't hold all of my [art supplies]*. Then get a larger container and put the items in it. Say *This [box] holds all of my art supplies*. Repeat again with new containers and/or items. Then repeat once more, asking students *Does this [box] hold all of my [books]?*

Developing/Expanding Ensure understanding of *hold*. Try to put objects into a container that isn't big enough. Say *This [box] can't hold all of my [art supplies]*. Then get a larger container and put the items in it. Say *This [box] holds all of my art supplies.* Repeat again with new containers and/or items. Then ask students to use *hold* in a sentence, demonstrating with new items. Provide sentence frames if needed.

Bridging/Reaching Ask students to look at the Learn page and to use *hold* in a similar way in their own sentence. Then ask them to come up with other meanings and uses of the word (*hold something with your hands, hold a baby, hold a meeting,* etc.). Allow students to use a dictionary to help them if needed.

Practice & Reflect 10 min



On My Own

Name

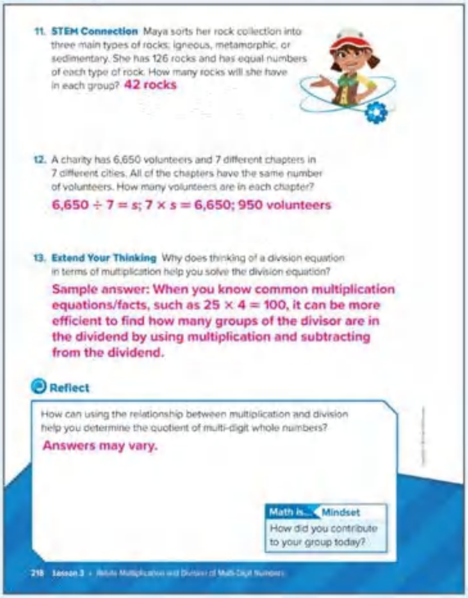
1. How many groups of 23 can you make from 184? 8
2. How many groups of 14 can you make from 700? 50
3. How many groups of 12 can you make from 192? 16
4. How many groups of 18 can you make from 720? 40

Solve for the unknown.

5. $396 \div 12 = n$
   $n \times 12 = 396$
   $n = 33$
6. $448 \div 16 = s$
   $s \times 16 = 448$
   $s = 28$
7. $312 \div 52 = m$
   $m \times 52 = 312$
   $m = 6$
8. $533 \div 41 = a$
   $a \times 41 = 533$
   $a = 13$

9. The fifth-grade class is setting up for a performance. They need to set up enough chairs for 280 people. The chairs are set up in rows of 35. How many rows will they have?
   8 rows
10. Merrick wants to organize his trading cards into a binder. He can fit 18 cards in each plastic sheet in the binder. He has 1,440 cards. How many plastic sheets will he need?
   80 plastic sheets

Unit 7 • Divide Whole Numbers 217



11. **STEM Connection** Maya sorts her rock collection into three main types of rocks: igneous, metamorphic, or sedimentary. She has 126 rocks and has equal numbers of each type of rock. How many rocks will she have in each group? 42 rocks
12. A charity has 6,650 volunteers and 7 different chapters in 7 different cities. All of the chapters have the same number of volunteers. How many volunteers are in each chapter?
   $6{,}650 \div 7 = s$; $7 \times s = 6{,}650$; 950 volunteers
13. **Extend Your Thinking** Why does thinking of a division equation in terms of multiplication help you solve the division equation?
   Sample answer: When you know common multiplication equations/facts, such as $25 \times 4 = 100$, it can be more efficient to find how many groups of the divisor are in the dividend by using multiplication and subtracting from the dividend.

Reflect

How can using the relationship between multiplication and division help you determine the quotient of multi-digit whole numbers?

Answers may vary.

Math is... Mindset
How did you contribute to your group today?

218 Lesson 3

Practice

Build Fluency from Understanding

Common Error: Exercises 1–8 Remind students to consider numbers that are compatible with the divisors before they begin solving. For example, for Exercise 3, students may know that $12 \times 4 = 48$, so can use groups of 4 to see how many groups of 12 are in 192.

Practice Item Analysis

Item	DOK	Rigor
1–8	1	Procedural Skill and Fluency
9–12	2	Application
13	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can using the relationship between multiplication and division help you determine the quotient of multi-digit whole numbers?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How can working as a team help us achieve our goals?

Students reflect on how they developed stronger relationship skills.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can use the relationship between multiplication and division to determine the quotient when dividing by a 2-digit divisor.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Relate multiplication and division	5.NBT.B.6
2	1	Relate multiplication and division	5.NBT.B.6
3	2	Relate multiplication and division	5.NBT.B.6
4	2	Relate multiplication and division	5.NBT.B.6

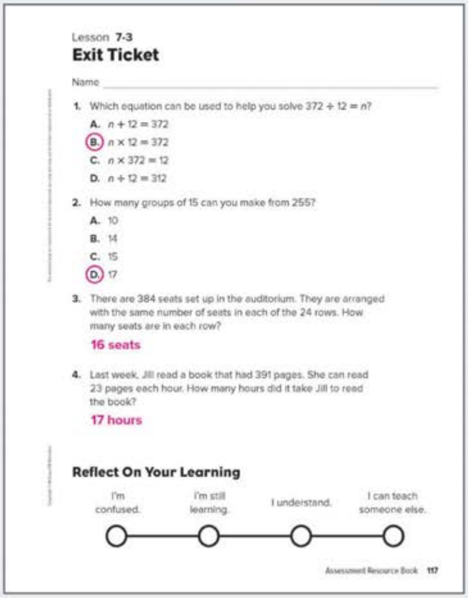
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the B or E activities
3 of 4	*Take Another Look* or any of the B activities
2 or fewer of 4	Small Group Intervention or any of the R activities

Key for Differentiation

- R Reinforce Understanding
- B Build Proficiency
- E Extend Thinking



Lesson 7-3

Exit Ticket

Name ____________________

1. Which equation can be used to help you solve $372 \div 12 = n$?
   A. $n + 12 = 372$
   [✓ B.] $n \times 12 = 372$
   C. $n \times 372 = 12$
   D. $n \div 12 = 312$

2. How many groups of 15 can you make from 255?
   A. 10
   B. 14
   C. 15
   [✓ D.] 17

3. There are 384 seats set up in the auditorium. They are arranged with the same number of seats in each of the 24 rows. How many seats are in each row?
   16 seats

4. Last week, Jill read a book that had 391 pages. She can read 23 pages each hour. How many hours did it take Jill to read the book?
   17 hours

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 117

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Swap It

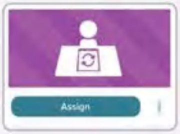
Work with students in pairs. Partners use number cubes to create and solve a multiplication equation with a 3-digit product and a 1-digit factor. Partners work together to write and solve a related division equation If students are struggling suggest them use a model to help. Have partners check their work with a calculator.

GO ONLINE

Take Another Look Lesson

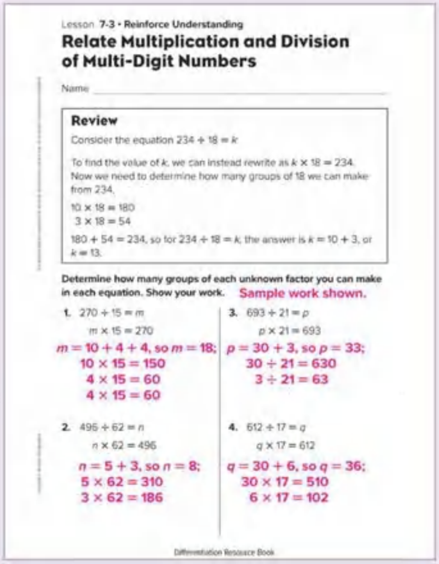
Assign the interactive lesson to reinforce targeted skills.

- Relate Multiplication and Division (Whole Numbers)



INDEPENDENT WORK

Differentiation Resource Book, p. 67



Lesson 7-3 • Reinforce Understanding

Relate Multiplication and Division of Multi-Digit Numbers

Name

Review

Consider the equation $234 \div 18 = k$

To find the value of k, we can instead rewrite as $k \times 18 = 234$. Now we need to determine how many groups of 18 we can make from 234.

$10 \times 18 = 180$
$3 \times 18 = 54$

$180 + 54 = 234$, so for $234 \div 18 = k$, the answer is $k = 10 + 3$, or $k = 13$.

Determine how many groups of each unknown factor you can make in each equation. Show your work. Sample work shown.

1. $270 \div 15 = m$
   $m \times 15 = 270$
   $m = 10 + 4 + 4$, so $m = 18$;
   $10 \times 15 = 150$
   $4 \times 15 = 60$
   $4 \times 15 = 60$

2. $496 \div 62 = n$
   $n \times 62 = 496$
   $n = 5 + 3$, so $n = 8$;
   $5 \times 62 = 310$
   $3 \times 62 = 186$

3. $693 \div 21 = p$
   $p \times 21 = 693$
   $p = 30 + 3$, so $p = 33$;
   $30 \div 21 = 630$
   $3 \div 21 = 63$

4. $612 \div 17 = q$
   $q \times 17 = 612$
   $q = 30 + 6$, so $q = 36$;
   $30 \times 17 = 510$
   $6 \times 17 = 102$

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Multi-Digit Division Tic Tac Toe

Students find quotients of expressions that include multiples of 10 and 100.

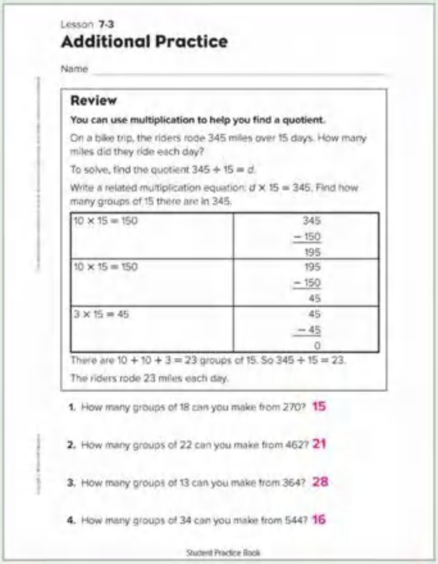
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 67–68



Lesson 7-3

Additional Practice

Name

Review

You can use multiplication to help you find a quotient.

On a bike trip, the riders rode 345 miles over 15 days. How many miles did they ride each day?

To solve, find the quotient $345 \div 15 = d$.

Write a related multiplication equation: $d \times 15 = 345$. Find how many groups of 15 there are in 345.

$10 \times 15 = 150$	345 − 150 195
$10 \times 15 = 150$	195 − 150 45
$3 \times 15 = 45$	45 − 45 0

There are $10 + 10 + 3 = 23$ groups of 15. So $345 \div 15 = 23$.

The riders rode 23 miles each day.

1. How many groups of 18 can you make from 270? 15

2. How many groups of 22 can you make from 462? 21

3. How many groups of 13 can you make from 364? 28

4. How many groups of 34 can you make from 544? 16

Student Practice Book

Extend Thinking

WORKSTATIONS

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

Use It! Application Station

That Is Astronomical Students practice finding quotients, rounding, and writing equations by researching the hours in a day for each planet. *The content of this card has concepts covered later in Lesson 7-7. You may want to assign this card to students ready to explore content covered later in this unit.*

GO ONLINE

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 67–68

Write the related multiplication equation. Then solve.

5. $442 \div 17 = n$

$n \times 17 = 442; n = 26$

6. $473 \div 11 = w$

$w \times 11 = 473; w = 43$

7. $456 \div 24 = m$

$m \times 24 = 456; m = 19$

8. $325 \div 13 = b$

$b \times 13 = 325; b = 25$

9. A landscaper plants 288 flowers. The flowers are planted in 18 equal rows. How many flowers are in each row?

16 flowers

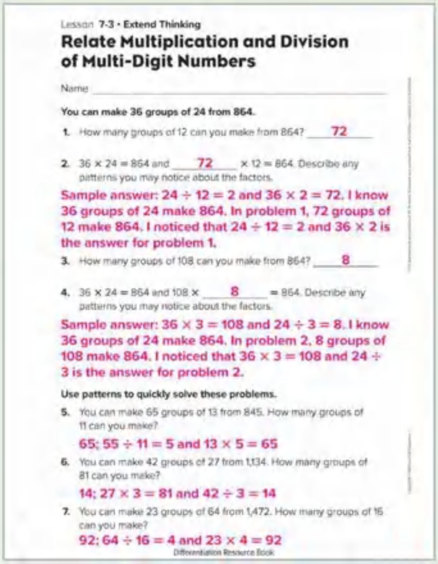
10. A farmer has 209 chickens. He builds enough coops so that there can be 11 chickens in each coop. How many coops does the farmer build?

19 coops

Math @ Home Activity With your child, make two sets of number cards: one set with the numbers from 5 to 15, and the second set with the numbers 11 to 40. Have your child select one card from each set. Away from your child, multiply the two numbers, and give your child one of the numbers and the product. Have him or her find the number of groups on the first card that are in the product. The answer will be the number on the second card. Have your child explain how he or she found the answer. After verifying that the answer is correct, return the cards and repeat the activity by selecting again.

Student Practice Book

Differentiation Resource Book, p. 68



Lesson 7-3 • Extend Thinking

Relate Multiplication and Division of Multi-Digit Numbers

Name ________________

You can make 36 groups of 24 from 864.

1. How many groups of 12 can you make from 864? 72

2. $36 \times 24 = 864$ and 72 $\times 12 = 864$. Describe any patterns you may notice about the factors.

Sample answer: $24 \div 12 = 2$ and $36 \times 2 = 72$. I know 36 groups of 24 make 864. In problem 1, 72 groups of 12 make 864. I noticed that $24 \div 12 = 2$ and 36×2 is the answer for problem 1.

3. How many groups of 108 can you make from 864? 8

4. $36 \times 24 = 864$ and $108 \times$ 8 $= 864$. Describe any patterns you may notice about the factors.

Sample answer: $36 \times 3 = 108$ and $24 \div 3 = 8$. I know 36 groups of 24 make 864. In problem 2, 8 groups of 108 make 864. I noticed that $36 \times 3 = 108$ and $24 \div 3$ is the answer for problem 2.

Use patterns to quickly solve these problems.

5. You can make 65 groups of 13 from 845. How many groups of 11 can you make?

65; $55 \div 11 = 5$ and $13 \times 5 = 65$

6. You can make 42 groups of 27 from 1,134. How many groups of 81 can you make?

14; $27 \times 3 = 81$ and $42 \div 3 = 14$

7. You can make 23 groups of 64 from 1,472. How many groups of 16 can you make?

92; $64 \div 16 = 4$ and $23 \times 4 = 92$

Differentiation Resource Book

LESSON **7-4**

Represent Division of 2-Digit Divisors

Learning Target

- I can use an area model to determine partial quotients and add partial quotients to calculate the quotient.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or area models.

Math Practices and Processes

MPP Model with mathematics.

MPP Look for and make use of structure.

Vocabulary

Math Term	**Academic Terms**
partial quotient	reflect
	speculate

Materials

The materials may be for any part of the lesson.

- base-ten blocks
- calculators

Focus

Content Objective	**Language Objectives**	**SEL Objective**
• Students use an area model to determine partial quotients and add partial quotients to calculate the quotient.	• Students explain how to use an area model to determine and add partial quotients using comparatives *more useful, less useful, more helpful,* and *less helpful*. • To support optimizing output, ELs participate in MLR1: Stronger and Clearer Each Time.	• Students discuss how a rule or routine can help develop mathematical skills and knowledge and be responsible contributors.

Coherence

Previous	**Now**	**Next**
• Students used place-value strategies to find quotients (Grade 4). • Students used the relationship between multiplication and division to divide (Lesson 3).	• Students extend their understanding of division to divide using an area model and partial quotients.	• Students will use partial quotients to divide by 2-digit divisors (Lesson 5). • Students will fluently divide using an algorithm (Grade 6).

Rigor

Conceptual Understanding	**Procedural Skill & Fluency**	**Application**
• Students build on their understanding of division as they begin to divide with 2-digit divisors using area models.	• Students build proficiency with division facts for dividing with 2-digit divisors.	• Students apply their understanding of division to solve real-world problems. *Application is not a specific element of rigor for this standard.*

Number Routine
Find the Pattern, Make a Pattern

5–7 min

Build Fluency Students build reasoning skills as they determine a given pattern, find missing terms, and repeat the pattern with different numbers.

These prompts encourage students to talk about their reasoning:

- What do you notice about the numbers?
- How did you determine the pattern used?
- What is another way to think about the pattern?
- How did you determine the missing value?
- What do you notice about the new patterns?

Launch 5–7 min

Sense-Making Routine

Purpose Students think about what they know about the image and what math they can use to describe it.

Notice & Wonder

- Tell me everything you can.

Teaching Tip You may want to have students work in pairs as they notice and wonder. This can help build a collaborative classroom culture. It also allows for greater participation among students as they work with their partners.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of representing division using area models and are based on possible comments and questions that students may make during the share out.

- How are area, length, and width related?
- How does this image remind you of problems you have solved before?

Math is... Mindset

- What is your responsibility in building a safe classroom culture?

SEL Responsible Decision-Making: Ethical Responsibility

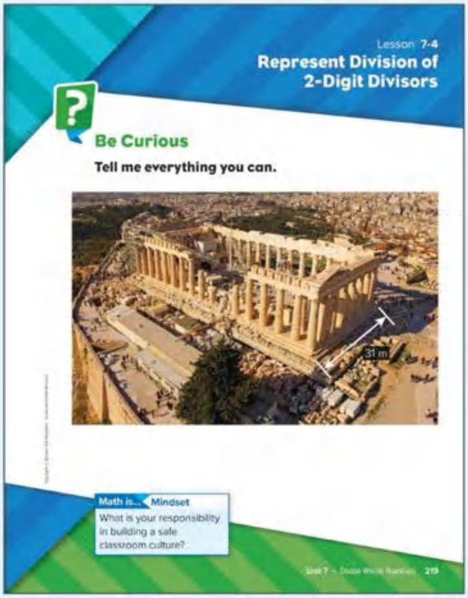
Invite students to discuss the rules or routines they will follow while working through the Notice & Wonder routine. Have them consider how these rules or routines help them be responsible contributors to their classroom community. As students work through the lesson, have them consider how they can work ethically and responsibly with others, giving credit to others and acknowledging the contributions of others, while also contributing their own thoughts and ideas.

Transition to Explore & Develop

Ask questions that get students thinking about the use of division to solve problems. Guide the discussion to have students think about how they could represent the divsion.

ETP Establish Goals to Focus Learning

- Let's think about how we can represent division using area models.



Lesson 7-4

Represent Division of 2-Digit Divisors

Be Curious

Tell me everything you can.

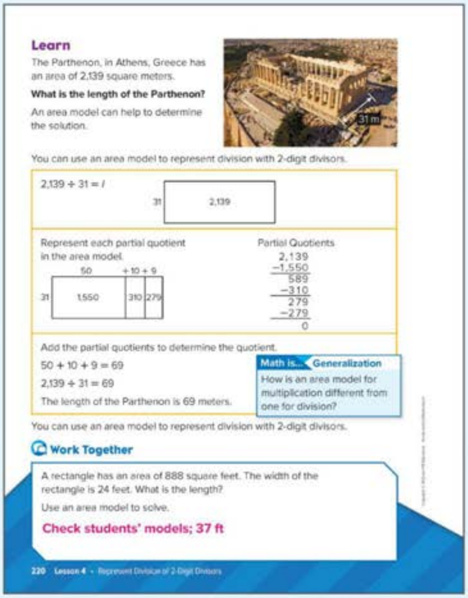
Math is... Mindset

What is your responsibility in building a safe classroom culture?

Be Curious

Tell me everything you can.

Explore & Develop 20 min



Learn

The Parthenon, in Athens, Greece has an area of 2,139 square meters.

What is the length of the Parthenon?

An area model can help to determine the solution.

You can use an area model to represent division with 2-digit divisors.

$2{,}139 \div 31 = l$

Represent each partial quotient in the area model.

Partial Quotients

$$\begin{array}{r} 2{,}139 \\ -1{,}550 \\ \hline 589 \\ -310 \\ \hline 279 \\ -279 \\ \hline 0 \end{array}$$

Add the partial quotients to determine the quotient.

$50 + 10 + 9 = 69$

$2{,}139 \div 31 = 69$

The length of the Parthenon is 69 meters.

Math is... Generalization

How is an area model for multiplication different from one for division?

You can use an area model to represent division with 2-digit divisors.

Work Together

A rectangle has an area of 888 square feet. The width of the rectangle is 24 feet. What is the length?

Use an area model to solve.

Check students' models; 37 ft

220 Lesson 4 • Represent Division of 2-Digit Divisors

❶ Pose the Problem

ETP Pose Purposeful Questions

- Have you seen problems like this before? How were they similar? How were they different?
- What operation do you think you will use the solve this problem? Why do you think so?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR Stronger and Clearer Each Time

Pair students and have them work on a problem like the one on the Learn page. Have them individually write how they can solve the problem using an area model. Then have them share their writing with their partner and fix mistakes. Revisit the task throughout the lesson for reinforcement.

❸ Bring It Together

ETP Elicit Evidence of Student Thinking

- How could you explain to a friend how to use an area model to find partial quotients?
- Could you use this model if the problem was not about area? Why or why not?

Key Takeaway

- One division strategy uses an area model to determine partial quotients, which are then added together to arrive at the quotient.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of using an area model to find the quotient of whole numbers with a 2-digit divisor.

Common Misconception Students may not understand that there are many different ways to separate an area model into partial quotients. They should find one that works best for them.

LOM Language of Math

As students work through the lesson, point out the word ***part*** in partial. Explain that a partial quotient is part of the quotient. In everyday use, the word ***partial*** means part of, but not complete.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using an area model to divide by 2-digit divisors by extending their understanding of using an area model to divide by 1-digit divisors.

Directions: Write the division equation 1,550 ÷ 5 = m. In pairs, have students solve using an area model. Then, write the equation 1,550 ÷ 25 = t. With their partner, have students first discuss a plan on how they could use an area model to represent division with a 2-digit divisor. Have students test their plan to divide by a 2-digit divisor.

Implement Tasks That Promote Reasoning and Problem Solving

- What steps did you take to solve the equation with a 1-digit divisor?
- Do you think you could extend this understanding to solve a division equation with a 2-digit divisor?
- How was solving a division equation with a 2-digit divisor similar to solving a division equation with a 1-digit divisor? How was it different?

Math is… Modeling

- What did the area model tell you and how did it help you understand the problem?

Students interpret their mathematical results in the context of the situation and consider if the representation used served their purposes.

Activity Debrief: Ensure that students understand that using an area model to divide by a 2-digit divisor is an extension of their understanding of using an area model to divide by a 1-digit divisor.

Have students revisit the Pose the Problem question to solve and discuss answers.

- The Parthenon, in Athens, Greece covers an area of about 2,139 square meters. What is the length of the Parthenon?

Guided Exploration

Students extend their understanding of division to dividing by 2-digit divisors. They use area models to divide.

Use and Connect Mathematical Representations

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- What compatible numbers will you use to estimate the solution? Why?
- How will basic facts and place-value patterns help you estimate the solution?

- **Think About It:** Why was 60 used instead of the estimate of 70?

After finding the area represented by the each partial quotient, have students determine how much area is remaining.

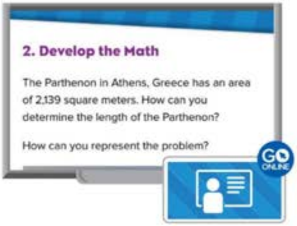
Have students use their estimates to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is… Modeling

- What did the area model tell you and how did it help you understand the problem?

Students interpret their mathematical results in the context of the situation and consider if the representation used served their purposes.



2. Develop the Math

The Parthenon in Athens, Greece has an area of 2,139 square meters. How can you determine the length of the Parthenon?

How can you represent the problem?

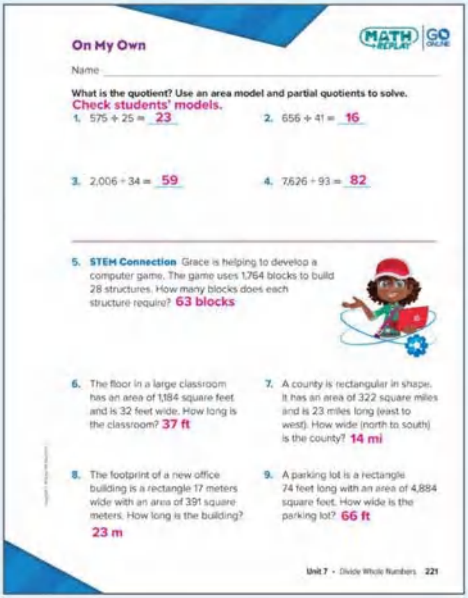
English Learner Scaffolds

Entering/Emerging Support students in understanding the word *solution*. Write an equation on the board. Say *I need to solve this equation*. Solve the equation and then say *I solved the equation. I determined the solution*. Point to the solution. Repeat twice with new equations, once showing a solution, and once not. Ask *Did I determine the solution?*

Developing/Expanding Support students in understanding the word *solution*. Write an equation on the board. Say *I need to solve this equation.* Solve the equation and then say *I solved the equation. I determined the solution.* Solve another equation, but this time, ask students to tell you what the solution is using the word *solution*. Provide sentence frames for students who need more guidance.

Bridging/Reaching Ask students to explain how *solution* is related to *solve*. Then ask students to come up with a list of similar words to *solution* (*answer, result,* etc.) and to share their list with the class. Finally, support students in discussing the similarities and differences in meaning between *solve* and *resolve*. Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min

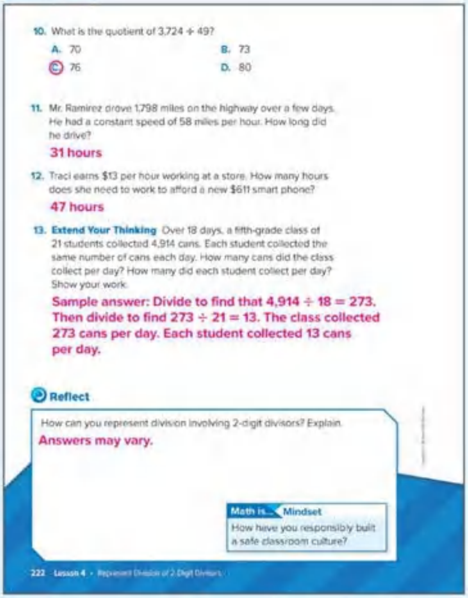


On My Own

Name

What is the quotient? Use an area model and partial quotients to solve.
Check students' models.

1. 575 ÷ 25 = 23
2. 656 ÷ 41 = 16
3. 2,006 ÷ 34 = 59
4. 7,626 ÷ 93 = 82
5. **STEM Connection** Grace is helping to develop a computer game. The game uses 1,764 blocks to build 28 structures. How many blocks does each structure require? 63 blocks
6. The floor in a large classroom has an area of 1,184 square feet and is 32 feet wide. How long is the classroom? 37 ft
7. A county is rectangular in shape. It has an area of 322 square miles and is 23 miles long (east to west). How wide (north to south) is the county? 14 mi
8. The footprint of a new office building is a rectangle 17 meters wide with an area of 391 square meters. How long is the building? 23 m
9. A parking lot is a rectangle 74 feet long with an area of 4,884 square feet. How wide is the parking lot? 66 ft



10. What is the quotient of 3,724 ÷ 49?
   A. 70
   B. 73
   [✓ C.] 76
   D. 80
11. Mr. Ramirez drove 1,798 miles on the highway over a few days. He had a constant speed of 58 miles per hour. How long did he drive?
   31 hours
12. Traci earns $13 per hour working at a store. How many hours does she need to work to afford a new $611 smart phone?
   47 hours
13. **Extend Your Thinking** Over 18 days, a fifth-grade class of 21 students collected 4,914 cans. Each student collected the same number of cans each day. How many cans did the class collect per day? How many did each student collect per day? Show your work.
   Sample answer: Divide to find that 4,914 ÷ 18 = 273. Then divide to find 273 ÷ 21 = 13. The class collected 273 cans per day. Each student collected 13 cans per day.

Reflect

How can you represent division involving 2-digit divisors? Explain.
Answers may vary.

Math is... Mindset
How have you responsibly built a safe classroom culture?

Practice

ETP Build Fluency from Understanding

Common Error: Exercises 1–12 When using an area model to divide, students may often choose partial quotients that yield a product greater than the remaining area. Instead, students should choose partial quotients that yield products that are significantly less than the remaining area.

Practice Item Analysis

Item	DOK	Rigor
1–4	1	Procedural Skill and Fluency
5–9	2	Application
10	1	Conceptual Understanding
11–12	2	Application
13	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you represent division involving 2-digit divisors?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What is your responsibility in building a safe classroom culture?

Students reflect on how they practiced responsible decision-making.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can use an area model to determine partial quotients and add partial quotients to calculate the quotient.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

GO ONLINE MATH REPLAY

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Represent division of 2-digit divisors	5.NBT.B.6
2	2	Represent division of 2-digit divisors	5.NBT.B.6
3	2	Represent division of 2-digit divisors	5.NBT.B.6

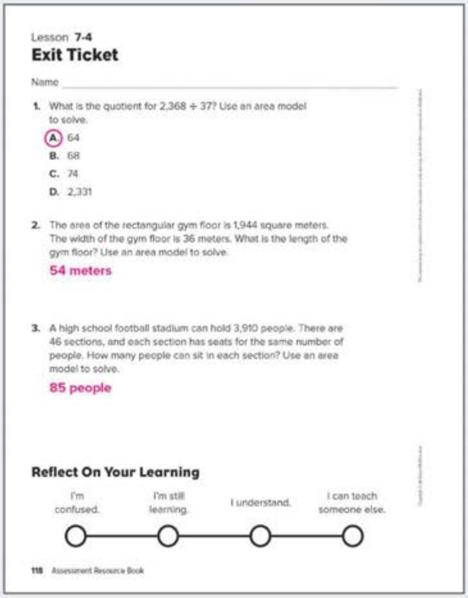
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking



Lesson 7-4

Exit Ticket

Name

1. What is the quotient for 2,368 ÷ 37? Use an area model to solve.
   - [✓ A.] 64
   - B. 68
   - C. 74
   - D. 2,331

2. The area of the rectangular gym floor is 1,944 square meters. The width of the gym floor is 36 meters. What is the length of the gym floor? Use an area model to solve.
   54 meters

3. A high school football stadium can hold 3,910 people. There are 46 sections, and each section has seats for the same number of people. How many people can sit in each section? Use an area model to solve.
   85 people

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

118 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

Reinforce Understanding

SMALL GROUP

Apply It!

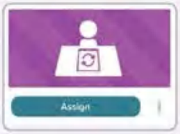
Work with students in groups. Provide students with base ten blocks. Write a few division expressions (that have no remainder) that represents a 3- or 4-digit number divided by a 2-digit number. Students should work together to model the expression by dividing base ten blocks into equal groups of that size, or equally into that many groups. Help students write the division expression that goes with the base ten blocks.

GO ONLINE

Take Another Look Lesson

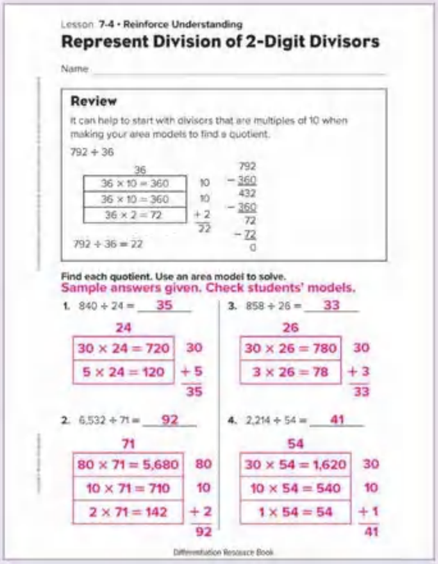
Assign the interactive lesson to reinforce targeted skills.

- Divide by 2-Digits (Area Models)



INDEPENDENT WORK

Differentiation Resource Book, p. 69



Lesson 7-4 • Reinforce Understanding

Represent Division of 2-Digit Divisors

Name

Review

It can help to start with divisors that are multiples of 10 when making your area models to find a quotient.

792 ÷ 36

36

36 × 10 = 360	10	792 − 360
36 × 10 = 360	10	432 − 360
36 × 2 = 72	+ 2	72 − 72
	22	0

792 ÷ 36 = 22

Find each quotient. Use an area model to solve.

Sample answers given. Check students' models.

1. 840 ÷ 24 = 35

24

30 × 24 = 720	30
5 × 24 = 120	+ 5
	35

2. 6,532 ÷ 71 = 92

71

80 × 71 = 5,680	80
10 × 71 = 710	10
2 × 71 = 142	+ 2
	92

3. 858 ÷ 26 = 33

26

30 × 26 = 780	30
3 × 26 = 78	+ 3
	33

4. 2,214 ÷ 54 = 41

54

30 × 54 = 1,620	30
10 × 54 = 540	10
1 × 54 = 54	+ 1
	41

Differentiation Resource Book

Build Proficiency

WORKSTATIONS

Practice It! Game Station

Division with 2-Digit Divisors Task Cards

Students practice dividing with 2-digit divisors by using base-ten blocks.

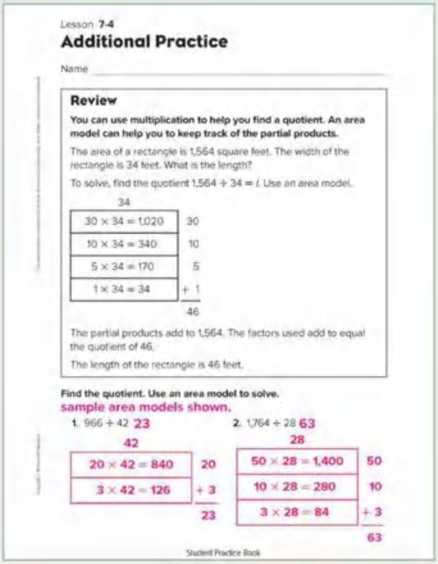
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 69–70



Lesson 7-4

Additional Practice

Name

Review

You can use multiplication to help you find a quotient. An area model can help you to keep track of the partial products.

The area of a rectangle is 1,564 square feet. The width of the rectangle is 34 feet. What is the length?

To solve, find the quotient 1,564 ÷ 34 = *l*. Use an area model.

34

30 × 34 = 1,020	30
10 × 34 = 340	10
5 × 34 = 170	5
1 × 34 = 34	+ 1
	46

The partial products add to 1,564. The factors used add to equal the quotient of 46.

The length of the rectangle is 46 feet.

Find the quotient. Use an area model to solve.

sample area models shown.

1. 966 ÷ 42 23

42

20 × 42 = 840	20
3 × 42 = 126	+ 3
	23

2. 1,764 ÷ 28 63

28

50 × 28 = 1,400	50
10 × 28 = 280	10
3 × 28 = 84	+ 3
	63

Student Practice Book

Extend Thinking

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

WORKSTATIONS

Use It! Application Station

Online Learning: Is It Safe? Students write rules for safely using electronic devices and practice their rules by researching how to divide multi-digit numbers. *The content of this card has concepts covered later in Lesson 7-6. You may want to assign this card to students ready to explore content covered later in this unit.*

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

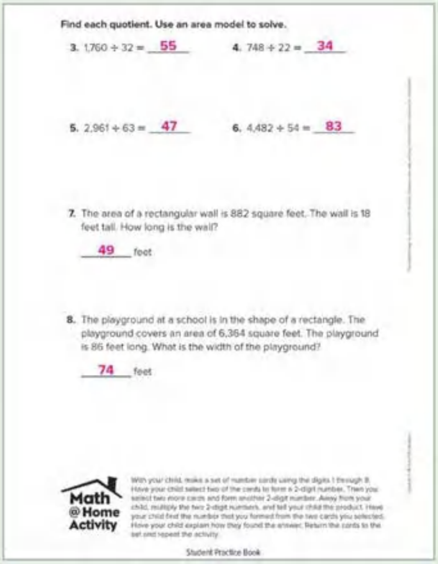
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 69–70



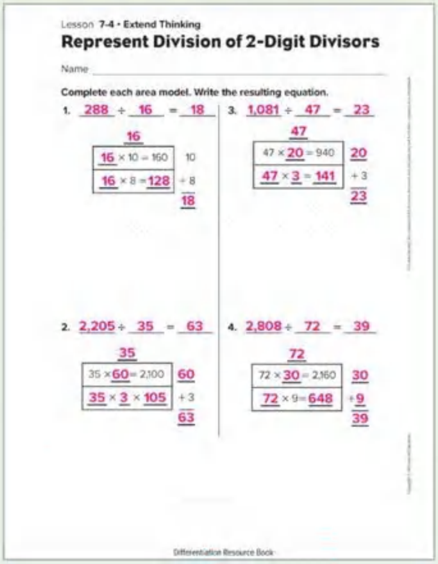
Find each quotient. Use an area model to solve.

3. 1,760 ÷ 32 = 55
4. 748 ÷ 22 = 34
5. 2,961 ÷ 63 = 47
6. 4,482 ÷ 54 = 83
7. The area of a rectangular wall is 882 square feet. The wall is 18 feet tall. How long is the wall?
   49 feet
8. The playground at a school is in the shape of a rectangle. The playground covers an area of 6,364 square feet. The playground is 86 feet long. What is the width of the playground?
   74 feet

Math @Home Activity With your child, make a set of number cards using the digits 1 through 8. Have your child select two of the cards to form a 2-digit number. Then you select two more cards and form another 2-digit number. Away from your child, multiply the two 2-digit numbers, and tell your child the product. Have your child find the number that you formed from the two cards you selected. Have your child explain how they found the answer. Return the cards to the set and repeat the activity.

Student Practice Book

Differentiation Resource Book, p. 70



Lesson **7-4 • Extend Thinking**

Represent Division of 2-Digit Divisors

Name ____________

Complete each area model. Write the resulting equation.

1. 288 ÷ 16 = 18

16
16 × 10 = 160 | 10
16 × 8 = 128 | + 8
18

2. 2,205 ÷ 35 = 63

35
35 × 60 = 2,100 | 60
35 × 3 × 105 | + 3
63

3. 1,081 ÷ 47 = 23

47
47 × 20 = 940 | 20
47 × 3 = 141 | + 3
23

4. 2,808 ÷ 72 = 39

72
72 × 30 = 2,160 | 30
72 × 9 = 648 | + 9
39

Differentiation Resource Book

LESSON **7-5**

Use Partial Quotients to Divide

Learning Target

- I can record partial quotients using a strategy.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations rectangular arrays, and/or area models.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Look for and express regularity in repeated reasoning.

Vocabulary

Math Term	Academic Terms
partial quotients	condition
	drawback

Materials

The materials may be for any part of the lesson.

- *Blank Partial Quotients* Teaching Resource

Focus

Content Objective	Language Objectives	SEL Objective
• Students record partial quotients using a strategy.	• Students discuss recording partial quotients while using the verb *relate*. • To support optimizing output, students participate in MLR4: Info Gap.	• Students exchange ideas for mathematical problem-solving with a peer, listening attentively and providing thoughtful and constructive feedback.

Coherence

Previous	Now	Next
• Students used place-value strategies to find quotients with up to 4-digit dividends and 1-digit divisor (Grade 4). • Students extended their understanding of division to divide using an area model and partial quotients (Lesson 4).	• Students use partial quotients to divide multi-digit dividends by 2-digit divisors to find quotients.	• Students will divide multi-digit numbers by 2-digit numbers to find quotients with remainders (Lesson 6). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students understanding of division is enhanced as they divide multi-digit numbers using partial quotients.	• Students gain skills and fluency with division as they repeat the process for using partial products throughout the lesson.	• Students apply their understanding of division to solve problems with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine Find the Pattern, Make a Pattern

5–7 min

Build Fluency Students build reasoning skills as they determine a given pattern, find missing terms, and repeat the pattern with different numbers.

These prompts encourage students to talk about their reasoning:

- What do you notice about the numbers?
- To find a pattern, what did you consider first?
- What is another way to think about the pattern?
- How can you be sure your pattern is correct?

Launch 5–7 min

Sense-Making Routine

Purpose Students read a numberless word problem as they engage in contextual sense-making. They share thoughts on what math they see in the problem and describe the relationship between the quantities.

Numberless Word Problem

- What math do you see in this problem?

Teaching Tip You may want to have students work in pairs as they make sense of the context. Encourage them to think about quantities and their relationship.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' thinking about the partial quotients strategy and are based on possible comments and questions that students may make during the share out.

- How can you describe this situation in your own words?
- How do you know what operation to use to solve the problem?
- What do you need to know to determine the solution?

Math is... Mindset

- What behaviors show respect towards someone?

SEL Social Awareness: Ethical Responsibility

As students work with partners to complete the Numberless Word Problem routine, remind them to show respect by listening attentively when others are sharing their ideas. Provide models of constructive and respectful feedback to guide students. As students share the math they saw in the problem, encourage classmates to provide thoughtful feedback to one another. Remind students that respecting others is an important part of being a member of the class community.

Transition to Explore & Develop

Have students share their thoughts on what they think the quantities may be in the problem. Ask them to describe the relationship between the quantities in the problem. Explain that they are going to consider the same problem but with numbers this time.

ETP Establish Goals to Focus Learning

- Let's think about a strategy we can use to divide multi-digit numbers.

Lesson 7-5

Use Partial Quotients to Divide

Be Curious

What math do you see in this problem?

An adult bison weighs a number of times the weight of a bison calf. How can you find the weight of the bison calf?

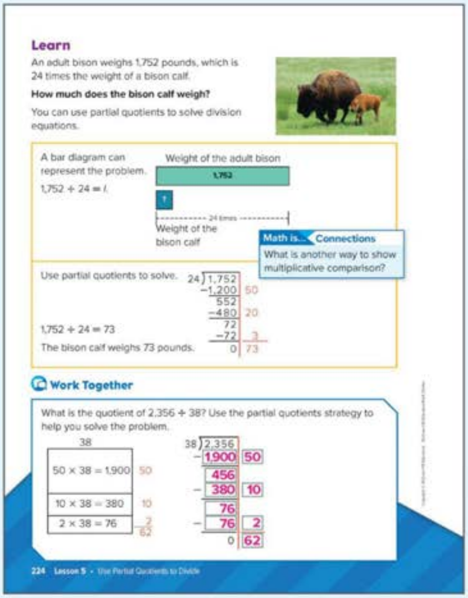
Math is... Mindset

What behaviors show respect towards someone?

Be Curious

What math do you see in this problem?

Explore & Develop 20 min



Learn

An adult bison weighs 1,752 pounds, which is 24 times the weight of a bison calf.

How much does the bison calf weigh?

You can use partial quotients to solve division equations.

A bar diagram can represent the problem.

1,752 ÷ 24 = /

Math is... Connections
What is another way to show multiplicative comparison?

Use partial quotients to solve.

```
24)1,752
  −1,200 | 50
     552
   −480  | 20
      72
    −72  |  3
       0 | 73
```

1,752 ÷ 24 = 73

The bison calf weighs 73 pounds.

Work Together

What is the quotient of 2,356 ÷ 38? Use the partial quotients strategy to help you solve the problem.

```
38)2,356
  −1,900 | 50
     456
    −380 | 10
      76
     −76 |  2
       0 | 62
```

224 Lesson 5 • Use Partial Quotients to Divide

1 Pose the Problem

ETP Pose Purposeful Questions

- Have you seen problems like this before? How were they similar? How were they different?
- What operation do you think you will use to solve this problem? Why do you think so?

2 Develop the Math

Choose the option that best meets your instructional goals.

MLR Info Gap

Pair students. Provide Partner A with a problem like the one on the Learn page. Provide Partner B with the information to carry out the problem. Instruct Partner B to ask A what information they need, and for A to respond, explaining why they need it. Have students continue until the problem is completed.

3 Bring It Together

ETP Elicit Evidence of Student Thinking

- What do you need to consider when choosing what partial quotient to use next?
- Could you use this model if the divisor was only 1-digit or was 3 or more digits? Explain.

Key Takeaway

- The quotients of multi-digit divideds and 2-digit divisors can be found using partial quotients.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of using the partial quotients strategy to find the quotient of whole numbers with a 2-digit divisor.

Common Error Students need to make sure to add all of the partial quotients to find the quotient of the division problem when using the partial quotients strategy.

LOM Language of Math

The division symbol ÷ is called an *obelus*, and was first used as a symbol for division in 1659 by Swiss mathematician Johann Rahn. The divsion symbol in this strategy separating the dividend and divisor has no name.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using the *partial quotients* strategy to divide by 2-digit divisors by extending their understanding of using the partial quotients strategy to divide by 1-digit divisors.

Directions: Write the division equation $1{,}752 \div 4 = r$. In pairs, have students solve using the partial quotients strategy. Then, write the equation $1{,}752 \div 24 = w$. With their partner, have students first discuss a plan on how they could use the partial quotients strategy to solve a division problem with a 2-digit divisor. Have students test their plan to divide by a 2-digit divisor.

Implement Tasks That Promote Reasoning and Problem Solving

- What steps did you take to solve the equation?
- Do you think you could extend this understanding to solve a division equation with a 2-digit divisor?
- How was solving a division equation with a 2-digit divisor using the partial products strategy similar to solving a division equation with a 1-digit divisor? How was it different?

Math is... Generalizations

- How does using an area model relate to the partial quotients strategy?

Students use a representation to understand a strategy.

Activity Debrief: Ensure that students understand that using the partial quotients strategy to divide by a 2-digit divisor is an extension of their understanding of using partial quotients to divide by a 1-digit divisor.

Have students revisit the Pose the Problem question and discuss answers.

- How can you find the weight of the bison calf?

Guided Exploration

Students extend their understanding of division by 2-digit divisors. They use the *partial quotients* strategy to divide.

Use and Connect Mathematical Representations

- **Think About It:** How can you use a representation to help you make sense of the problem?

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Have the students estimate the solution. Ask:

- What compatible numbers will you use to estimate the solution? Why?
- How will basic facts and place-value patterns help you estimate the solution?

Have students follow along using the *Blank Partial Quotients* Teaching Resource.

- Why do you subtract each product from the dividend?

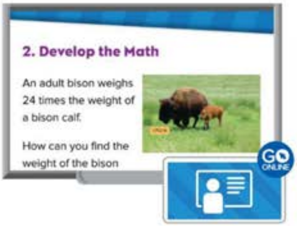
Have students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Math is... Generalizations

- How does the area model relate to the partial quotients strategy?

Students use a representation to understand a strategy.



2. Develop the Math

An adult bison weighs 24 times the weight of a bison calf.

How can you find the weight of the bison

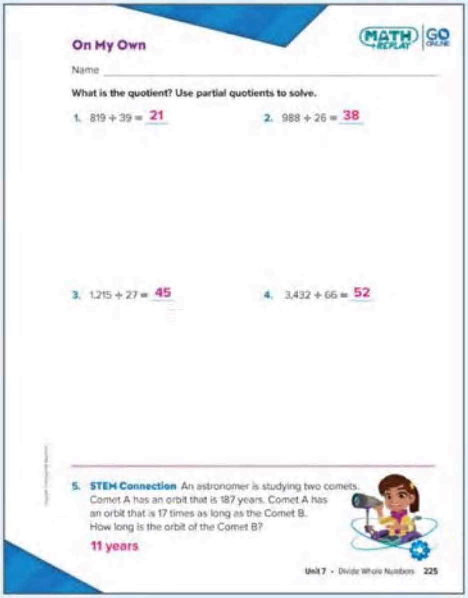
English Learner Scaffolds

Entering/Emerging Ensure understanding of (*x*) *times as great as*.... Using two containers and 24 counters, say *I have 24 counters*. Count them out. Say *I have 2 containers*. Say *The number of counters is 12 times as great as the number of containers.* Write $2 \times 12 = 24$. Then write $2 \times 7 = 14$. Point to each part as you ask *Is 7 fourteen times as great as 2?* (no) *Is 14 seven times as great as 2?* (yes)

Developing/Expanding Ensure understanding of (*x*) *times as great as*.... Using two containers and 24 counters, say *I have 24 counters*. Count them out. Say *I have 2 containers*. Say *The number of counters is 12 times as great as the number of containers*. Write $2 \times 12 = 24$. Then write $2 \times 7 = 14$. Say *Tell me about 14*. (It's seven times as great as 2). Provide a sentence frame if needed.

Bridging/Reaching Ask students to demonstrate and say a sentence using (*x*) *times as great as*. Then ask students to list other phrases that are similar in meaning ((*x*) *more*, (*x*) *greater than*, etc.), and to share their list with the class. Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min



On My Own

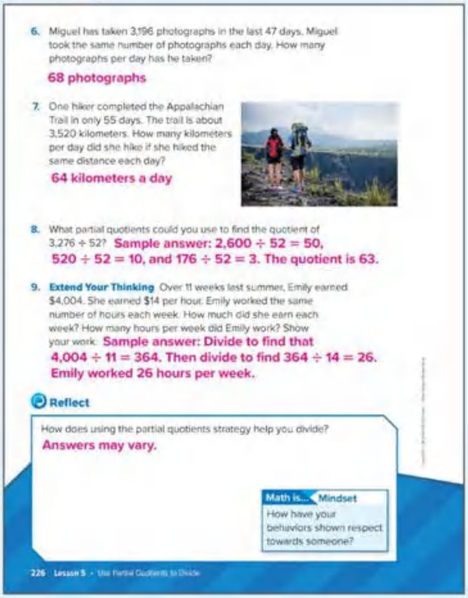
Name ____________________

What is the quotient? Use partial quotients to solve.

1. 819 ÷ 39 = **21**
2. 988 ÷ 26 = **38**
3. 1,215 ÷ 27 = **45**
4. 3,432 ÷ 66 = **52**
5. **STEM Connection** An astronomer is studying two comets. Comet A has an orbit that is 187 years. Comet A has an orbit that is 17 times as long as the Comet B. How long is the orbit of the Comet B?

   11 years

Unit 7 • Divide Whole Numbers 225



6. Miguel has taken 3,196 photographs in the last 47 days. Miguel took the same number of photographs each day. How many photographs per day has he taken?

   68 photographs

7. One hiker completed the Appalachian Trail in only 55 days. The trail is about 3,520 kilometers. How many kilometers per day did she hike if she hiked the same distance each day?

   64 kilometers a day

8. What partial quotients could you use to find the quotient of 3,276 ÷ 52? **Sample answer: 2,600 ÷ 52 = 50, 520 ÷ 52 = 10, and 176 ÷ 52 = 3. The quotient is 63.**
9. **Extend Your Thinking** Over 11 weeks last summer, Emily earned $4,004. She earned $14 per hour. Emily worked the same number of hours each week. How much did she earn each week? How many hours per week did Emily work? Show your work. **Sample answer: Divide to find that 4,004 ÷ 11 = 364. Then divide to find 364 ÷ 14 = 26. Emily worked 26 hours per week.**

Reflect

How does using the partial quotients strategy help you divide?

Answers may vary.

Math is... Mindset

How have your behaviors shown respect towards someone?

226 Lesson 5 • Use Partial Quotients to Divide

Practice

ETP Build Fluency from Understanding

Common Error: Exercises 1–4 When using the partial quotients strategy to solve division problems, students may make subtraction or place value errors. They should always assess the resonableness of their calculated quotients using estimates or check their calculated quotients by multiplying the quotient by the divisor.

Practice Item Analysis

Item	DOK	Rigor
1–4	2	Procedural Skill and Fluency
5–7	1	Application
8	2	Conceptual Understanding
9	3	Application

Reflect

Students complete the Reflect question.

- How does using the partial quotients strategy help you divide?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How have you behaved flexibly while working with others?

Students reflect on how they practiced social awareness.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can record the calculation of a multi-digit number divided by a 2-digit divisor using a partial quotients strategy.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Use partial quotients	5.NBT.B.6
2	2	Use partial quotients	5.NBT.B.6
3	3	Use partial quotients	5.NBT.B.6

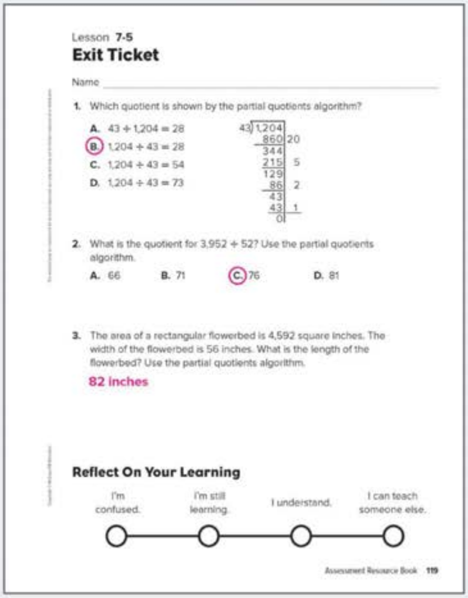
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

Ⓡ Reinforce Understanding
Ⓑ Build Proficiency
Ⓔ Extend Thinking



Lesson **7-5**

Exit Ticket

Name

1. Which quotient is shown by the partial quotients algorithm?

A. $43 \div 1{,}204 = 28$
[✓ B.] $1{,}204 \div 43 = 28$
C. $1{,}204 \div 43 = 54$
D. $1{,}204 \div 43 = 73$

$$\begin{array}{r|l} 43\overline{)1{,}204} & \\ \underline{860} & 20 \\ 344 & \\ \underline{215} & 5 \\ 129 & \\ \underline{86} & 2 \\ 43 & \\ \underline{43} & \underline{1} \\ 0 & \end{array}$$

2. What is the quotient for $3{,}952 \div 52$? Use the partial quotients algorithm.

A. 66 B. 71 [✓ C.] 76 D. 81

3. The area of a rectangular flowerbed is 4,592 square inches. The width of the flowerbed is 56 inches. What is the length of the flowerbed? Use the partial quotients algorithm.

82 inches

Reflect On Your Learning

○ I'm confused. ○ I'm still learning. ○ I understand. ○ I can teach someone else.

Assessment Resource Book 119

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Pass It On!

Work with students in groups. Provide each student with a division problem with a 3- or 4-digit dividend and a 2-digit divisor such that there will be no remainder. Each student finds the first partial quotient for their problem before passing the paper to the left. If students are unsure about the previous result, help them check and, if necessary, correct it before they complete the next step. Continue until all solutions are reached.

GO ONLINE

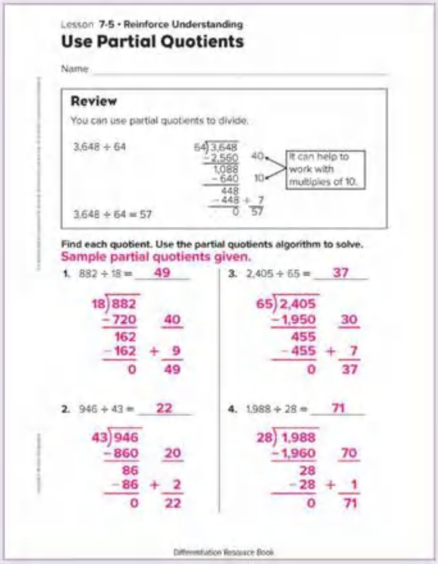
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Divide by 1-Digit (Partial Quotients)

INDEPENDENT WORK

Differentiation Resource Book, p. 71



Lesson **7-5 • Reinforce Understanding**

Use Partial Quotients

Name ________________

Review

You can use partial quotients to divide.

3,648 ÷ 64

64)3,648
−2,560 40
1,088
−640 10
448
−448 + 7
0 57

It can help to work with multiples of 10.

3,648 ÷ 64 = 57

Find each quotient. Use the partial quotients algorithm to solve.
Sample partial quotients given.

1. 882 ÷ 18 = 49

18)882
−720 40
162
−162 + 9
0 49

2. 946 ÷ 43 = 22

43)946
−860 20
86
−86 + 2
0 22

3. 2,405 ÷ 65 = 37

65)2,405
−1,950 30
455
−455 + 7
0 37

4. 1,988 ÷ 28 = 71

28)1,988
−1,960 70
28
−28 + 1
0 71

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Division with 2-Digit Divisors Race

Students practice dividing by 2-digit divisors.

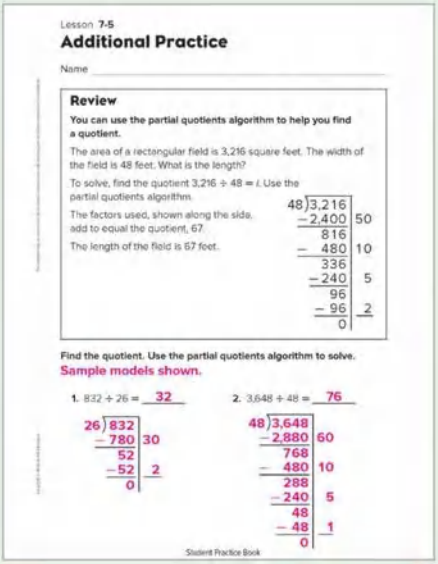
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 71–72



Lesson **7-5**

Additional Practice

Name ________________

Review

You can use the partial quotients algorithm to help you find a quotient.

The area of a rectangular field is 3,216 square feet. The width of the field is 48 feet. What is the length?

To solve, find the quotient 3,216 ÷ 48 = *l*. Use the partial quotients algorithm.

The factors used, shown along the side, add to equal the quotient, 67.

The length of the field is 67 feet.

48)3,216
−2,400 | 50
816
− 480 | 10
336
−240 | 5
96
− 96 | 2
0

Find the quotient. Use the partial quotients algorithm to solve.
Sample models shown.

1. 832 ÷ 26 = 32

26)832
−780 | 30
52
−52 | 2
0

2. 3,648 ÷ 48 = 76

48)3,648
−2,880 | 60
768
− 480 | 10
288
−240 | 5
48
− 48 | 1
0

Student Practice Book

Own It! Digital Station

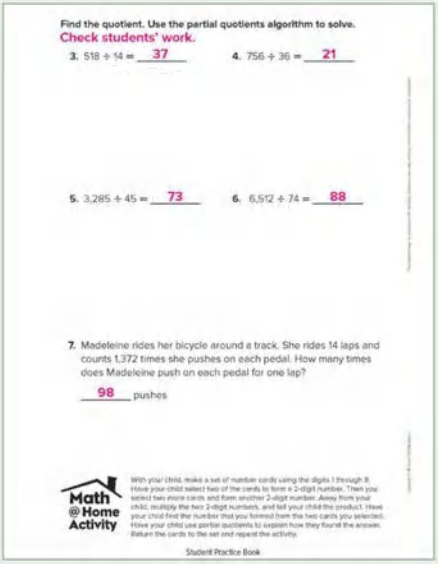
Build Fluency Games

Assign the digital game to develop fluency with addition and subtraction of decimals.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 71–72



Find the quotient. Use the partial quotients algorithm to solve.
Check students' work.

3. 518 ÷ 14 = 37

4. 756 ÷ 36 = 21

5. 3,285 ÷ 45 = 73

6. 6,512 ÷ 74 = 88

7. Madeleine rides her bicycle around a track. She rides 14 laps and counts 1,372 times she pushes on each pedal. How many times does Madeleine push on each pedal for one lap?

98 pushes

Math @Home Activity With your child, make a set of number cards using the digits 1 through 8. Have your child select two of the cards to form a 2-digit number. Then you select two more cards and form another 2-digit number. Away from your child, multiply the two 2-digit numbers, and tell your child the product. Have your child find the number that you formed from the two cards you selected. Have your child use partial quotients to explain how they found the answer. Return the cards to the set and repeat the activity.

Student Practice Book

WORKSTATIONS

GO ONLINE

INDEPENDENT WORK

E Extend Thinking

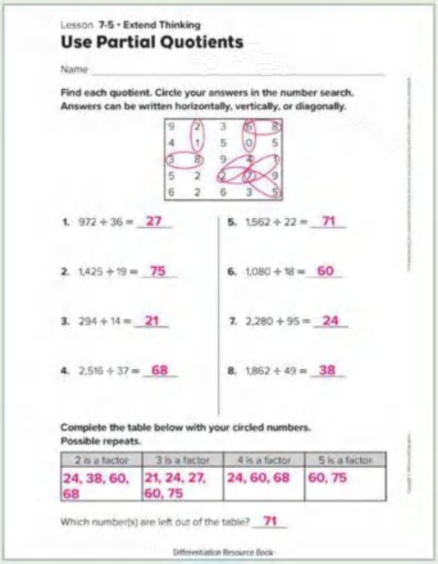
Use It! Application Station

Estimate High School Density Students research the density of schools in 10 U.S. states.

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

Differentiation Resource Book, p. 72



Lesson 7-5 • Extend Thinking

Use Partial Quotients

Name

Find each quotient. Circle your answers in the number search. Answers can be written horizontally, vertically, or diagonally.

9	2	3	6	8
4	1	5	0	5
3	8	9	4	1
5	2	2	7	9
6	2	6	3	5

1. 972 ÷ 36 = 27

2. 1,425 ÷ 19 = 75

3. 294 ÷ 14 = 21

4. 2,516 ÷ 37 = 68

5. 1,562 ÷ 22 = 71

6. 1,080 ÷ 18 = 60

7. 2,280 ÷ 95 = 24

8. 1,862 ÷ 49 = 38

Complete the table below with your circled numbers. Possible repeats.

2 is a factor	3 is a factor	4 is a factor	5 is a factor
24, 38, 60, 68	21, 24, 27, 60, 75	24, 60, 68	60, 75

Which number(s) are left out of the table? 71

Differentiation Resource Book

LESSON **7-6**

Divide Multi-Digit Whole Numbers

Learning Target

- I can use partial quotients to solve division problems, which sometimes include a remainder.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or models.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Use appropriate tools strategically.

Vocabulary

Math Terms	Academic Terms
partial quotients	address
remainder	advantage

Materials

The materials may be for any part of the lesson.

- base-ten blocks

Focus

Content Objective	Language Objectives	SEL Objective
• Students solve division problems using partial quotients, which sometimes include remainders.	• Students explain how to solve division problems using partial quotients, which sometimes include remainders, using *If...then*. • To support maximizing linguistic and cognitive meta-awareness, ELs participate in MLR5: Co-Craft Questions and Problems.	• Students set a focused mathematical goal and make a plan for achieving that goal.

Coherence

Previous	Now	Next
• Students used place-value strategies to find quotients with up to 4-digit dividends and 1-digit divisors (Grade 4). • Students used partial quotients to divide multi-digit numbers by 2-digit divisors to find quotients (Lesson 5).	• Students divide multi-digit numbers by 2-digit numbers to find quotients with remainders.	• Students will solve word problems involving division by 2-digit numbers and interpreting remainders (Lesson 7). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of division as they represent multi-digit division by 2-digit divisors.	• Students build proficiency by using partial quotients to represent division with remainders.	• Students apply their understanding of division to solve problems with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine

Decompose It

5–7 min

Build Fluency Students build number sense as they decompose the number 1,125 in at least 3 different ways.

These prompts encourage students to talk about their reasoning:

- What do you notice about the number?
- How did you determine the different decompositions?
- How could you use this decomposition to create another decomposition?

Launch 5–7 min

Sense-Making Routine

Purpose Students focus their thinking on what it means when a remainder is present in division by considering two completed partial quotients algorithms – one with a remainder, and one without.

Numberless Word Problem

- What math do you see in this problem?

Teaching Tip You may want to have students work in pairs as they discuss the situation and the math they see in the problem. Encourage them to think about what a remainder is, and how the algorithm shows remainders.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of remainders and the partial quotients strategy and are based on possible comments and questions that students may make during the share out.

- What operation could be used to solve this problem?
- How does "left over" sound like something you have already seen in division problems?

Math is... Mindset

- What actions can help you achieve your day's goal?

SEL Self-Management: Goal Setting

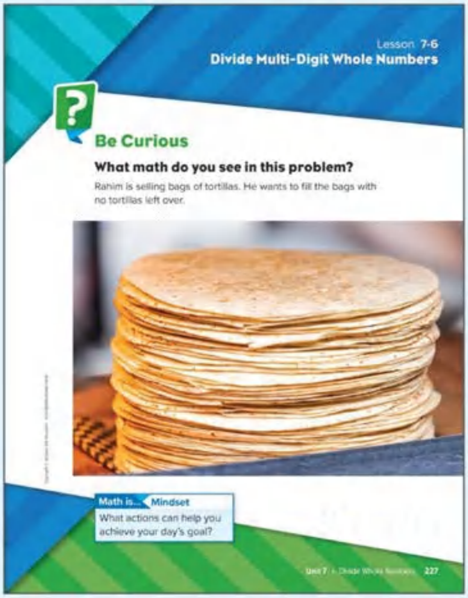
Before students begin the Numberless Word Problem routine, invite them to share or write down one mathematical goal they have for the day. Have students create a plan for how they will work toward achieving their goal. Encourage students to focus their goals around dividing multi-digit whole numbers.

Transition to Explore & Develop

To make sure students are ready to focus on remainders rather than the strategy, have them as a class summarize the partial quotients algorithm.

ETP Establish Goals to Focus Learning

- Let's talk about situations where the partial quotients strategy leaves a remainder, and what that means.



Lesson 7-6
Divide Multi-Digit Whole Numbers

Be Curious

What math do you see in this problem?

Rahim is selling bags of tortillas. He wants to fill the bags with no tortillas left over.

Math is... Mindset
What actions can help you achieve your day's goal?

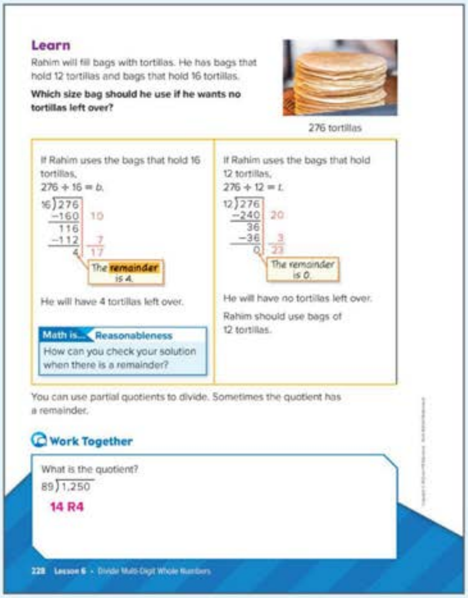
Unit 7 • Divide Whole Numbers 227

Be Curious

What math do you see in this problem?

Rahim is selling bags of tortillas. He wants to fill the bags with no tortillas left over.

Explore & Develop
20 min



Learn

Rahim will fill bags with tortillas. He has bags that hold 12 tortillas and bags that hold 16 tortillas.

Which size bag should he use if he wants no tortillas left over?

276 tortillas

If Rahim uses the bags that hold 16 tortillas,
$276 \div 16 = b$.

$$\begin{array}{r|l} 16\overline{)276} & \\ -160 & 10 \\ \hline 116 & \\ -112 & \underline{7} \\ \hline 4 & 17 \end{array}$$

The **remainder** is 4.

He will have 4 tortillas left over.

Math is... Reasonableness
How can you check your solution when there is a remainder?

If Rahim uses the bags that hold 12 tortillas,
$276 \div 12 = t$.

$$\begin{array}{r|l} 12\overline{)276} & \\ -240 & 20 \\ \hline 36 & \\ -36 & \underline{3} \\ \hline 0 & 23 \end{array}$$

The remainder is 0.

He will have no tortillas left over.

Rahim should use bags of 12 tortillas.

You can use partial quotients to divide. Sometimes the quotient has a remainder.

Work Together

What is the quotient?

$89\overline{)1,250}$

14 R4

228 Lesson 6 • Divide Multi-Digit Whole Numbers

❶ Pose the Problem

ETP **Pose Purposeful Questions**
- What does it mean to have "none left over"?
- In this problem, why might Rahim not want to have any left over tortillas?
- Have you seen a problem like this before? How is this problem different?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR **Co-Craft Questions and Problems**
Pair students and have them co-create a problem similar to the one on the Learn page. Have them work together to solve their problem and then trade their problem with another pair. After each pair solves the other pair's problems, have them form a group of four to check solutions and correct any mistakes that may have been made. Revisit the routine throughout the lesson for reinforcement.

❸ Bring It Together

ETP **Elicit Evidence of Student Thinking**
- How do you know when a quotient includes a remainder?
- How could you describe to a friend what a remainder is?

Key Takeaway
- When dividing multi-digit dividends and 2-digit divisors, the quotient sometimes includes a remainder.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of using the partial quotients algorithm to find the quotient of whole numbers with a 2-digit divisor including where there is a remainder.

Common Error Students need to make sure to add all of the partial quotients to find the quotient of the division problem when using the partial quotients algorithm.

LOM **Language of Math**
In mathematics, a *remainder* is the amount left over. Here, it is the amount left over in a division problem. In a subtraction problem, the amount left over, or the remainder, is called the *difference*.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students explore using the *partial quotients* strategy with remainders.

Directions: Have students work together to solve the Pose the Problem. Students may use any strategy to divide.

ETP Support Productive Struggle

- How is your solution method similar to a classmates' solution method? How is it different?
- When dividing using the partial quotients strategy how do you know what to do next?
- How do you know when to stop dividing when using partial quotients?
- How can you explain to a classmate what it means when you have a remainder?
- Is your calculated quotient reasonable? How do you know?

Math is... Choosing Tools

- How can you check your solution when there is a remainder?

Students detect possible errors by strategically using mathematical knowledge.

Activity Debrief: Have students share their solutions. Encourage students to defend their argument using mathematically precise language.

Guided Exploration

Students extend their understanding of division by 2-digit divisors. They use the *partial quotients* strategy to divide.

ETP Facilitate Meaningful Discourse

Have the students create the equation for the larger bags. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

- **Think About It:** Would estimating the quotient help you solve this problem? Why or why not?

Have the students create the equation for the smaller bags. Ask:

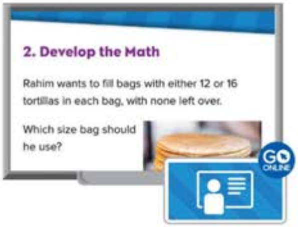
- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

- **Think About It:** What multiples of 12 can you use to help you divide?

Math is... Choosing Tools

- How can you check your solution when there is a remainder?

Students detect possible errors by strategically using mathematical knowledge.



2. Develop the Math

Rahim wants to fill bags with either 12 or 16 tortillas in each bag, with none left over.

Which size bag should he use?

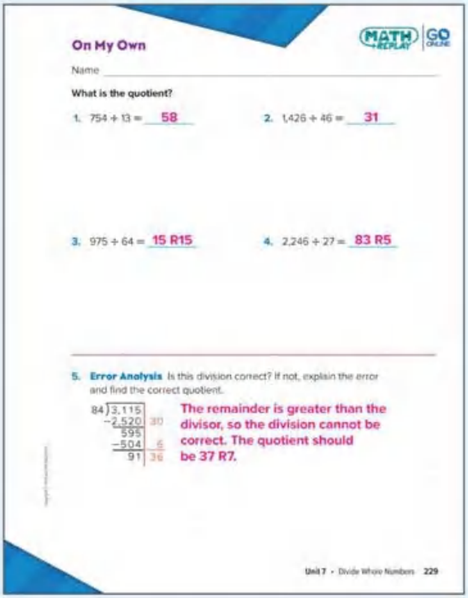
EL English Learner Scaffolds

Entering/Emerging Ensure understanding of (*none*) *left over* using counting chips. Say *I have 20 chips*. Then hand out 15 to different students. Say *I have five left over*. Hand out the rest of your chips. Show your empty hands. Say *I have no chips. I have none left over.* Repeat twice with a new amount of chips, once giving away all your chips, and once keeping a few. Say *I have none left over. Yes or No?*

Developing/Expanding Ensure understanding of *none left over* using counting chips. Say, *I have 20 chips*. Then hand out 15 to different students. Say *I have five left over*. Hand out the rest of your chips. Show your empty hands. Say *I have no chips. I have none left over.* Repeat once. Then ask students to demonstrate none left over, providing sentence frames for students who need more guidance.

Bridging/Reaching Ask students to demonstrate and use *none left over* in a sentence. Then have students come up with similar words and phrases to *none* (*zero, not any,* etc.) and *left over* (*remaining, more,* etc.). Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min



On My Own

Name ______

What is the quotient?

1. 754 ÷ 13 = 58

2. 1,426 ÷ 46 = 31

3. 975 ÷ 64 = 15 R15

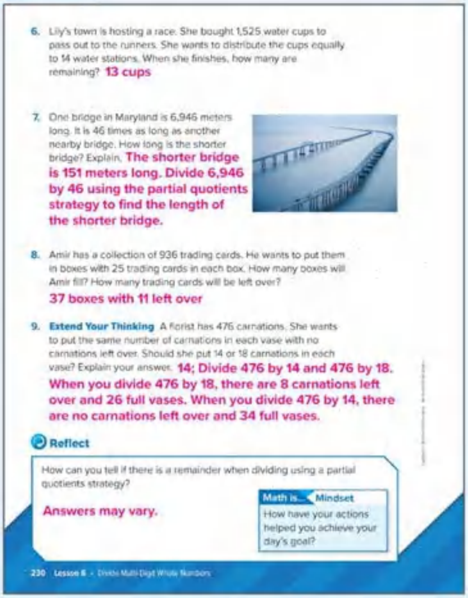
4. 2,246 ÷ 27 = 83 R5

5. **Error Analysis** Is this division correct? If not, explain the error and find the correct quotient.

84)3,115
−2,520 | 30
595
−504 | 6
91 | 36

The remainder is greater than the divisor, so the division cannot be correct. The quotient should be 37 R7.

Unit 7 • Divide Whole Numbers 229



6. Lily's town is hosting a race. She bought 1,525 water cups to pass out to the runners. She wants to distribute the cups equally to 14 water stations. When she finishes, how many are remaining? 13 cups

7. One bridge in Maryland is 6,946 meters long. It is 46 times as long as another nearby bridge. How long is the shorter bridge? Explain. The shorter bridge is 151 meters long. Divide 6,946 by 46 using the partial quotients strategy to find the length of the shorter bridge.

8. Amir has a collection of 936 trading cards. He wants to put them in boxes with 25 trading cards in each box. How many boxes will Amir fill? How many trading cards will be left over? 37 boxes with 11 left over

9. **Extend Your Thinking** A florist has 476 carnations. She wants to put the same number of carnations in each vase with no carnations left over. Should she put 14 or 18 carnations in each vase? Explain your answer. 14; Divide 476 by 14 and 476 by 18. When you divide 476 by 18, there are 8 carnations left over and 26 full vases. When you divide 476 by 14, there are no carnations left over and 34 full vases.

Reflect

How can you tell if there is a remainder when dividing using a partial quotients strategy?

Answers may vary.

Math is... Mindset

How have your actions helped you achieve your day's goal?

230 Lesson 6 • Divide Multi-Digit Whole Numbers

Practice

Build Fluency from Understanding

Common Error: Exercises 3–4 Students may have difficulty determining the remainder. Remind students to keep finding partial quotients until the number remaining is less than the divisor.

Practice Item Analysis

Item	DOK	Rigor
1–4	1	Procedural Skill and Fluency
5	2	Conceptual Understanding
6–8	2	Application
9	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- How can you tell if there is a remainder when dividing using the partial quotients strategy?

Ask students to share their reflections with their classmates.

Math is... Mindset

- What actions helped you achieve your day's goals?

Students reflect on how they practiced self-management.

Learning Target

Ask students to reflect on the Learning Target of the lesson.

- I can use partial quotients to solve division problems, which sometimes include a remainder.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	1	Divide multi-digit whole numbers with remainders	5.NTB.B.6
2	2	Divide multi-digit whole numbers with remainders	5.NBT.B.6
3	2	Divide multi-digit whole numbers with remainders	5.NBT.B.6

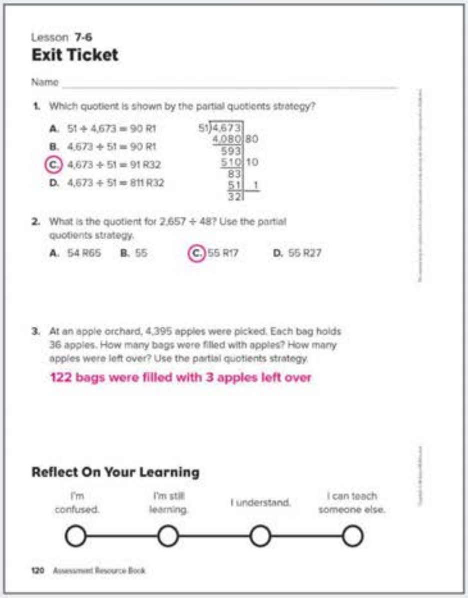
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
3 of 3	Additional Practice or any of the Ⓑ or Ⓔ activities
2 of 3	*Take Another Look* or any of the Ⓑ activities
1 or fewer of 3	Small Group Intervention or any of the Ⓡ activities

Key for Differentiation

- Ⓡ Reinforce Understanding
- Ⓑ Build Proficiency
- Ⓔ Extend Thinking


Lesson 7-6

Exit Ticket

Name

1. Which quotient is shown by the partial quotients strategy?

A. 51 ÷ 4,673 = 90 R1

B. 4,673 ÷ 51 = 90 R1

[✓ C.] 4,673 ÷ 51 = 91 R32

D. 4,673 ÷ 51 = 811 R32

```
51)4,673
   4,080 | 80
     593
     510 | 10
      83
      51 |  1
      32
```

2. What is the quotient for 2,657 ÷ 48? Use the partial quotients strategy.

A. 54 R65 B. 55 [✓ C.] 55 R17 D. 55 R27

3. At an apple orchard, 4,395 apples were picked. Each bag holds 36 apples. How many bags were filled with apples? How many apples were left over? Use the partial quotients strategy.

122 bags were filled with 3 apples left over

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

120 Assessment Resource Book

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Partial Quotients Division

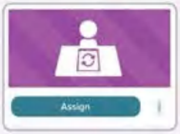
Work with pairs of students. Have students work together to write a word problem in which a 3-digit number is divided by a 2-digit divisor, then use partial quotients to solve the problem. Make sure students recognize that there may be more than one way to write the problem using partial quotients.

GO ONLINE

Take Another Look Lesson

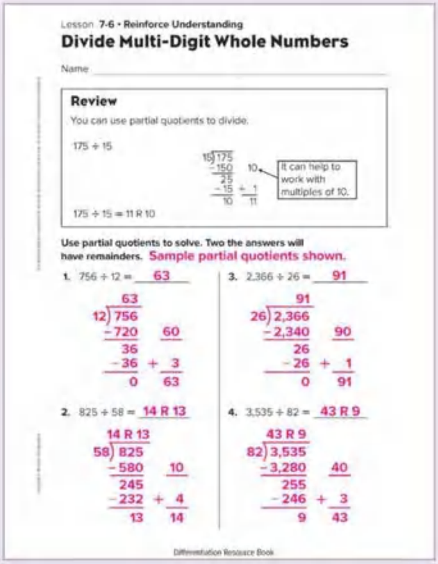
Assign the interactive lesson to reinforce targeted skills.

- Divide by 2-Digit (Partial Quotients)



INDEPENDENT WORK

Differentiation Resource Book, p. 73



Lesson 7-6 • Reinforce Understanding

Divide Multi-Digit Whole Numbers

Name ________________

Review

You can use partial quotients to divide.

175 ÷ 15

15)175
−150 10
25
−15 + 1
10 11

It can help to work with multiples of 10.

175 ÷ 15 = 11 R 10

Use partial quotients to solve. Two the answers will have remainders. Sample partial quotients shown.

1. 756 ÷ 12 = 63

63
12)756
−720 60
36
−36 + 3
0 63

2. 825 ÷ 58 = 14 R 13

14 R 13
58)825
−580 10
245
−232 + 4
13 14

3. 2,366 ÷ 26 = 91

91
26)2,366
−2,340 90
26
−26 + 1
0 91

4. 3,535 ÷ 82 = 43 R 9

43 R 9
82)3,535
−3,280 40
255
−246 + 3
9 43

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Remainder Showdown

Students practice dividing by 2-digit numbers.

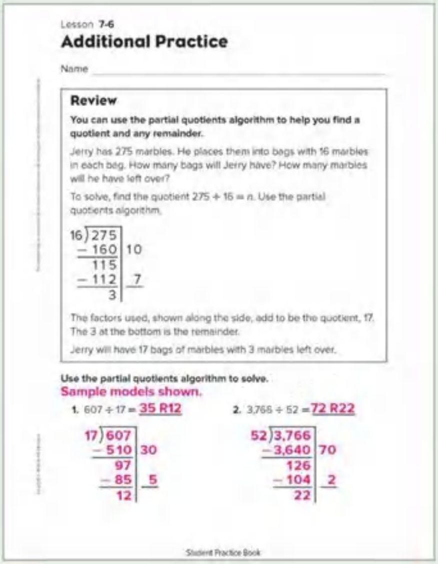
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 73–74



Lesson 7-6

Additional Practice

Name ________________

Review

You can use the partial quotients algorithm to help you find a quotient and any remainder.

Jerry has 275 marbles. He places them into bags with 16 marbles in each bag. How many bags will Jerry have? How many marbles will he have left over?

To solve, find the quotient 275 ÷ 16 = n. Use the partial quotients algorithm.

16)275
−160 | 10
115
−112 | 7
3

The factors used, shown along the side, add to be the quotient, 17. The 3 at the bottom is the remainder.

Jerry will have 17 bags of marbles with 3 marbles left over.

Use the partial quotients algorithm to solve. Sample models shown.

1. 607 ÷ 17 = 35 R12

17)607
−510 | 30
97
−85 | 5
12

2. 3,766 ÷ 52 = 72 R22

52)3,766
−3,640 | 70
126
−104 | 2
22

Student Practice Book

Own It! Digital Station

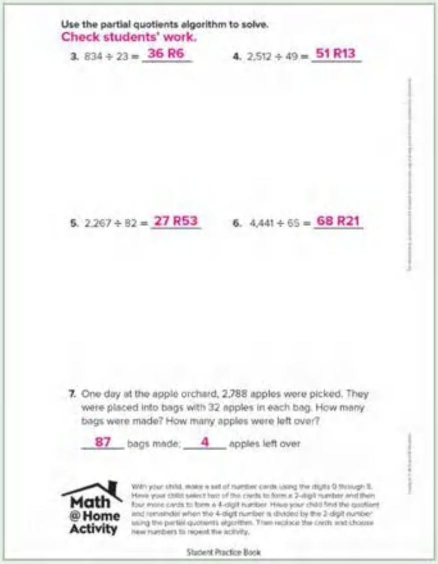
Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

Student Practice Book, pp. 73–74



Use the partial quotients algorithm to solve.
Check students' work.

3. 834 ÷ 23 = 36 R6
4. 2,512 ÷ 49 = 51 R13
5. 2,267 ÷ 82 = 27 R53
6. 4,441 ÷ 65 = 68 R21
7. One day at the apple orchard, 2,788 apples were picked. They were placed into bags with 32 apples in each bag. How many bags were made? How many apples were left over?

87 bags made; 4 apples left over

Math @Home Activity With your child, make a set of number cards using the digits 0 through 9. Have your child select two of the cards to form a 2-digit number and then four more cards to form a 4-digit number. Have your child find the quotient and remainder when the 4-digit number is divided by the 2-digit number using the partial quotients algorithm. Then replace the cards and choose new numbers to repeat the activity.

Student Practice Book

E Extend Thinking

WORKSTATIONS

Use It! Application Station

Online Learning: Is It Safe? Students write rules for safely using electronic devices and practice their rules by researching how to divide multi-digit numbers.

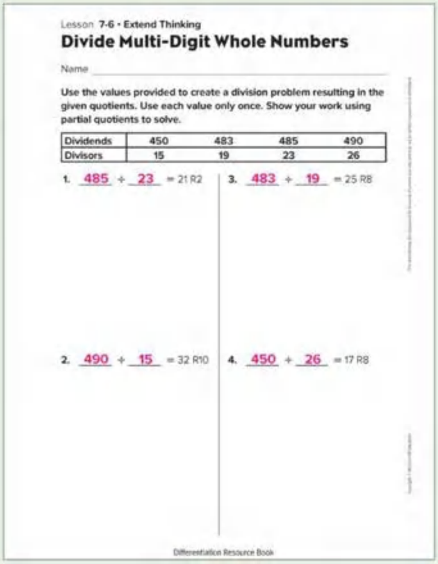
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Differentiation Resource Book, p. 74



Lesson 7-6 • Extend Thinking

Divide Multi-Digit Whole Numbers

Name ____________

Use the values provided to create a division problem resulting in the given quotients. Use each value only once. Show your work using partial quotients to solve.

Dividends	450	483	485	490
Divisors	15	19	23	26

1. 485 ÷ 23 = 21 R2
2. 490 ÷ 15 = 32 R10
3. 483 ÷ 19 = 25 R8
4. 450 ÷ 26 = 17 R8

Differentiation Resource Book

LESSON **7-7**

Solve Problems Involving Division

Learning Targets

- I can use solve word problems involving division.
- I can interpret the remainder when solving word problems.

Standards ◇ Major △ Supporting ○ Additional

Content

◇ **5.NBT.B** Perform operations with multi-digit whole numbers and with decimals to hundredths.

◇ **5.NBT.B.6** Find whole-number quotients of whole numbers with up to four-digit dividends and two-digit divisors, using strategies based on place value, the properties of operations, and/or the relationship between multiplication and division. Illustrate and explain the calculation by using equations, rectangular arrays, and/or models.

Math Practices and Processes

MPP Make sense of problems and persevere in solving them.

MPP Reason abstractly and quantitatively.

Vocabulary

Math Term	Academic Terms
remainder	note transition

Materials

The materials may be for any part of the lesson.

- none

Focus

Content Objectives	Language Objectives	SEL Objective
• Students solve word problems involving division. • Students interpret the remainder, when necessary, to solve problems.	• Students talk about solving word problems involving division while using the modals *can* and *could*. • To support sense-making, ELs participate in MLR6: Three Reads.	• Students break down a situation to identify the problem at hand.

Coherence

Previous	Now	Next
• Students used place-value strategies to find quotients with up to 4-digit dividends and 1-digit divisors (Grade 4). • Students divided multi-digit numbers by 2-digit numbers to find quotients with remainders (Lesson 6).	• Students solve word problems involving division by 2-digit numbers and interpreting remainders.	• Students will solve problems involving division with decimals to hundredths (Unit 8). • Students will fluently divide multi-digit numbers using the standard algorithm (Grade 6).

Rigor

Conceptual Understanding	Procedural Skill & Fluency	Application
• Students build on their understanding of division as they represent multi-digit division by 2-digit divisors.	• Students build proficiency by using partial quotients to represent division with remainders.	• Students will apply their understanding of division to solve problems with real-world contexts. *Application is not a specific element of rigor for this standard.*

Number Routine

Decompose It

5–7 min

Build Fluency Students build number sense as they decompose the number 4.53 in at least 3 different ways.

These prompts encourage students to talk about their reasoning:

- What do you notice about the number?
- How did you think about the number before decomposing it?
- How could you use one way to decompose to create another one?
- What other ways have you decomposed the number?
- Do you notice any patterns in your list of decomposed examples? Explain.

Launch 5–7 min

Sense-Making Routine

Purpose Students make sense of a situation without focusing on the numbers.

Numberless Word Problem

- What's the question?

Teaching Tip Encourage students to discuss their understanding of the numberless word problem, and what information would be needed to solve such a problem.

ETP Pose Purposeful Questions

The questions that follow may be asked in any order. They are meant to help advance students' understanding of remainders and the partial quotients algorithm in the context of word problems and are based on possible comments and questions students may make during the share out.

- What information do you need to determine how many nights Javier can afford to stay at the hotel?
- What operation could you use to solve a problem like this?

Math is... Mindset

- How can you help identify a problem in your class or community?

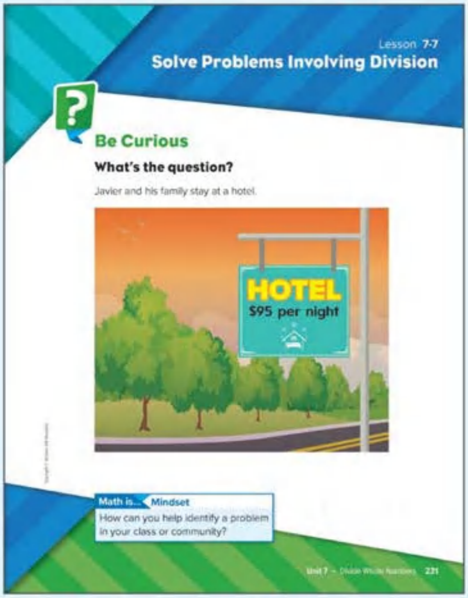
SEL Responsible Decision Making: Identify Problems

Help students develop strong learning habits by providing them opportunities to practice responsible decision-making skills. As students consider the Numberless Word Problem routine, invite them to share what information is most useful to identify the mathematical task at hand.

To make sure students are ready, have them as a class summarize the types of questions that a division word problem could ask.

ETP Establish Goals to Focus Learning

- Let's think about how to identify what to do with the remainder in a division word problem.



Lesson 7-7

Solve Problems Involving Division

Be Curious

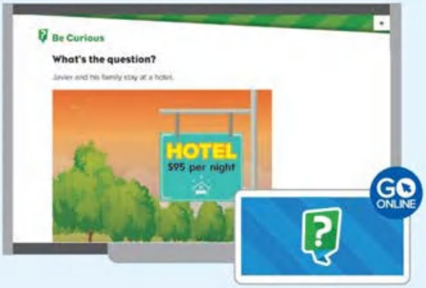
What's the question?

Javier and his family stay at a hotel.

Math is... Mindset

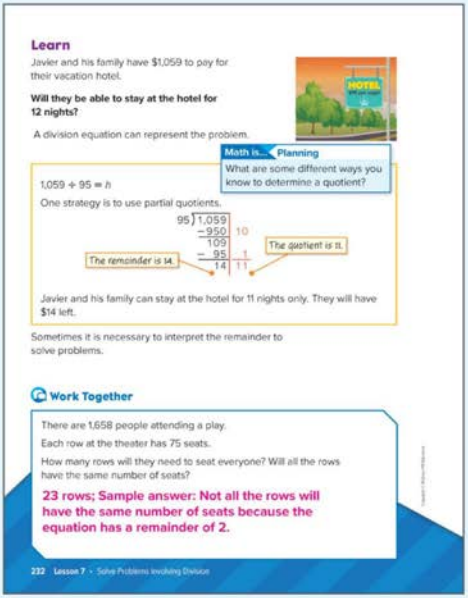
How can you help identify a problem in your class or community?

Unit 7 • Divide Whole Numbers 231



Explore & Develop

20 min



Learn

Javier and his family have $1,059 to pay for their vacation hotel.

Will they be able to stay at the hotel for 12 nights?

A division equation can represent the problem.

Math is... Planning

What are some different ways you know to determine a quotient?

$1{,}059 \div 95 = h$

One strategy is to use partial quotients.

$$\begin{array}{r|l} 95\overline{)1{,}059} & \\ -950 & 10 \\ 109 & \\ -\ \ 95 & 1 \\ \hline 14 & 11 \end{array}$$

The remainder is 14.

The quotient is 11.

Javier and his family can stay at the hotel for 11 nights only. They will have $14 left.

Sometimes it is necessary to interpret the remainder to solve problems.

Work Together

There are 1,658 people attending a play.

Each row at the theater has 75 seats.

How many rows will they need to seat everyone? Will all the rows have the same number of seats?

23 rows; Sample answer: Not all the rows will have the same number of seats because the equation has a remainder of 2.

232 Lesson 7 • Solve Problems Involving Division

❶ Pose the Problem

ETP **Pose Purposeful Questions**

- Are you trying to find the number of groups or the size of each group?
- How is this problem similar to others you have solved in this unit? How is it different?

❷ Develop the Math

Choose the option that best meets your instructional goals.

MLR **Three Reads**

1st read: Instruct students to look at the Work Together problem on the Learn page. Ensure students understand the situation and key words: *attend*, *row*, and *seat*.

2nd read: Focus students' attention on the *How many...* question.

3rd read: Brainstorm with students ways to solve the problem.

❸ Bring It Together

ETP **Elicit Evidence of Student Thinking**

- Why might it be important to be able to interpret the remainder when solving problems?
- How do you know whether the quotient, 1 more than the quotient, or the remainder is the answer?

Key Takeaways

- Problems involving division can be solved using known strategies for division.
- Some problems require interpreting the remainder when determining the solution.

Work Together

The Work Together activity can be used as a formative assessment opportunity to check students' understanding of how to interpret the quotient of a division word problem when there is a remainder.

Common Error Students may always round a quotient to the nearest whole, instead of considering whether they may need to round up or down given the situation.

LOM **Language of Math**

Remainder comes from the word *remain*. A part that has not been destroyed, taken, or used up is something that remains. The ruins are all that remains of old buildings that are mostly destroyed.

CHOOSE YOUR OPTION

Activity-Based Exploration

Students solve division word problems.

Materials: *Problem-Solving Tool* Teaching Resource

Directions: Provide copies of the *Problem-Solving Tool* Teaching Resource. Have students work together to solve the Pose the Problem.

Math is... Planning

- What are some different ways you know to determine a quotient?

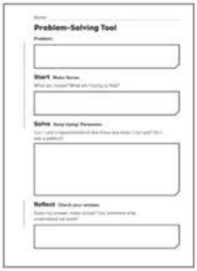
ETP Support Productive Struggle

- What strategies have you tried to use to solve the problem? Why do you think those strategies did not work?
- How does your solution method compare to others?
- How else could you have arrived at your answer?
- Does your answer seem reasonable? How do you know?

Students look for entry points for a problem's solution.

Activity Debrief: Have students share their solutions and strategies to solving the problem. Encourage students to find similarities and differences among the solution methods.

A PDF of the Teaching Resource is available in the Digital Teacher Center.



Problem-Solving Tool

Problem:

Start

Solve

Reflect

Guided Exploration

Students extend their understanding of solving division word problems.

ETP Facilitate Meaningful Discourse

- Why might it be important for Javier to determine how many nights he can stay at the hotel before booking his trip?

Have the students create the equation. Ask:

- What should the operation be? Why?
- How should the numbers appear in the equation? Why?
- How should the unknown appear in the equation? Why?

Math is... Planning

- What are some different ways you know to determine a quotient?

Students look for entry points for a problem's solution.

Have the students estimate the solution. Ask:

- What compatible numbers will you use to estimate the solution? Why?
- How will basic facts and place-value patterns help you estimate the solution?
- Why is 10 a good choice for the first partial quotient?
- **Think About It:** How are the quotient of 11 and the remainder of 11 represented in the partial quotients algorithm?

Have the students use their estimate to assess the reasonableness of the calculated solution. Ask:

- Is the calculated solution reasonable? Why or why not?

Have the students check if their calculated solution is correct. Ask:

- How do you check if a quotient with a remainder is correct?

2. Develop the Math

Javier has $1,056 saved.
How can you determine the number of nights he can stay at the hotel?

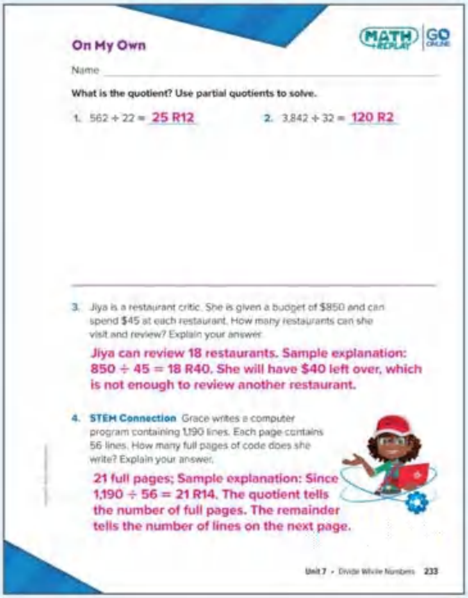
EL English Learner Scaffolds

Entering/Emerging Ensure understanding of *saved* with play money. Say *I want to save money to buy a new coat. It costs $50.* Show $10. Say *I'm going to save $10 for my coat*. Put it aside. Show $15. Say *I'm going to save $15 more for my coat.* Put it aside. Say *I saved $25 so far.* I need $25 more. Repeat with a new item to save for. This time, ask *How much have I saved?*

Developing/Expanding Ensure understanding of *saved* with play money. Say *I want to save money to buy a new coat. It costs $50.* Show $10. Say *I'm going to save $10 for my coat*. Put it aside. Show $15. Say *I'm going to save $15 more for my coat.* Put it aside. Say *I saved $25 so far*. I need $25 more. Repeat with a new item to save for. This time, ask students to tell you how much you have saved.

Bridging/Reaching Ask students what they would buy if they had any money saved. Then have them come up with synonyms (i.e., *set aside*) and antonyms (i.e., *spent*) for *saved*, and to share their list with the class. Allow students to use a dictionary or thesaurus if desired.

Practice & Reflect 10 min



On My Own

Name ____________

What is the quotient? Use partial quotients to solve.

1. 562 ÷ 22 = **25 R12**

2. 3,842 ÷ 32 = **120 R2**

3. Jiya is a restaurant critic. She is given a budget of $850 and can spend $45 at each restaurant. How many restaurants can she visit and review? Explain your answer.

   Jiya can review 18 restaurants. Sample explanation: 850 ÷ 45 = 18 R40. She will have $40 left over, which is not enough to review another restaurant.

4. **STEM Connection** Grace writes a computer program containing 1,190 lines. Each page contains 56 lines. How many full pages of code does she write? Explain your answer.

   21 full pages; Sample explanation: Since 1,190 ÷ 56 = 21 R14. The quotient tells the number of full pages. The remainder tells the number of lines on the next page.

5. A farmer packs 1,124 pears to take to the farmers' market. Each tray holds 16 pears. How many trays will she take to the farmers' market? Explain your answer. **71 trays; Sample answer: 70 trays will hold most of the pears, but 4 are left over so another tray is needed.**

6. Alicia has 2,056 stickers. She puts the same number of stickers into 24 gift bags. How many stickers are in each gift bag? Will she use all her stickers? Explain your answer.

   85 stickers; She will not use all her stickers. There are 16 stickers left over.

7. Lily rents buses to take 1,980 runners to the starting line of a marathon. Each bus holds 40 people. How many buses are needed? Explain your answer.

   50 buses; Sample answer: 1,980 ÷ 40 = 49 R20; There will be 20 people left, so another bus is needed.

8. **Extend Your Thinking** There are 8,554 runners participating in a marathon. The runners will be divided into 12 groups with about the same number of runners in each group. How many runners can be in each group? Explain.

   Sample answer: Because 8,554 ÷ 12 = 712 R10, there will be 712 groups of 12 runners with 10 runners remaining. One option for grouping is to have 712 groups with 12 runners and 1 group with 10 runners.

Reflect

What does the remainder tell you?

Answers may vary.

Math is... Mindset

How did you help identify a problem in your class or community?

Practice

Build Fluency from Understanding

Common Error: Exercises 3–7 Students may have difficulty interpreting the remainder. Remind students to consider the context of each problem. In Exercises 3 and 4, the context suggests rounding down (eliminating the remainder). In Exercise 7, the context suggests rounding up (if there is a remainder).

Practice Item Analysis

Item	DOK	Rigor
1–2	1	Procedural Skill and Fluency
3–7	2	Application
8	3	Conceptual Understanding

Reflect

Students complete the Reflect question.

- What does the remainder tell you?

Ask students to share their reflections with their classmates.

Math is... Mindset

- How did you help identify a problem in your class or community?

Students reflect on how they practiced responsible decision-making.

Learning Targets

Ask students to reflect on the Learning Targets of the lesson.

- I can solve word problems involving division.
- I can interpret the remainder when solving word problems.

To review today's lesson, have students watch the Math Replay video in their Digital Student Center.

Assign the On My Own practice to students from the Digital Teacher Center.

Assess 10 min

Exit Ticket ✓ Formative Assessment

The *Exit Ticket* assesses students' understanding of lesson concepts.

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Exit Ticket Skill Tracker

Item	DOK	Skill	Standard
1	2	Interpret remainders in division	5.NBT.B.6
2	2	Interpret remainders in division	5.NBT.B.6
3	2	Interpret remainders in division	5.NBT.B.6
4	2	Interpret remainders in division	5.NBT.B.6

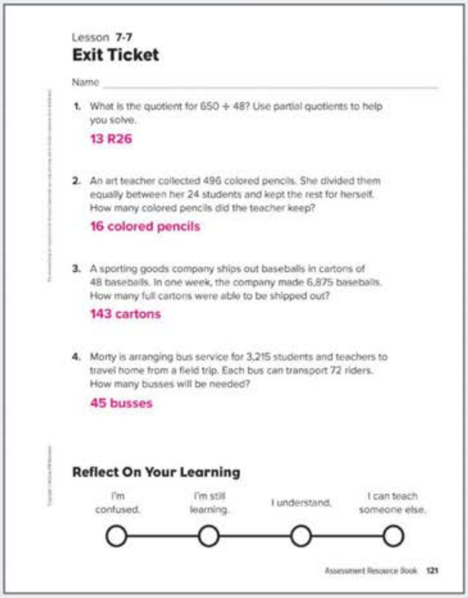
Data Use students' scores on the *Exit Ticket* to assign the differentiated resources available. When students complete the *Exit Ticket* in the digital workspace, their responses are auto-scored.

Exit Ticket Recommendations

If students score	Then have students do
4 of 4	Additional Practice or any of the (B) or (E) activities
3 of 4	*Take Another Look* or any of the (B) activities
2 or fewer of 4	Small Group Intervention or any of the (R) activities

Key for Differentiation

- (R) Reinforce Understanding
- (B) Build Proficiency
- (E) Extend Thinking



Lesson 7-7

Exit Ticket

Name ______________________________

1. What is the quotient for 650 ÷ 48? Use partial quotients to help you solve.
   13 R26

2. An art teacher collected 496 colored pencils. She divided them equally between her 24 students and kept the rest for herself. How many colored pencils did the teacher keep?
   16 colored pencils

3. A sporting goods company ships out baseballs in cartons of 48 baseballs. In one week, the company made 6,875 baseballs. How many full cartons were able to be shipped out?
   143 cartons

4. Morty is arranging bus service for 3,215 students and teachers to travel home from a field trip. Each bus can transport 72 riders. How many busses will be needed?
   45 busses

Reflect On Your Learning

I'm confused.	I'm still learning.	I understand.	I can teach someone else.
○	○	○	○

Assessment Resource Book 121

Differentiate

10 min Select resources based on your classroom setup and your students' needs.

R Reinforce Understanding

SMALL GROUP

Remainders

Work with students in pairs. Have students work together to write a word problem in which a 4-digit number is divided by a 2-digit divisor and the remainder matters, then solve the problem. Then work with students to adjust the problem to use different numbers to see how different remainders affect the solution.

GO ONLINE

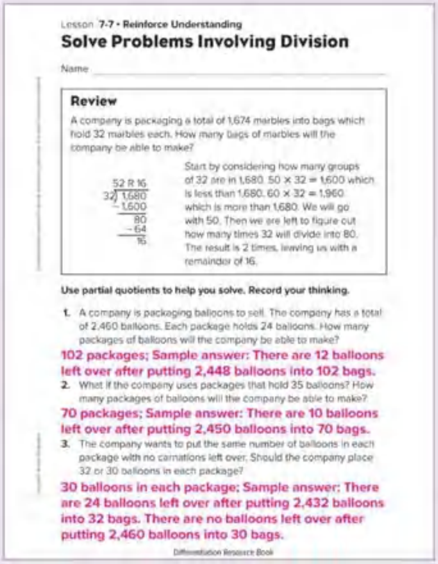
Take Another Look Lesson

Assign the interactive lesson to reinforce targeted skills.

- Interpret Remainders in Word Problems

INDEPENDENT WORK

Differentiation Resource Book, p. 75



Lesson 7-7 • Reinforce Understanding

Solve Problems Involving Division

Name ______________________

Review

A company is packaging a total of 1,674 marbles into bags which hold 32 marbles each. How many bags of marbles will the company be able to make?

```
    52 R 16
32)1,680
  −1,600
      80
     −64
      16
```

Start by considering how many groups of 32 are in 1,680. 50 × 32 = 1,600 which is less than 1,680. 60 × 32 = 1,960 which is more than 1,680. We will go with 50. Then we are left to figure out how many times 32 will divide into 80. The result is 2 times, leaving us with a remainder of 16.

Use partial quotients to help you solve. Record your thinking.

1. A company is packaging balloons to sell. The company has a total of 2,460 balloons. Each package holds 24 balloons. How many packages of balloons will the company be able to make?

102 packages; Sample answer: There are 12 balloons left over after putting 2,448 balloons into 102 bags.

2. What if the company uses packages that hold 35 balloons? How many packages of balloons will the company be able to make?

70 packages; Sample answer: There are 10 balloons left over after putting 2,450 balloons into 70 bags.

3. The company wants to put the same number of balloons in each package with no carnations left over. Should the company place 32 or 30 balloons in each package?

30 balloons in each package; Sample answer: There are 24 balloons left over after putting 2,432 balloons into 32 bags. There are no balloons left over after putting 2,460 balloons into 30 bags.

Differentiation Resource Book

B Build Proficiency

WORKSTATIONS

Practice It! Game Station

Dividing with Remainders Bump

Students practice identifying remainders in division problems.

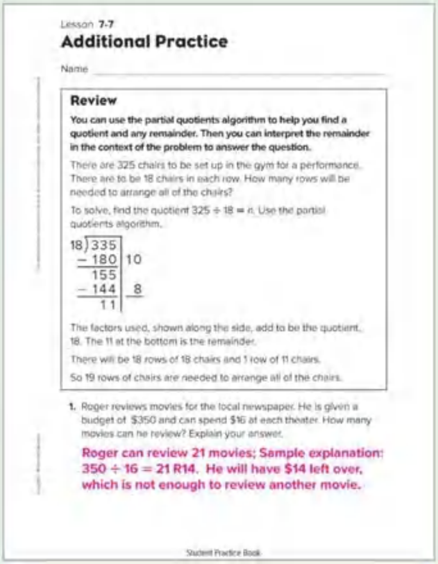
GO ONLINE

Interactive Additional Practice

Assign the digital version of the Student Practice Book.

INDEPENDENT WORK

Student Practice Book, pp. 75–76



Lesson 7-7

Additional Practice

Name ______________________

Review

You can use the partial quotients algorithm to help you find a quotient and any remainder. Then you can interpret the remainder in the context of the problem to answer the question.

There are 325 chairs to be set up in the gym for a performance. There are to be 18 chairs in each row. How many rows will be needed to arrange all of the chairs?

To solve, find the quotient $325 \div 18 = n$. Use the partial quotients algorithm.

```
18)335 |
  −180 | 10
   155 |
  −144 |  8
    11 |
```

The factors used, shown along the side, add to be the quotient, 18. The 11 at the bottom is the remainder.

There will be 18 rows of 18 chairs and 1 row of 11 chairs.

So 19 rows of chairs are needed to arrange all of the chairs.

1. Roger reviews movies for the local newspaper. He is given a budget of $350 and can spend $16 at each theater. How many movies can he review? Explain your answer.

Roger can review 21 movies; Sample explanation: 350 ÷ 16 = 21 R14. He will have $14 left over, which is not enough to review another movie.

Student Practice Book

E Extend Thinking

Own It! Digital Station

Build Fluency **Games**

Assign the digital game to develop fluency with addition and subtraction of decimals.

WORKSTATIONS

Use It! Application Station

That Is Astronomical Students practice finding quotients, rounding, and writing equations by researching the hours in a day for each planet.

Spiral Review

Assign the digital Spiral Review Practice to students or download and print PDFs of the Spiral Review from the Digital Teacher Center.

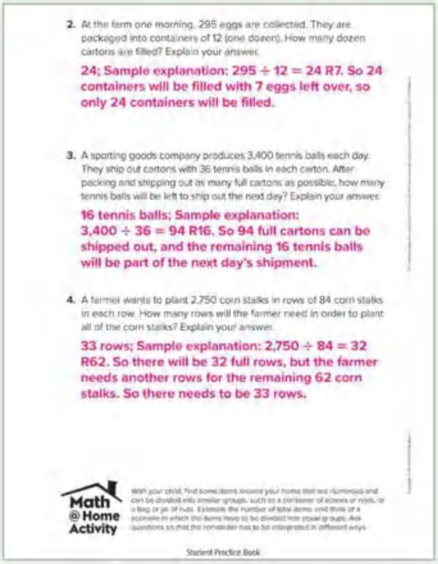
GO ONLINE

STEM Adventure

Assign a digital simulation to apply skills and extend thinking.

INDEPENDENT WORK

Student Practice Book, pp. 75–76



2. At the farm one morning, 295 eggs are collected. They are packaged into containers of 12 (one dozen). How many dozen cartons are filled? Explain your answer.

   24; Sample explanation: 295 ÷ 12 = 24 R7. So 24 containers will be filled with 7 eggs left over, so only 24 containers will be filled.

3. A sporting goods company produces 3,400 tennis balls each day. They ship out cartons with 36 tennis balls in each carton. After packing and shipping out as many full cartons as possible, how many tennis balls will be left to ship out the next day? Explain your answer.

   16 tennis balls; Sample explanation: 3,400 ÷ 36 = 94 R16. So 94 full cartons can be shipped out, and the remaining 16 tennis balls will be part of the next day's shipment.

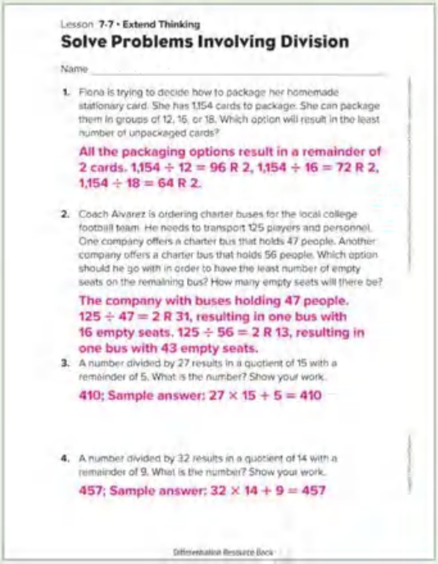
4. A farmer wants to plant 2,750 corn stalks in rows of 84 corn stalks in each row. How many rows will the farmer need in order to plant all of the corn stalks? Explain your answer.

   33 rows; Sample explanation: 2,750 ÷ 84 = 32 R62. So there will be 32 full rows, but the farmer needs another rows for the remaining 62 corn stalks. So there needs to be 33 rows.

Math @ Home Activity With your child, find some items around your home that are numerous and can be divided into smaller groups, such as a container of screws or nails, or a bag or jar of nuts. Estimate the number of total items and think of a scenario in which the items have to be divided into equal groups. Ask questions so that the remainder has to be interpreted in different ways.

Student Practice Book

Differentiation Resource Book, p. 76



Lesson 7-7 • **Extend Thinking**

Solve Problems Involving Division

Name ____________________

1. Fiona is trying to decide how to package her homemade stationary card. She has 1,154 cards to package. She can package them in groups of 12, 16, or 18. Which option will result in the least number of unpackaged cards?

   All the packaging options result in a remainder of 2 cards. 1,154 ÷ 12 = 96 R 2, 1,154 ÷ 16 = 72 R 2, 1,154 ÷ 18 = 64 R 2.

2. Coach Alvarez is ordering charter buses for the local college football team. He needs to transport 125 players and personnel. One company offers a charter bus that holds 47 people. Another company offers a charter bus that holds 56 people. Which option should he go with in order to have the least number of empty seats on the remaining bus? How many empty seats will there be?

   The company with buses holding 47 people. 125 ÷ 47 = 2 R 31, resulting in one bus with 16 empty seats. 125 ÷ 56 = 2 R 13, resulting in one bus with 43 empty seats.

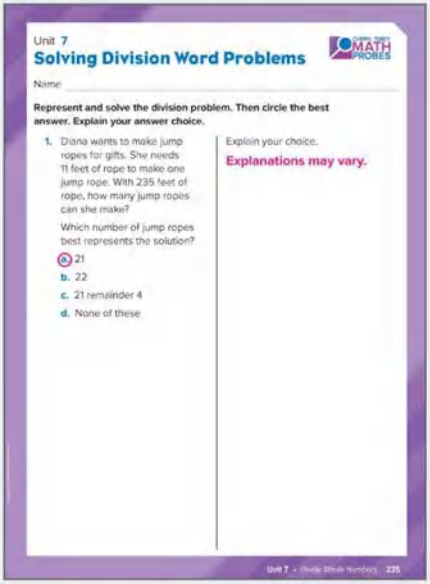
3. A number divided by 27 results in a quotient of 15 with a remainder of 5. What is the number? Show your work.

   410; Sample answer: 27 × 15 + 5 = 410

4. A number divided by 32 results in a quotient of 14 with a remainder of 9. What is the number? Show your work.

   457; Sample answer: 32 × 14 + 9 = 457

Differentiation Resource Book



Unit 7

Solving Division Word Problems

Name

Represent and solve the division problem. Then circle the best answer. Explain your answer choice.

1. Diana wants to make jump ropes for gifts. She needs 11 feet of rope to make one jump rope. With 235 feet of rope, how many jump ropes can she make?

   Which number of jump ropes best represents the solution?

   [✓ a. 21]
   b. 22
   c. 21 remainder 4
   d. None of these

Explain your choice.

Explanations may vary.

2. Mrs. Philbrick is packing 374 eggs into cartons. Each carton holds 12 eggs. How many cartons will she need in order to pack all of the eggs?

   Which number of cartons best represents the solution?

   a. 31
   [✓ b. 32]
   c. 31 remainder 2
   d. None of these

Explain your choice.

Explanations may vary.

Reflect On Your Learning

Analyze the Probe

Formative Assessment

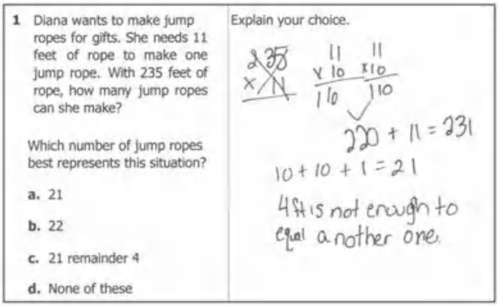
Targeted Concept Solve division word problems involving 2-digit divisors where there is a need to interpret the remainder based on the context of the problem. Students are able to use area models to represent and solve the problem.

Targeted Misconceptions Some students have difficulty recognizing a word problem that involves division. Other students are unable to interpret the context of a remainder. In particular, they may not understand situations where the quotient, without regard to the remainder, is the solution to the problem. In such cases, the student may include the remainder with the answer even though the inclusion of the remainder does not make sense with respect to the problem context. In other cases, students may not understand situations where the remainder signifies the need for increasing the quotient to the next whole number to solve the problem.

Sample Student Work

Below are examples of students' explanations.

Sample A



1 Diana wants to make jump ropes for gifts. She needs 11 feet of rope to make one jump rope. With 235 feet of rope, how many jump ropes can she make?

Which number of jump ropes best represents this situation?

a. 21
b. 22
c. 21 remainder 4
d. None of these

Explain your choice.

235 × 11

11 × 10 = 110

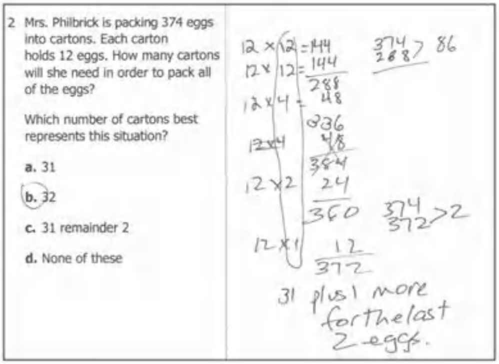
11 × 10 = 110

220 + 11 = 231

10 + 10 + 1 = 21

4 ft is not enough to equal another one.

Sample B



2 Mrs. Philbrick is packing 374 eggs into cartons. Each carton holds 12 eggs. How many cartons will she need in order to pack all of the eggs?

Which number of cartons best represents this situation?

a. 31
[✓ b. 32]
c. 31 remainder 2
d. None of these

12 × 12 = 144

12 × 12 = 144

288

12 × 4 = 48

336

12 × 4 48

384

12 × 2 24

360

12 × 1 12

372

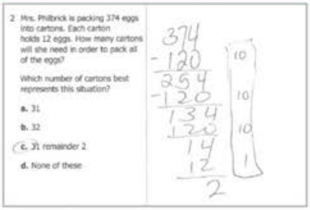
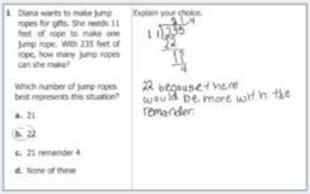
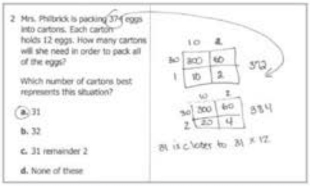
374 − 288 > 86

374 − 372 > 2

31 plus 1 more for the last 2 eggs.

Collect and Assess Student Work

Collect and review student response to determine possible misconceptions. See examples in If-Then chart.

IF incorrect…	THEN the student likely …	Sample Misconceptions
1. c 2. c	solves the division problem without applying an understanding of how the remainder connects to the context by keeping the remainder as part of the answer.	 2 Mrs. Philbrick is packing 374 eggs into cartons. Each carton holds 12 eggs. How many cartons will she need in order to pack all of the eggs? Which number of cartons best represents this situation? a. 31 b. 32 [✓ c. 31 remainder 2] d. None of these
1. b 2. a	solves the division problem without applying an understanding of how the remainder connects to the context by rounding up or down incorrectly.	 1 Diana wants to make jump ropes for gifts. She needs 11 feet of rope to make one jump rope. With 235 feet of rope, how many jump ropes can she make? Which number of jump ropes best represents this situation? a. 21 [✓ b. 22] c. 21 remainder 4 d. None of these Explain your choice. 22 because there would be more with the remainder
1. d 2. d	makes an error in the division process; OR does not recognize the problem context as a division situation.	 2 Mrs. Philbrick is packing 374 eggs into cartons. Each carton holds 12 eggs. How many cartons will she need in order to pack all of the eggs? Which number of cartons best represents this situation? [✓ a. 31] b. 32 c. 31 remainder 2 d. None of these 31 is closer to 31 × 12
has difficulty representing 1-digit or 2-digit division; OR solves the division problem correctly and interprets the remainder correctly, but considers more than one answer as correct; OR justifies both rounding down and rounding up. For example, in Item B, a student may circle both choice a for how many full cartons there are and choice b for how many total cartons there are.		

Take Action

Choose from the following resources or suggestions:

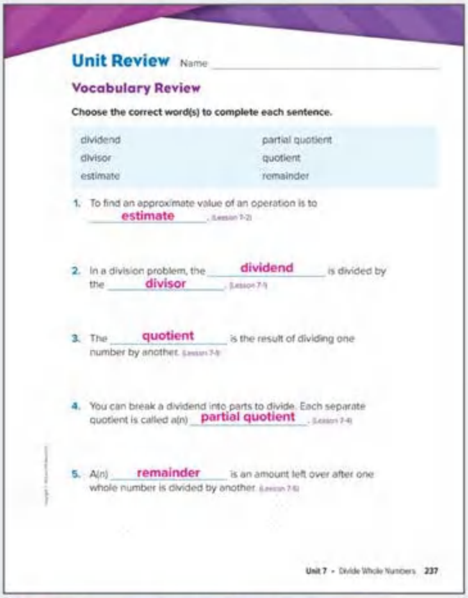
- Revisit representing division with 2-digit divisors in Lessons 7-4–7-6.
- Use structured approaches that include asking students to estimate before computing, making a drawing to represent the situation, and comparing their final answer to their estimate.
- Discuss the meaning of a remainder by making explicit connections between a visual representation (such as area models) and the numeric representation.
- Discuss what the dividend, divisor, and quotient mean in the context of a real-world problem. Discuss the best way to describe the answer based on the problem context when there is a nonzero remainder. Ask, “Should we express the answer with a remainder, or should we round down or round up to the next whole number?” Ask students to write their own contexts for division problems.

Revisit the Probe After additional instruction, have students review their initial answers. Use these questions for discussion:

- *Are there any answers you would like to change? Explain.*
- *Are there any questions that you still have about any of the items on this probe?*

Metacognitive Check *Reflect on Your Learning* allows students to think about their level of understanding of the lesson content on a scale of 1 to 4 with 4 being the highest confidence.

Unit Review



Unit Review

Name ______________________

Vocabulary Review

Choose the correct word(s) to complete each sentence.

dividend
divisor
estimate
partial quotient
quotient
remainder

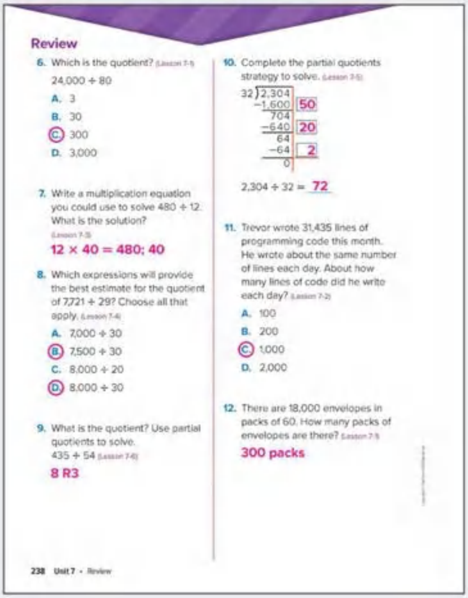
1. To find an approximate value of an operation is to **estimate**. (Lesson 7-2)

2. In a division problem, the **dividend** is divided by the **divisor**. (Lesson 7-1)

3. The **quotient** is the result of dividing one number by another. (Lesson 7-1)

4. You can break a dividend into parts to divide. Each separate quotient is called a(n) **partial quotient**. (Lesson 7-4)

5. A(n) **remainder** is an amount left over after one whole number is divided by another. (Lesson 7-6)



Review

6. Which is the quotient? (Lesson 7-1)
24,000 ÷ 80
A. 3
B. 30
[✓ C.] 300
D. 3,000

7. Write a multiplication equation you could use to solve 480 ÷ 12. What is the solution? (Lesson 7-3)
12 × 40 = 480; 40

8. Which expressions will provide the best estimate for the quotient of 7,721 ÷ 29? Choose all that apply. (Lesson 7-4)
A. 7,000 ÷ 30
[✓ B.] 7,500 ÷ 30
C. 8,000 ÷ 20
[✓ D.] 8,000 ÷ 30

9. What is the quotient? Use partial quotients to solve.
435 ÷ 54 (Lesson 7-6)
8 R3

10. Complete the partial quotients strategy to solve. (Lesson 7-5)

$$\begin{array}{r|l} 32\overline{)2{,}304} & \\ -1{,}600 & \boxed{50} \\ \hline 704 & \\ -640 & \boxed{20} \\ \hline 64 & \\ -64 & \boxed{2} \\ \hline 0 & \end{array}$$

2,304 ÷ 32 = **72**

11. Trevor wrote 31,435 lines of programming code this month. He wrote about the same number of lines each day. About how many lines of code did he write each day? (Lesson 7-2)
A. 100
B. 200
[✓ C.] 1,000
D. 2,000

12. There are 18,000 envelopes in packs of 60. How many packs of envelopes are there? (Lesson 7-1)
300 packs

Students can complete the **Unit Review** to prepare for the **Unit Assessment**. Students may complete the Review in their Interactive eBook in the Digital Student Center.

Vocabulary Review

Item Analysis

Item	Lesson
1	7-2
2	7-1
3	7-1
4	7-4
5	7-6

Review

Item Analysis

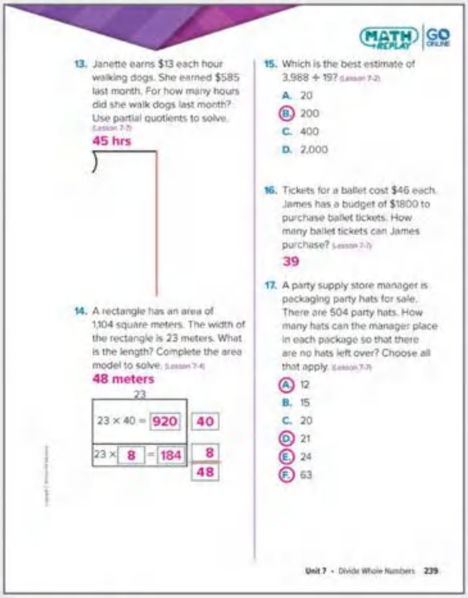
Item	DOK	Lesson	Standard
6	1	7-1	5.NBT.B.6
7	1	7-3	5.NBT.B.6
8	2	7-4	5.NBT.B.6
9	1	7-6	5.NBT.B.6
10	1	7-5	5.NBT.B.6
11	2	7-2	5.NBT.B.6
12	2	7-1	5.NBT.B.6

To review the lessons in this unit, have students watch the Math Replay video in their Digital Student Center.

Assign the Unit Review practice to students from the Digital Teacher Center.

Item Analysis (continued)

Item	DOK	Lesson	Standard
13	2	7-7	5.NBT.B.6
14	1	7-4	5.NBT.B.6
15	1	7-2	5.NBT.B.6
16	2	7-7	5.NBT.B.6
17	2	7-7	5.NBT.B.6


13. Janette earns $13 each hour walking dogs. She earned $585 last month. For how many hours did she walk dogs last month? Use partial quotients to solve. (Lesson 7-7)

45 hrs

14. A rectangle has an area of 1,104 square meters. The width of the rectangle is 23 meters. What is the length? Complete the area model to solve. (Lesson 7-4)

48 meters

23

23 × 40 = 920 | 40

23 × 8 = 184 | 8

48

15. Which is the best estimate of 3,988 ÷ 197? (Lesson 7-2)

A. 20

[✓ B.] 200

C. 400

D. 2,000

16. Tickets for a ballet cost $46 each. James has a budget of $1800 to purchase ballet tickets. How many ballet tickets can James purchase? (Lesson 7-7)

39

17. A party supply store manager is packaging party hats for sale. There are 504 party hats. How many hats can the manager place in each package so that there are no hats left over? Choose all that apply. (Lesson 7-7)

[✓ A.] 12

B. 15

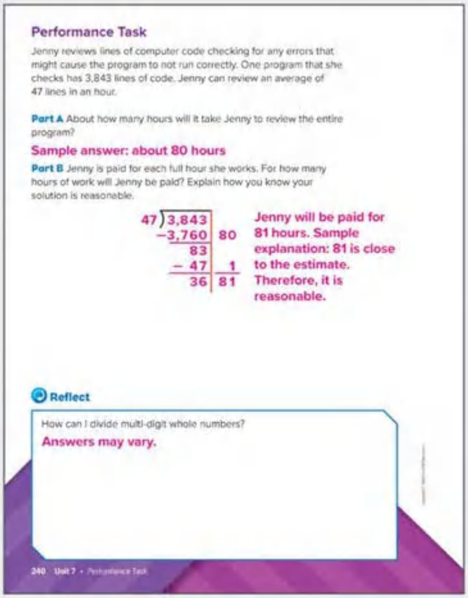
C. 20

[✓ D.] 21

[✓ E.] 24

[✓ F.] 63

Unit 7 • Divide Whole Numbers 239


Performance Task

Jenny reviews lines of computer code checking for any errors that might cause the program to not run correctly. One program that she checks has 3,843 lines of code. Jenny can review an average of 47 lines in an hour.

Part A About how many hours will it take Jenny to review the entire program?

Sample answer: about 80 hours

Part B Jenny is paid for each full hour she works. For how many hours of work will Jenny be paid? Explain how you know your solution is reasonable.

47)3,843
−3,760 | 80
83
− 47 | 1
36 | 81

Jenny will be paid for 81 hours. Sample explanation: 81 is close to the estimate. Therefore, it is reasonable.

Reflect

How can I divide multi-digit whole numbers?

Answers may vary.

240 Unit 7 • Performance Task

Performance Task

Standard: 5.NBT.AB.6

Rubric (4 points)

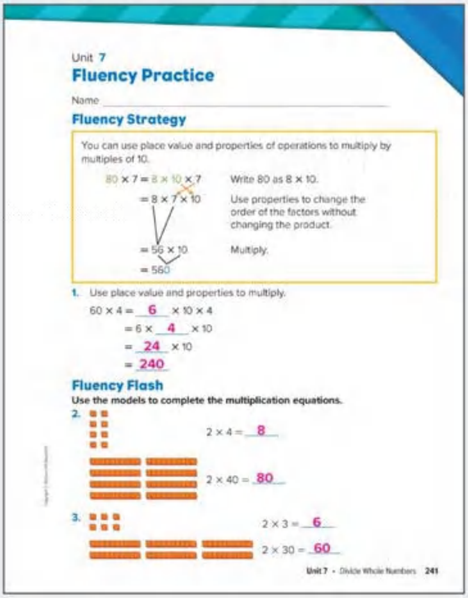
Part A (DOK 2) – 2 points	
2 POINTS	Student's work reflects a proficiency with estimating quotients. The student's estimates are reasonable.
1 POINT	Student's work reflects developing proficiency with estimating quotients. One of the estimates is reasonable.
0 POINTS	Student's work reflects a poor understanding of estimating quotients. No estimates are reasonable.

Part B (DOK 2) – 2 points	
2 POINTS	Student's work reflects a proficiency with multi-digit whole number division using partial quotients algorithm. The solution is accurate.
1 POINT	Student's work reflects developing proficiency with multi-digit whole number division using partial quotients algorithm. The solution is incorrect due to computational errors, not conceptual weakness.
0 POINTS	Student's work reflects a poor understanding of multi-digit whole number division using partial quotients algorithm. The solution is incorrect.

Reflect

The Reflect question provides an opportunity for students to express their understanding of the unit level focus question.

Fluency Practice



Unit 7

Fluency Practice

Name

Fluency Strategy

You can use place value and properties of operations to multiply by multiples of 10.

$80 \times 7 = 8 \times 10 \times 7$ Write 80 as 8 × 10.

$= 8 \times 7 \times 10$ Use properties to change the order of the factors without changing the product.

$= 56 \times 10$ Multiply.

$= 560$

1. Use place value and properties to multiply.

$60 \times 4 = \underline{6} \times 10 \times 4$

$= 6 \times \underline{4} \times 10$

$= \underline{24} \times 10$

$= \underline{240}$

Fluency Flash

Use the models to complete the multiplication equations.

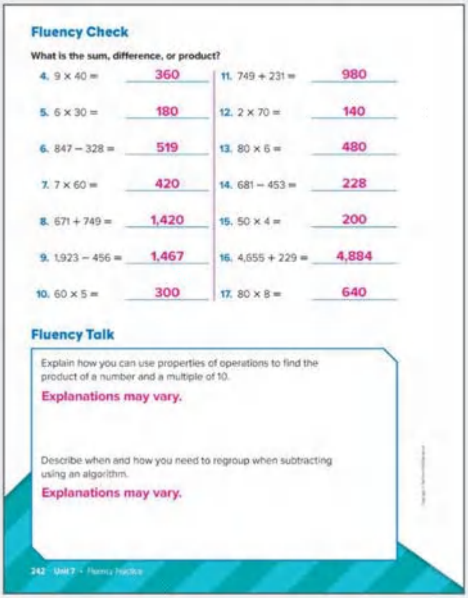
2. $2 \times 4 = \underline{8}$

$2 \times 40 = \underline{80}$

3. $2 \times 3 = \underline{6}$

$2 \times 30 = \underline{60}$

Unit 7 • Divide Whole Numbers 241



Fluency Check

What is the sum, difference, or product?

4. 9 × 40 = 360
5. 6 × 30 = 180
6. 847 − 328 = 519
7. 7 × 60 = 420
8. 671 + 749 = 1,420
9. 1,923 − 456 = 1,467
10. 60 × 5 = 300
11. 749 + 231 = 980
12. 2 × 70 = 140
13. 80 × 6 = 480
14. 681 − 453 = 228
15. 50 × 4 = 200
16. 4,655 + 229 = 4,884
17. 80 × 8 = 640

Fluency Talk

Explain how you can use properties of operations to find the product of a number and a multiple of 10.

Explanations may vary.

Describe when and how you need to regroup when subtracting using an algorithm.

Explanations may vary.

242 **Unit 7** • Fluency Practice

Fluency practice helps students develop procedural fluency, that is, the "ability to apply procedures accurately, efficiently, and flexibly." Because there is no expectation of speed, students should not be timed when completing the practice activity.

Build Fluency **Objective** Students practice multiplying by multiples of 10.

Fluency Progression

Unit	Skill	Standard
1	Use Partial Sums to Add	4.NBT.B.4
2	Decompose by Place Value to Subtract	4.NBT.B.4
3	Use an Algorithm to Add	4.NBT.B.4
4	Use an Algorithm to Subtract	4.NBT.B.4
5	Choose a Strategy to Add	4.NBT.B.4
6	Choose a Strategy to Subtract	4.NBT.B.4
7	**Multiply by Multiples of 10**	**5.NBT.B.5**
8	Multiply by Multiples of 100	5.NBT.B.5
9	Divide Multiples of 10	5.NBT.B.6
10	Divide Multiples of 100	5.NBT.B.6
11	Use an Algorithm to Multiply (2- and 3-Digit Numbers by 1-Digit Numbers)	5.NBT.B.5
12	Use an Algorithm to Multiply (2-Digit Numbers by 2-Digit Numbers)	5.NBT.B.5
13	Choose a Strategy to Multiply	5.NBT.B.5
14	Choose a Strategy to Multiply	5.NBT.B.5

Fluency Expectations

Grade 4

- Add and subtract within 1,000,000.

Grade 5

- Multiply multi-digit whole numbers.

Grade 6

- Divide multi-digit numbers using the standard algorithm.
- Add, subtract, multiply, and divide multi-digit decimals using the standard algorithm for each operation.

Performance Task

Locked Cashbox

Students draw on their understanding of dividing whole numbers. Use the rubric shown to evaluate students' work.

Standards: 5.NBT.B.6

Rubric (10 points)

Part A (DOK 3) – 2 points

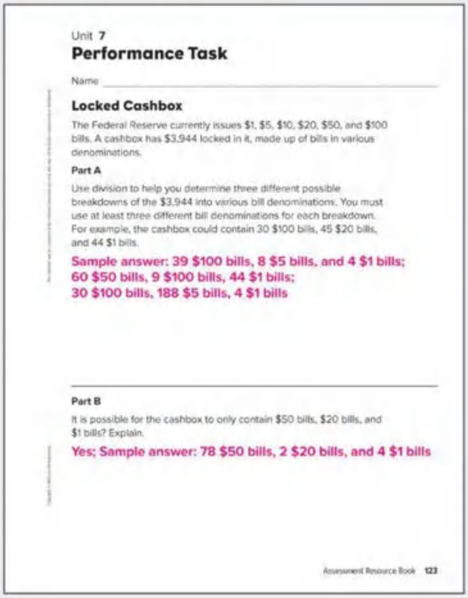
2 POINTS	Student's work reflects a proficiency in dividing multi-digit factors. The student was able to accurately provide 3 possible breakdowns.
1 POINT	Student's work reflects a developing proficiency in dividing multi-digit factors. The student was able to accurately provide 2 possible breakdowns.
0 POINTS	Student's work reflects a weak proficiency of dividing multi-digit factors. The student was able to accurately provide 1 or 0 possible breakdowns.

Parts B, C, and D (DOK 2) – 6 points

2 POINTS	Student's work reflects a proficiency in dividing multi-digit factors. The student was able to accurately calculate an answer and given an explanation.
1 POINT	Student's work reflects a developing proficiency in dividing multi-digit factors. The student was able to accurately calculate an answer but has given an incorrect explanation.
0 POINTS	Student's work reflects a weak proficiency of dividing multi-digit factors. The student was able to accurately calculate an answer and has given a correct explanation.

Part E (DOK 3) – 2 points

2 POINTS	Student's work reflects a proficiency in dividing multi-digit factors. The student's work, answer, and list are all correct.
1 POINT	Student's work reflects a developing proficiency in dividing multi-digit factors. Some of the student's work, answer, and list are incorrect.
0 POINTS	Student's work reflects a weak proficiency of dividing multi-digit factors. The student's work, answer, and list are all incorrect.



Unit **7**

Performance Task

Name ______________________

Locked Cashbox

The Federal Reserve currently issues $1, $5, $10, $20, $50, and $100 bills. A cashbox has $3,944 locked in it, made up of bills in various denominations.

Part A

Use division to help you determine three different possible breakdowns of the $3,944 into various bill denominations. You must use at least three different bill denominations for each breakdown. For example, the cashbox could contain 30 $100 bills, 45 $20 bills, and 44 $1 bills.

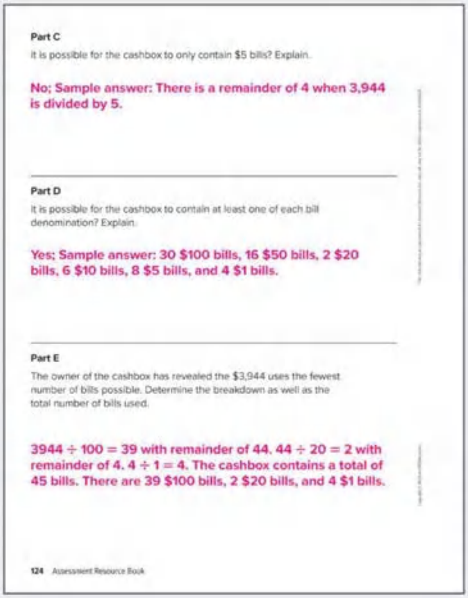
Sample answer: 39 $100 bills, 8 $5 bills, and 4 $1 bills;
60 $50 bills, 9 $100 bills, 44 $1 bills;
30 $100 bills, 188 $5 bills, 4 $1 bills

Part B

It is possible for the cashbox to only contain $50 bills, $20 bills, and $1 bills? Explain.

Yes; Sample answer: 78 $50 bills, 2 $20 bills, and 4 $1 bills

Assessment Resource Book **123**



Part C

It is possible for the cashbox to only contain $5 bills? Explain.

No; Sample answer: There is a remainder of 4 when 3,944 is divided by 5.

Part D

It is possible for the cashbox to contain at least one of each bill denomination? Explain.

Yes; Sample answer: 30 $100 bills, 16 $50 bills, 2 $20 bills, 6 $10 bills, 8 $5 bills, and 4 $1 bills.

Part E

The owner of the cashbox has revealed the $3,944 uses the fewest number of bills possible. Determine the breakdown as well as the total number of bills used.

$3944 \div 100 = 39$ with remainder of 44. $44 \div 20 = 2$ with remainder of 4. $4 \div 1 = 4$. The cashbox contains a total of 45 bills. There are 39 $100 bills, 2 $20 bills, and 4 $1 bills.

124 Assessment Resource Book

Unit Assessments

Two forms of the Unit Assessment, Form A and Form B, are available for either print or digital administration. The items on the two assessments are parallel items, assessing the same concept and standard. The table below provides the item analysis for both forms.

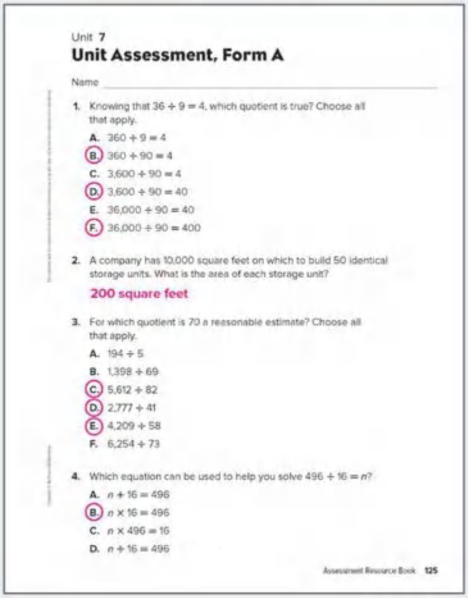
Both Unit Assessments are available in the Assessment Resource Book or as downloadable files from the Digital Teacher Center.

Data When students complete the Unit Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Lesson	Guided Support Intervention Lesson	Standard
1	2	7-1	Divide by Multiples of 10	5.NBT.B.6
2	2	7-1	Divide by Multiples of 10	5.NBT.B.6
3	2	7-2	Estimate Quotients (Whole Number)	5.NBT.B.6
4	2	7-3	Relate Multiplication and Division (Whole Numbers)	5.NBT.B.6
5	2	7-3	Relate Multiplication and Division (Whole Numbers)	5.NBT.B.6
6	2	7-4	Divide by 2-Digits (Area Models)	5.NBT.B.6
7	2	7-4	Divide by 2-Digits (Area Models)	5.NBT.B.6
8	2	7-5	Divide by 1-Digit (Partial Quotients)	5.NBT.B.6
9	2	7-5	Divide by 1-Digit (Partial Quotients)	5.NBT.B.6
10	2	7-6	Divide by 2-Digit (Partial Quotients)	5.NBT.B.6
11	2	7-6	Divide by 2-Digit (Partial Quotients)	5.NBT.B.6
12	3	7-2	Estimate Quotients (Whole Number)	5.NBT.B.6
13	3	7-7	Interpret Remainders in Word Problems	5.NBT.B.6
14	3	7-7	Interpret Remainders in Word Problems	5.NBT.B.6

Assign the digital Unit Assessment (Form A or B) to students or download and print PDFs from the Digital Teacher Center.



Unit 7

Unit Assessment, Form A

Name ______________________

1. Knowing that $36 \div 9 = 4$, which quotient is true? Choose all that apply.
   - A. $360 \div 9 = 4$
   - [✓ B.] $360 \div 90 = 4$
   - C. $3{,}600 \div 90 = 4$
   - [✓ D.] $3{,}600 \div 90 = 40$
   - E. $36{,}000 \div 90 = 40$
   - [✓ F.] $36{,}000 \div 90 = 400$

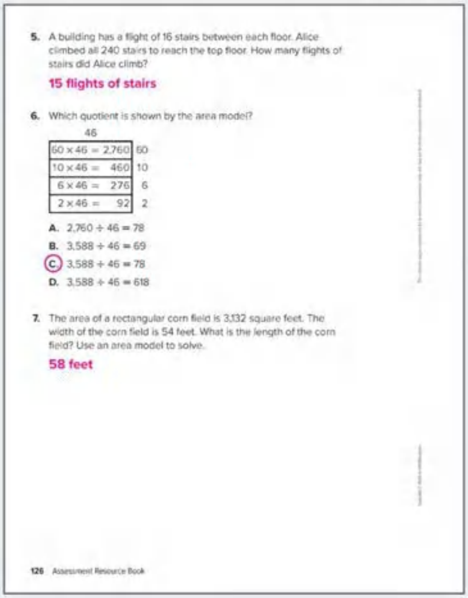
2. A company has 10,000 square feet on which to build 50 identical storage units. What is the area of each storage unit?

   200 square feet

3. For which quotient is 70 a reasonable estimate? Choose all that apply.
   - A. $194 \div 5$
   - B. $1{,}398 \div 69$
   - [✓ C.] $5{,}612 \div 82$
   - [✓ D.] $2{,}777 \div 41$
   - [✓ E.] $4{,}209 \div 58$
   - F. $6{,}254 \div 73$

4. Which equation can be used to help you solve $496 \div 16 = n$?
   - A. $n + 16 = 496$
   - [✓ B.] $n \times 16 = 496$
   - C. $n \times 496 = 16$
   - D. $n \div 16 = 496$

Assessment Resource Book 125



5. A building has a flight of 16 stairs between each floor. Alice climbed all 240 stairs to reach the top floor. How many flights of stairs did Alice climb?

   15 flights of stairs

6. Which quotient is shown by the area model?

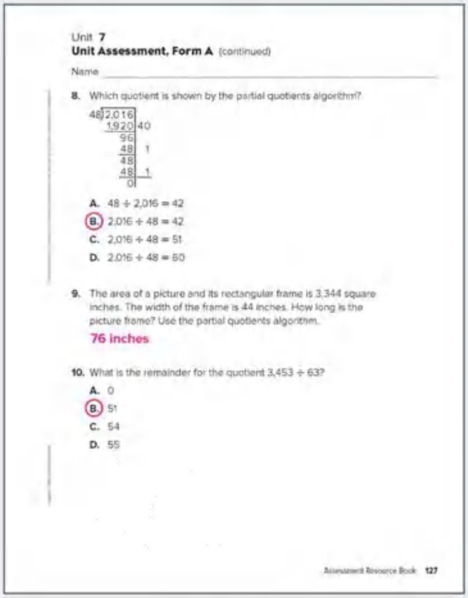
46	
$60 \times 46 = 2{,}760$	60
$10 \times 46 = 460$	10
$6 \times 46 = 276$	6
$2 \times 46 = 92$	2

   - A. $2{,}760 \div 46 = 78$
   - B. $3{,}588 \div 46 = 69$
   - [✓ C.] $3{,}588 \div 46 = 78$
   - D. $3{,}588 \div 46 = 618$

7. The area of a rectangular corn field is 3,132 square feet. The width of the corn field is 54 feet. What is the length of the corn field? Use an area model to solve.

   58 feet

126 Assessment Resource Book



Unit 7

Unit Assessment, Form A (continued)

Name ____________________

8. Which quotient is shown by the partial quotients algorithm?

```
48)2,016
   1,920  40
      96
      48   1
      48
      48   1
       0
```

A. 48 ÷ 2,016 = 42

[✓ **B.**] 2,016 ÷ 48 = 42

C. 2,016 ÷ 48 = 51

D. 2,016 ÷ 48 = 60

9. The area of a picture and its rectangular frame is 3,344 square inches. The width of the frame is 44 inches. How long is the picture frame? Use the partial quotients algorithm.

76 inches

10. What is the remainder for the quotient 3,453 ÷ 63?

A. 0

[✓ **B.**] 51

C. 54

D. 55

Assessment Resource Book 127

11. At the factory, 3,174 markers were made. Each box holds 24 markers. How many boxes were filled with markers? How many markers were left over?

132 boxes were filled and 6 markers left over

12. A football team scored 387 points during the season. They played 11 games. About how many points did the team score each game? Explain how you found your answer.

Sample answer: about 40 points; I used compatible numbers and changed 387 to 400 and 11 to 10, then 400 ÷ 10 = 40.

13. Patricia packages eggs into dozen containers. She is allowed to take home any eggs that are left over. Today, Patricia has 650 eggs to package. Will she be able to take any eggs home? If so, how many? Explain your answer.

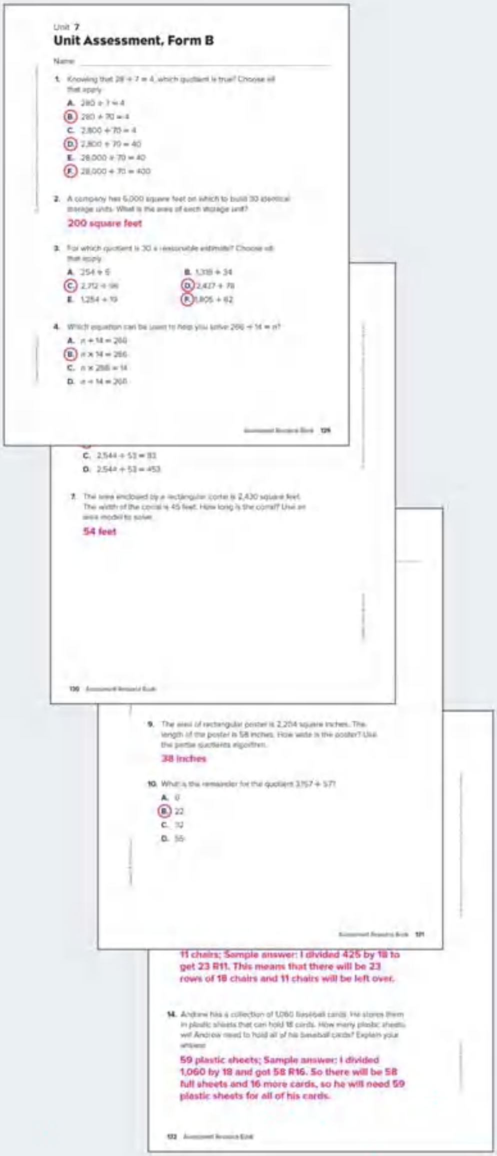
Yes, 2 eggs; Sample answer: I divided 650 by 12 to get 54 R2. This means that she will fill 54 containers and have 2 eggs left over, so she can take those home.

14. Phillip has a collection of 1,550 baseball cards. He stores them in plastic sheets that can hold 18 cards. How many plastic sheets will Phillip need to hold all of his baseball cards? Explain your answer.

87 plastic sheets; Sample answer: I divided 1,550 by 18 and got 86 R2. So there will be 86 full sheets and 2 more cards, so he will need 87 plastic sheets for all of his cards.

128 Assessment Resource Book

Form B



Unit 7

Unit Assessment, Form B

Name ____________________

1. Knowing that 28 ÷ 7 = 4, which quotient is true? Choose all that apply.

A. 280 ÷ 7 = 4

[✓ **B.**] 280 ÷ 70 = 4

C. 2,800 ÷ 70 = 4

[✓ **D.**] 2,800 ÷ 70 = 40

E. 28,000 ÷ 70 = 40

[✓ **F.**] 28,000 ÷ 70 = 400

2. A company has 6,000 square feet on which to build 30 identical storage units. What is the area of each storage unit?

200 square feet

3. For which quotient is 30 a reasonable estimate? Choose all that apply.

A. 254 ÷ 6

B. 1,318 ÷ 34

[✓ **C.**] 2,712 ÷ 96

[✓ **D.**] 2,427 ÷ 78

E. 1,254 ÷ 19

[✓ **F.**] 1,805 ÷ 62

4. Which equation can be used to help you solve 266 ÷ 14 = n?

A. n + 14 = 266

[✓ **B.**] n × 14 = 266

C. n × 266 = 14

D. n ÷ 14 = 266

Assessment Resource Book 129

C. 2,544 ÷ 53 = 83

D. 2,544 ÷ 53 = 453

7. The area enclosed by a rectangular corral is 2,430 square feet. The width of the corral is 45 feet. How long is the corral? Use an area model to solve.

54 feet

130 Assessment Resource Book

9. The area of rectangular poster is 2,204 square inches. The length of the poster is 58 inches. How wide is the poster? Use the partial quotients algorithm.

38 inches

10. What is the remainder for the quotient 3,727 ÷ 57?

A. 0

[✓ **B.**] 22

C. 32

D. 55

Assessment Resource Book 131

11 chairs; Sample answer: I divided 425 by 18 to get 23 R11. This means that there will be 23 rows of 18 chairs and 11 chairs will be left over.

14. Andrew has a collection of 1,060 baseball cards. He stores them in plastic sheets that can hold 18 cards. How many plastic sheets will Andrew need to hold all of his baseball cards? Explain your answer.

59 plastic sheets; Sample answer: I divided 1,060 by 18 and got 58 R16. So there will be 58 full sheets and 16 more cards, so he will need 59 plastic sheets for all of his cards.

132 Assessment Resource Book

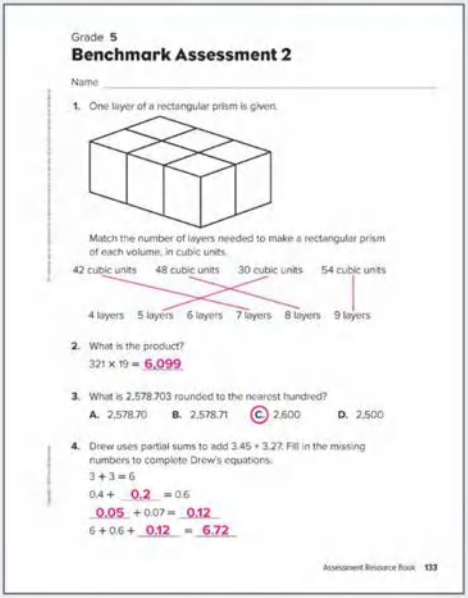
Benchmark Assessment 2

The Benchmark Assessment 2 is available in both print and digital.

Data When students complete the Benchmark Assessment in the Digital Student Center, their responses are auto-scored.

Item Analysis

Item	DOK	Skill	Standard
1	2	Use unit cubes to determine volume	5.MD.C.4
2	2	Multiply multi-digit numbers	5.NBT.B.5
3	2	Round decimals	5.NBT.A.4
4	2	Add decimals	5.NBT.B.7
5	1	Relate multiplication and division	5.NBT.B.6
6	2	Represent multiplication of decimals	5.NBT.B.7
7	2	Divide multi-digit numbers	5.NBT.B.6
8	2	Multiply decimals	5.NBT.B.7
9	1	Multiply decimals by powers of 10	5.NBT.A.2
10	2	Subtract decimals	5.NBT.B.7
11	2	Multiply multi-digit numbers using an algorithm	5.NBT.B.5
12	2	Solve volume word problems	5.MD.C.5
13	2	Represent decimals in different ways	5.NBT.A.3.a
14	1	Understand powers and exponents	5.NBT.A.2
15	3	Understand place value	5.NBT.A.1
16	2	Use strategies to multiply multi-digit numbers	5.NBT.B.5
17	2	Compare decimals	5.NBT.A.3.b
18	2	Determine volume	5.MD.C.5
19	2	Represent subtraction of decimals	5.NBT.B.7
20a	3	Represent division of multi-digit numbers	5.NBT.B.6
20b	2	Divide multi-digit numbers	5.NBT.B.6
21	2	Solve multiplication word problems	5.NBT.B.5



Grade 5

Benchmark Assessment 2

Name

1. One layer of a rectangular prism is given.

Match the number of layers needed to make a rectangular prism of each volume, in cubic units.

42 cubic units 48 cubic units 30 cubic units 54 cubic units

4 layers 5 layers 6 layers 7 layers 8 layers 9 layers

2. What is the product?

321 × 19 = 6,099

3. What is 2,578.703 rounded to the nearest hundred?

A. 2,578.70 B. 2,578.71 [✓ C. 2,600] D. 2,500

4. Drew uses partial sums to add 3.45 + 3.27. Fill in the missing numbers to complete Drew's equations.

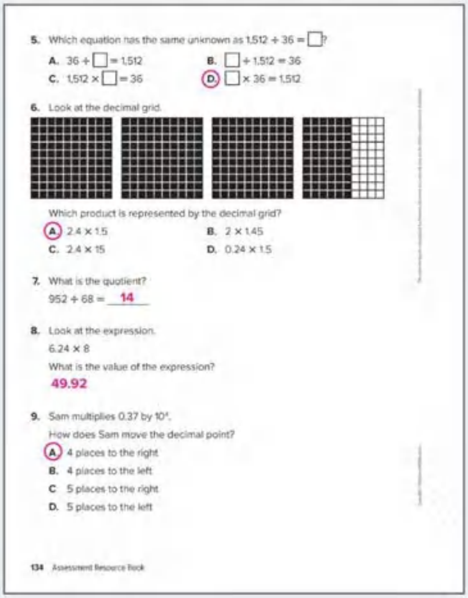
3 + 3 = 6

0.4 + 0.2 = 0.6

0.05 + 0.07 = 0.12

6 + 0.6 + 0.12 = 6.72

Assessment Resource Book 133



5. Which equation has the same unknown as 1,512 ÷ 36 = ☐?

A. 36 ÷ ☐ = 1,512 B. ☐ ÷ 1,512 = 36

C. 1,512 × ☐ = 36 [✓ D. ☐ × 36 = 1,512]

6. Look at the decimal grid.

Which product is represented by the decimal grid?

[✓ A. 2.4 × 1.5] B. 2 × 1.45

C. 2.4 × 15 D. 0.24 × 1.5

7. What is the quotient?

952 ÷ 68 = 14

8. Look at the expression.

6.24 × 8

What is the value of the expression?

49.92

9. Sam multiplies 0.37 by 10^4.

How does Sam move the decimal point?

[✓ A. 4 places to the right]

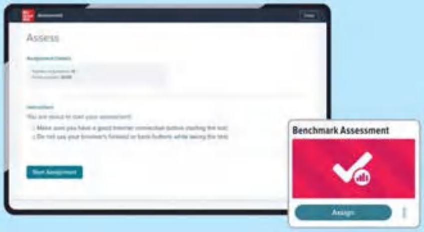
B. 4 places to the left

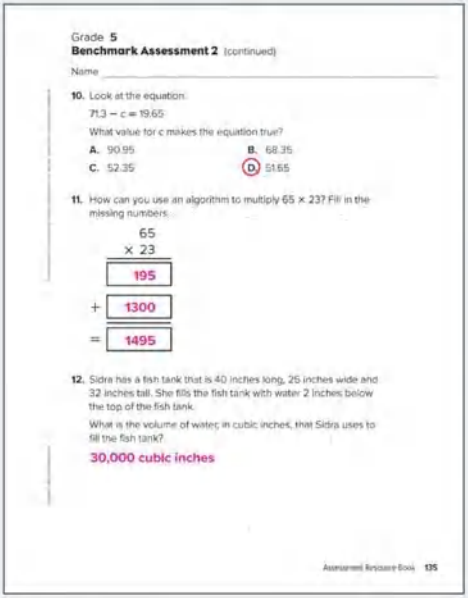
C. 5 places to the right

D. 5 places to the left

134 Assessment Resource Book

Assign the digital Benchmark Assessment to students or download and print PDFs from the Digital Teacher Center.





Grade 5

Benchmark Assessment 2 (continued)

Name ____________________

10. Look at the equation.

71.3 − c = 19.65

What value for c makes the equation true?

A. 90.95
B. 68.35
C. 52.35
[✓ **D.**] 51.65

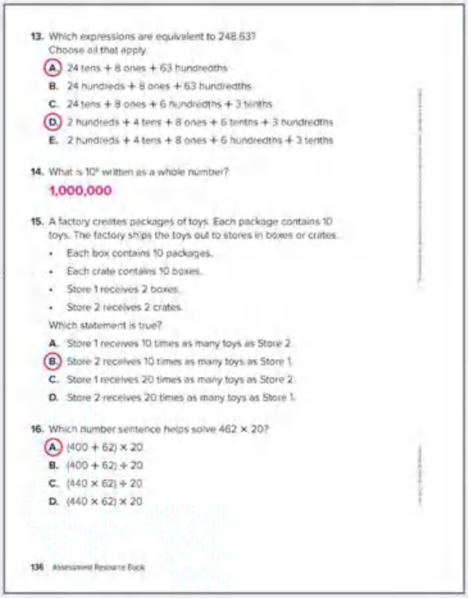
11. How can you use an algorithm to multiply 65 × 23? Fill in the missing numbers.

$$\begin{array}{r} 65 \\ \times\ 23 \\ \hline \boxed{195} \\ +\ \boxed{1300} \\ \hline =\ \boxed{1495} \end{array}$$

12. Sidra has a fish tank that is 40 inches long, 25 inches wide and 32 inches tall. She fills the fish tank with water 2 inches below the top of the fish tank.

What is the volume of water, in cubic inches, that Sidra uses to fill the fish tank?

30,000 cubic inches



13. Which expressions are equivalent to 248.63?
Choose all that apply.

[✓ **A.**] 24 tens + 8 ones + 63 hundredths
B. 24 hundreds + 8 ones + 63 hundredths
C. 24 tens + 8 ones + 6 hundredths + 3 tenths
[✓ **D.**] 2 hundreds + 4 tens + 8 ones + 6 tenths + 3 hundredths
E. 2 hundreds + 4 tens + 8 ones + 6 hundredths + 3 tenths

14. What is 10^6 written as a whole number?

1,000,000

15. A factory creates packages of toys. Each package contains 10 toys. The factory ships the toys out to stores in boxes or crates.

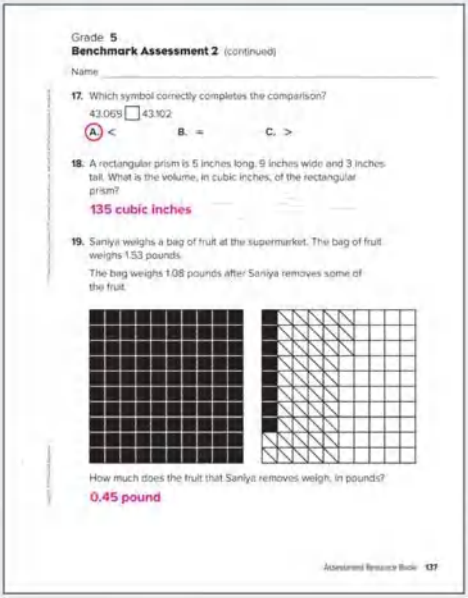
- Each box contains 10 packages.
- Each crate contains 10 boxes.
- Store 1 receives 2 boxes.
- Store 2 receives 2 crates.

Which statement is true?

A. Store 1 receives 10 times as many toys as Store 2.
[✓ **B.**] Store 2 receives 10 times as many toys as Store 1.
C. Store 1 receives 20 times as many toys as Store 2.
D. Store 2 receives 20 times as many toys as Store 1.

16. Which number sentence helps solve 462 × 20?

[✓ **A.**] (400 + 62) × 20
B. (400 + 62) ÷ 20
C. (440 × 62) ÷ 20
D. (440 × 62) × 20



Grade 5

Benchmark Assessment 2 (continued)

Name ____________________

17. Which symbol correctly completes the comparison?

43.069 ☐ 43.102

[✓ **A.**] <
B. =
C. >

18. A rectangular prism is 5 inches long, 9 inches wide and 3 inches tall. What is the volume, in cubic inches, of the rectangular prism?

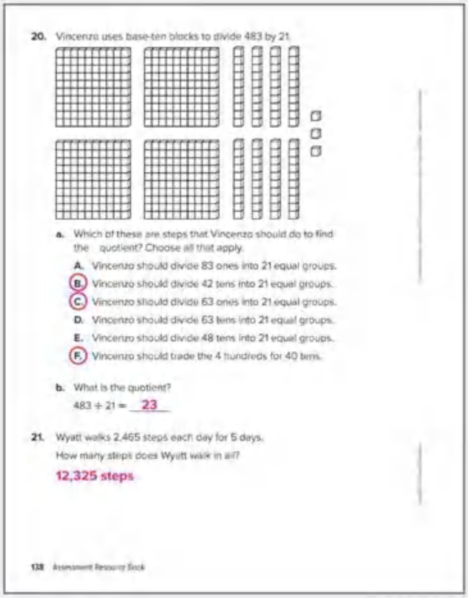
135 cubic inches

19. Saniya weighs a bag of fruit at the supermarket. The bag of fruit weighs 1.53 pounds.

The bag weighs 1.08 pounds after Saniya removes some of the fruit.

How much does the fruit that Saniya removes weigh, in pounds?

0.45 pound



20. Vincenzo uses base-ten blocks to divide 483 by 21.

a. Which of these are steps that Vincenzo should do to find the quotient? Choose all that apply.

A. Vincenzo should divide 83 ones into 21 equal groups.
[✓ **B.**] Vincenzo should divide 42 tens into 21 equal groups.
[✓ **C.**] Vincenzo should divide 63 ones into 21 equal groups.
D. Vincenzo should divide 63 tens into 21 equal groups.
E. Vincenzo should divide 48 tens into 21 equal groups.
[✓ **F.**] Vincenzo should trade the 4 hundreds for 40 tens.

b. What is the quotient?

483 ÷ 21 = 23

21. Wyatt walks 2,465 steps each day for 5 days.

How many steps does Wyatt walk in all?

12,325 steps

Appendix

Appendix

Sense-Making Routines

Notice & Wonder™
Students are presented with an image or situation and are asked to share what they notice and wonder about the image or situation. To increase student participation in this whole-class brainstorming activity, allow students adequate time to write or draw any noticings and wonderings. This will help students control their impulses, and expand their thinking. As you record students' thoughts, thank or acknowledge each student equally. Record all student suggestions, however resist praising, restating, clarifying, or asking questions.

This is primarily a whole-class, discussion-based brainstorming activity, one in which the noticings and wonderings of one student help spark additional noticings and wonderings among other students. Students should not be expected to write down what they notice and wonder; rather, the routine works better when students are more spontaneous and can respond to one another's comments.

As students share, the teacher may want to record students' noticings and wonderings for all to see and to avoid redundancy of ideas. Allow for some non-math-related observations and questions, but eventually pose questions to get students thinking about a math focus. The support in the Teacher Edition offers prompts that can focus students' thinking on a math focus.

These activities are low floor-high ceiling activities and it is important that all students feel comfortable participating and valued for their participation.

Variations of the *Notice & Wonder* routine include:

- Tell me everything you can.
- What question could you ask?
- What could the question be?

How are they the same? How are they different?
In this variation of the routine, students are presented with two or more images or situations and consider how the images or situations are similar and different. The students share similarities and differences, some of which may be mathematical in nature, others non-mathematical.

As with the *Notice & Wonder* routine, this is also primarily a whole-class, discussion-based activity. As students can share both mathematical and non-mathematical similarities and differences, the teacher can record these for reference. If students do not bring up the intended math focus, prompts in the Teacher Edition can get students thinking about the focus.

Which Doesn't Belong?
Students are presented with a series of images, quantities, or numbers – usually four, and think about the question, "Which doesn't belong?" The activity has been designed to have multiple responses depending on which criteria or attribute the student is considering. Students are encouraged to think about as many different ways to identify the one that does not belong.

As students share their responses, they should be encouraged to share their reasoning for which one does not belong.

Guidance in the Teacher Edition can help the teacher direct students' thinking to the specific math focus for the lesson.

Is It Always True?
Students are presented with one or more images or situations and think about the relationship among the objects in the image or situation. Students then consider whether the relationship always holds or whether it/they are unique to the image or situation.

As with the other sense-making routines, this is primarily a whole-class, discussion-based brainstorming activity, one in which students share their thoughts around the generalizability of the relationship and their reasoning for their claims. As with other routines, allow students adequate time for them to reason through their own thinking. Students should be encouraged to write down or draw their thoughts and reasoning. This additional think time allows students to process the information presented. However, some learners may need to make written notes to capture their thoughts and should feel free to do so.

Guidance in the Teacher Edition can help the teacher direct students' thinking to the specific math focus for the lesson that the sense-making routine is targeting.

Numberless Word Problems
Students are presented with a scenario or problem situation that suggests operations, but with no numbers. That is, instead of specifying quantities, the scenario or problem would indicate "some." For example, "Some dogs are in the dog park. Some dogs come into the dog park. Then some dogs leave the dog park." Students are expected to make sense of what is being described in the situation and explain which operations it represents. Without numbers, students are able to develop a better understanding of the underlying structure of the problem itself.

The prompts in the Teacher Edition offer options to extend and expand the discussion about the situation presented.

Number Routines

About How Much?

Purpose Build estimating skills.

Overview Students estimate the value of expressions (with operations) shown, explaining their strategies and thinking. The teacher records students' estimates, then reveals the value of the expression. Students analyze the estimates and discuss which are closest to the actual value of the expression.

Can You Make the Number?

Purpose Build flexible thinking and efficiency with operations.

Overview Students use all the given numbers to build expressions with a value of the given target number. Students can use a range of operations in their expressions. The teacher records students' expressions, then facilitates a discussion about students' expressions.

Decompose It

Purpose Build flexibility with numbers.

Overview Students come up with multiple (at least 3) ways to decompose given numbers and share their thinking for each decomposition. Teacher records decompositions then facilitates a discussion of patterns in the decompositions.

Find the Missing Values

Purpose Build their identification of patterns and their efficiency with solving equations as they examine a list of related equations.

Overview Students analyze a series of equations to look for patterns that they can use to determine the missing values in the equations. As students share their analyses and solutions, the teacher can reveal the missing values.

Find the Pattern, Make a Pattern

Purpose Build efficiency with recognizing and building patterns.

Overview Students determine the rule(s) for a given pattern, then use the rule(s) to continue the pattern or create a new pattern. The teacher records students' new patterns and facilitates a discussion to validate the pattern and its rules.

Greater Than, Less Than

Purpose Build proficiency with number and place value sense; estimating and comparing skills.

Overview Students use mental math to estimate or evaluate the value of given expressions and then compare the value of the expressions to a target benchmark number. Students share their solutions and thinking.

Math Pictures

Purpose Build number sense and mathematical awareness.

Overview Students respond to a prompt about an image.

What's Another Way to Write It?

Purpose Build flexibility with number sense and mental math operations.

Overview Given an expression, students come up with alternative expressions using the same or different operations that, when evaluated, have the same value. The teacher records expressions as students share. Students then look for relationships amongst the shared expressions.

Where Does It Go?

Purpose Build estimating skills using benchmarks.

Overview Students place a target number on number lines with different endpoints and justify their placement. In some instances, as a challenge, the target number may not actually belong on one of the number lines.

Which Benchmark Is It Closest To?

Purpose Enhance rounding and reasoning skills.

Overview Students determine to which benchmark the given number is closest and explain their reasoning.

Would You Rather?

Purpose Build flexibility with number sense and mental math operations; enhance decision-making.

Overview Students choose between two options, both of which require mental computation. Students explain their choice and their rationale for their choice.

Math Language Routines

MLR 1 Stronger and Clearer Each Time

Purpose To provide opportunities for students to revise and refine both their ideas and their verbal and written output (Zwiers, 2014).

Successive Pair Shares Students respond to a prompt either verbally or in writing. Then, students share their responses and their reasoning through successive pair shares, refining and revising their response after each pair share. Student-pairs are expected to provide details and to press their partners to provide details around their thinking. Students revise their responses after each pair share, incorporating as appropriate new ideas or language.

Convince Yourself, a Friend, a Skeptic Students think about an argument for three different audiences. They first justify the argument in a way that makes sense to them, then they explain what they know and think and how they know their argument is true to a classmate. For their third audience, students explain why they know their argument is true to a different classmate. Students' arguments may include words, pictures, numbers, and examples. Students should be prepared to offer counter-arguments.

MLR 2 Collect and Display

Purpose To help students build vocabulary and language when engaging in mathematical discourse.

Gather and Show Student Discourse (Dieckmann, 2017) While students are working in pairs or small groups, the teacher circulates and listens to student talk, capturing common or important words and phrases. The teacher organizes words and phrases captured in a visual display that the teacher and students can reference throughout the unit of study. The teacher can update and add to the visual display to show refinement in language students are using to discuss key concepts.

Number Talks (Humphreys & Parker, 2015) Number Talks have four parts: (1) Students are presented with a numeracy problem that they consider without written solution for a few minutes; (2) Students share their strategy for solving and their thinking about their strategy; (3) As students share their strategies and thinking, the teacher creates a visual display of students' strategies and thinking, noting common or important words or phrases shared; (4) The teacher facilitates a discussion analyzing the strategies and thinking, their benefits and drawbacks in different types of situations.

MLR 3 Critique, Correct, and Clarify

Purpose To have students analyze and reflect on a written or verbal mathematical argument.

Critique a Partial or Flawed Response The teacher presents a partial or flawed argument, explanation, or solution and has students come up ways to complete or fix the argument. Students can work individually or in pairs to propose improvements and/or additions to the argument. Students share their responses with a partner and based on feedback from their partner, they refine and revise their responses.

Always, Sometimes, Never The teacher presents a mathematical statement that students analyze to decide whether it is always, sometimes, or never true. If possible, the teacher presents the statement in a graphic organizer that can then be used to assess students' reasoning.

MLR 4 Information Gap

Purpose To create a need for students to communicate (Gibbons, 2002).

Info Gap Cards Each student-pair has two cards, Student A has Card A with the problem statement and Student B has Card B with data or information needed to solve the problem. Student A asks Student B for specific information that is needed to solve the problem. Before providing the information, Student B asks Student A to justify the need for information before providing the information requested (if available). Student A then explains how he or she will use the information to solve the problem.

Info Gap Games Student-pairs play a guessing or matching game. Student A shares the information and Student B uses his or her understanding of math concepts to guess what Student A is describing. For example, Student A may identify objects in the classroom that share a shape and Student B guesses the shape.

MLR 5 Co-Craft Questions and Problems

Purpose To allow students to use conversation skills and mathematical language to generate questions, problems, and situations.

Co-Craft Questions The teacher presents a scenario or part of a problem context and students come up with math-related questions that could be asked about the situation. Student-pairs share their questions, comparing and contrasting the questions each asked. The teacher can then facilitate a share-out of questions from the class, after which the actual question students will look to answer is revealed.

Co-Craft Problems Student-pairs work together to co-create problems. Student-pairs then solve their problems, and trade problems with another student-pair. Student-pairs solve the problems of others, checking their solution against that of the co-creators.

Co-Craft Situations The teacher presents a mathematical representation with no labels. Students work individually to write a story or scenario that matches the representation. Students then work with a partner to share their scenarios or situations, each explaining how their situations reflect the mathematical representation. Based on feedback from their partners, students revise their situations, adding details as appropriate.

MLR 6 Three Reads

Purpose To ensure that students make sense of problem situations and equip them with tools used to negotiate meaning (Kelemanik, Lucenta & Creighton, 2016).

Three Reads Students read a problem situation or scenario three times, each time with a different focus (1) Students read for comprehension, to understand the problem situation; (2) Students focus on the language used to present the mathematics with the goal of understanding what mathematics is most appropriate to use; (3) students think about which strategy or solution method would be appropriate.

Values/Units Chart (1) Students read through text and underline any words or phrases that represent a known or unknown value or amount. (2) They list these numbers, unknowns, and variables in the left column of their graphic organizer (Values). (3) After reading a second time, students write the meaning of the values in the right column of the graphic organizer (Units). (4) After the third read, students work in pairs to create mathematical expressions using only the right column.

MLR 7 Compare and Connect

Purpose To foster students' meta-awareness as they identify, compare, and contrast different mathematical approaches, representations, concepts, examples, and language.

Compare and Contrast Solution Strategies Students are given a problem to solve on their own. Students are then paired up and share their solution strategies with their partners, relating and connecting their partner's approach to their own approach. Some options include:

1. **Divide and conquer** Set students in pairs before they solve the problem. Each pair decides on two different ways to solve the problem; one partner does one way and the other partner does the other way.
2. **What is similar, what is different** After student-pairs share solution strategies, they identify what is similar and what is different about the approaches. Students can also discuss what worked with each approach.
3. **Mathematical focus** Student-pairs focus on specific mathematical relationships, operations, quantities and values.

Which One Doesn't Belong? Students are provided with sets of four numbers, equations, expressions, graphs, or geometric figures. Working in pairs, students decide together how to group the sets so that three of the items fit within a category they have created and one does not. Both partners should be prepared to explain to a different group how they agreed on a category and justify which item did not fit.

MLR 8 Discussion Supports

Purpose To facilitate rich discussions about mathematical ideas, representations, contexts, and strategies (Chapin, O'Connor, & Anderson, 2009).

Whole Class Discussion Supports During whole class discussion, the teacher can use these strategies to support mathematical discourse:

- **Restating** The teacher restates students' ideas as questions to clarify meaning and model appropriate mathematical language
- **Press for Details** The teacher asks students to elaborate on an idea, expand an argument, or give an example.
- **Think Alouds** The teacher talks through their thinking about a mathematical concept.
- **Use multiple modalities** The teacher uses different modalities to show concepts.
- **Choral responses** The teacher has students practice common or important words or phrases through choral repetition.

Numbered Heads Together (1) The teacher has students count off by 4s (or the number of students he or she wants to have in a group. (2) The teacher then presents a question or problem and has students work in their groups according to their number to come up with an explanation or justification. (3) Each group reporter shares the group explanation and/or agree or disagree with the previous group reporter. Other members of the group are not allowed to talk or write, but the reporter can use the notes from the group discussion. The correct answer, if there is one, is revealed once all groups have presented.

Key Concepts and Learning Objectives

KEY CONCEPT Habits of Mind and Classroom Norms for Productive Math Learning

- Students make sense of problems and quantities and represent them different ways. (Unit 1)
- Students represent a real-world situation using mathematics. (Unit 1)
- Students construct an argument to explain their thinking with clear and appropriate terms. (Unit 1)
- Students use patterns to develop efficient strategies to solve problems. (Unit 1)
- Students tell their math biography and recognize the behaviors and attitudes that support a productive learning environment. (Unit 1)

KEY CONCEPT Operations with Fractions

- Students add, subtract, and multiply fractions, including mixed numbers, with unlike denominators. (Units 9, 10)
- Students find the area of a rectangle with fractional side lengths. (Unit 10)
- Students describe multiplication as scaling. (Unit 10)
- Students divide unit fractions by whole numbers and whole numbers by unit fractions. (Unit 11)

KEY CONCEPT Operations with Whole Numbers and Decimals

- Students describe the relationship between place value positions. (Unit 3)
- Students use an algorithm to multiply whole numbers. (Unit 5)
- Students divide multi-digit dividends by 2-digit divisors. (Unit 7)
- Students add, subtract, multiply, or divide decimals. (Units 4, 6, 8)
- Students solve word problems involving operations with whole numbers or decimals. (Units 4, 5, 6, 7, 8)

KEY CONCEPT Measurement and Data

- Students describe volume is an attribute of solid figures. (Unit 2)
- Students measure volume by counting unit cubes. (Unit 2)
- Students calculate the volume of rectangular prisms using formulas. (Unit 2)
- Students find the volume of composite solid figures. (Unit 2)
- Students convert measurement units within a given measurement system. (Unit 12)
- Students interpret data on a line plot. (Unit 12)

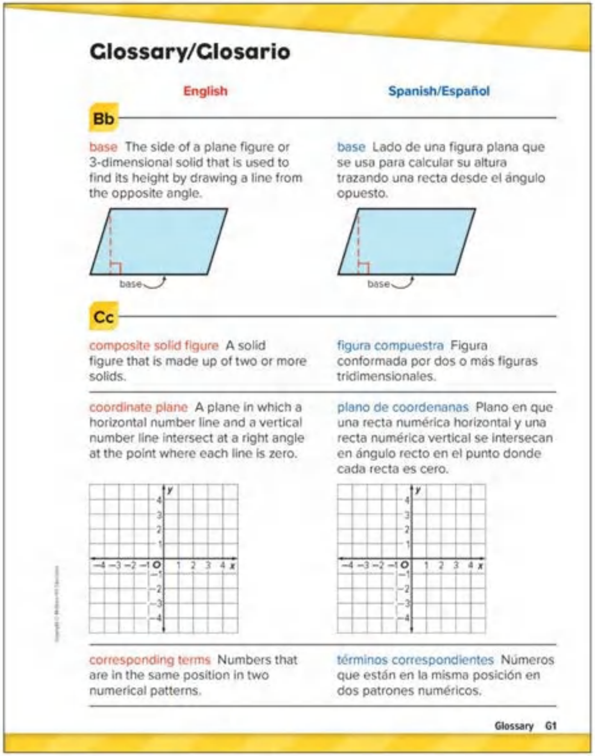
KEY CONCEPT Geometry

- Students identify and describe features of a coordinate plane. (Unit 13)
- Students graph points on the coordinate plane to solve problems. (Unit 13)
- Students classify 2-dimensional figures into categories based on their properties. (Unit 13)

KEY CONCEPT Algebraic Thinking

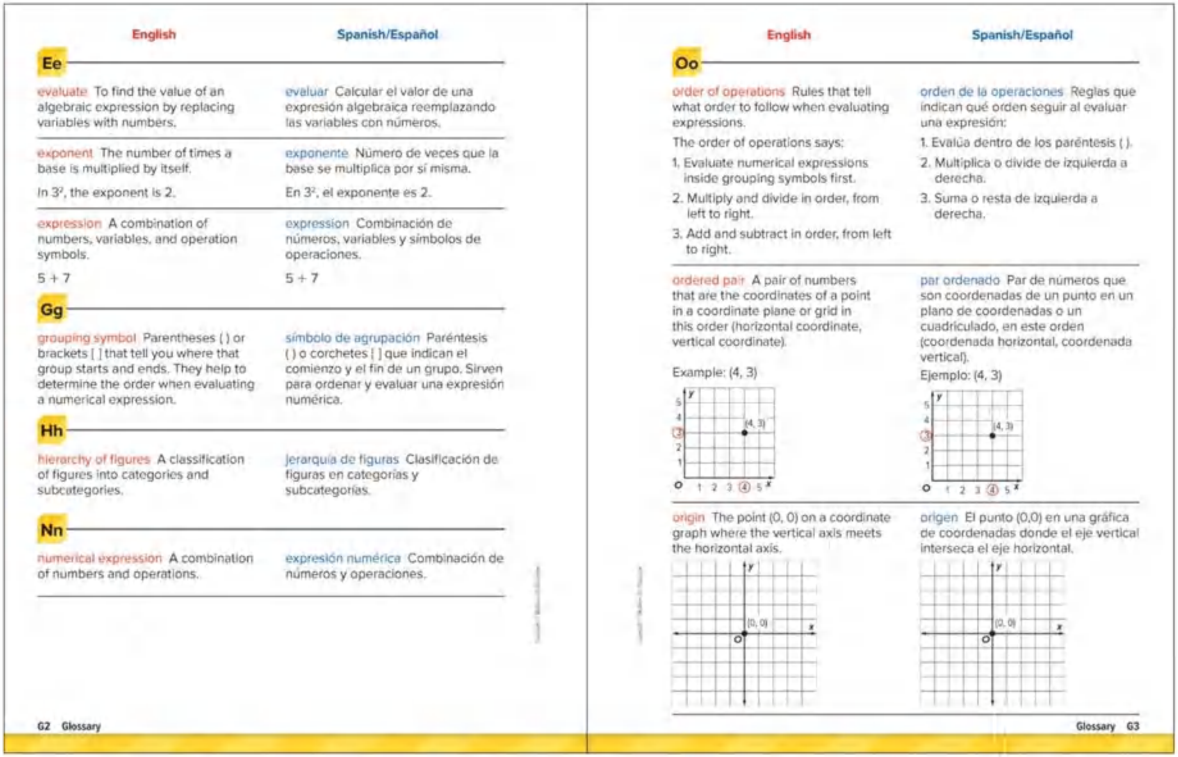
- Students write numerical expressions to represent calculations that are described using written statements. (Unit 14)
- Students interpret numerical expressions without evaluating them. (Unit 14)
- Students use the order of operations to evaluate numerical expressions. (Unit 14)
- Students generate two numerical patterns using two given rules. (Unit 14)
- Students identify apparent relationships between corresponding terms in the generated number patterns. (Unit 14)

Glossary/Glosario



Glossary/Glosario

English	Spanish/Español
Bb	
base The side of a plane figure or 3-dimensional solid that is used to find its height by drawing a line from the opposite angle.	**base** Lado de una figura plana que se usa para calcular su altura trazando una recta desde el ángulo opuesto.
Cc	
composite solid figure A solid figure that is made up of two or more solids.	**figura compuestra** Figura conformada por dos o más figuras tridimensionales.
coordinate plane A plane in which a horizontal number line and a vertical number line intersect at a right angle at the point where each line is zero.	**plano de coordenanas** Plano en que una recta numérica horizontal y una recta numérica vertical se intersecan en ángulo recto en el punto donde cada recta es cero.
corresponding terms Numbers that are in the same position in two numerical patterns.	**términos correspondientes** Números que están en la misma posición en dos patrones numéricos.

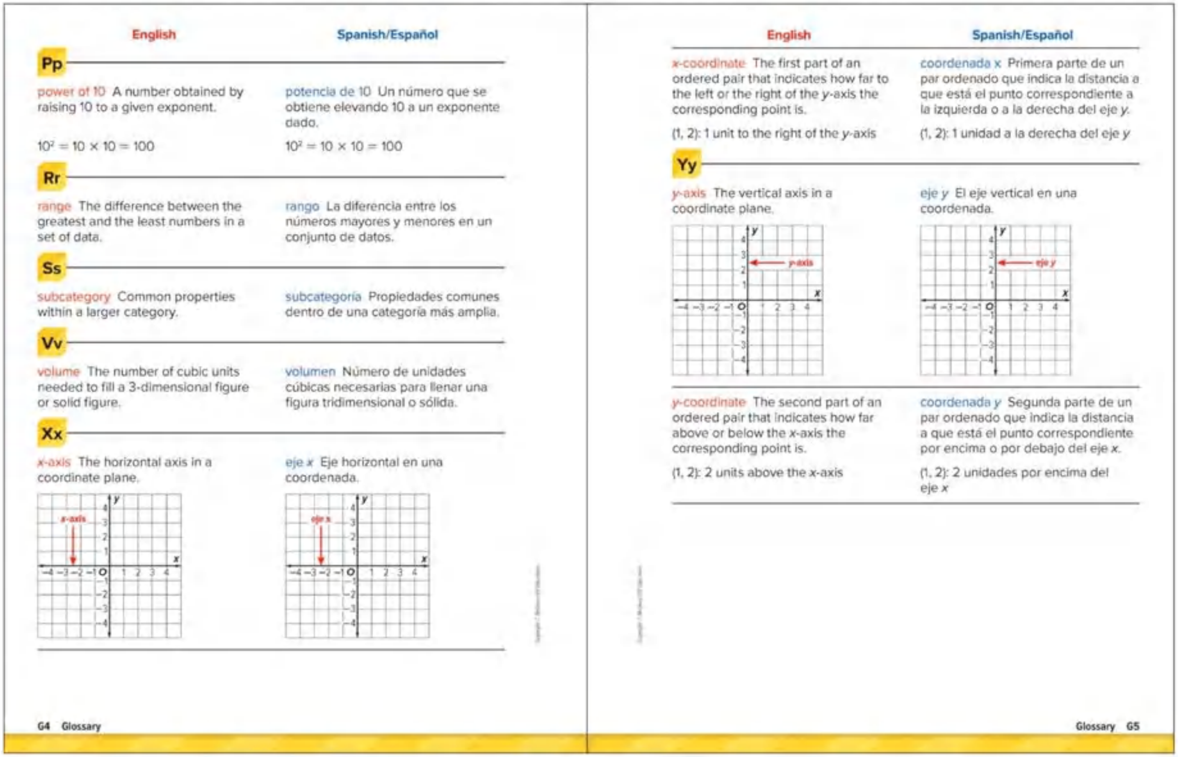


English	Spanish/Español
Ee	
evaluate To find the value of an algebraic expression by replacing variables with numbers.	evaluar Calcular el valor de una expresión algebraica reemplazando las variables con números.
exponent The number of times a base is multiplied by itself. In 3^2, the exponent is 2.	exponente Número de veces que la base se multiplica por sí misma. En 3^2, el exponente es 2.
expression A combination of numbers, variables, and operation symbols. 5 + 7	expression Combinación de números, variables y símbolos de operaciones. 5 + 7
Gg	
grouping symbol Parentheses ( ) or brackets [ ] that tell you where that group starts and ends. They help to determine the order when evaluating a numerical expression.	símbolo de agrupación Paréntesis ( ) o corchetes [ ] que indican el comienzo y el fin de un grupo. Sirven para ordenar y evaluar una expresión numérica.
Hh	
hierarchy of figures A classification of figures into categories and subcategories.	jerarquía de figuras Clasificación de figuras en categorías y subcategorías.
Nn	
numerical expression A combination of numbers and operations.	expresión numérica Combinación de números y operaciones.

G2 Glossary

English	Spanish/Español
Oo	
order of operations Rules that tell what order to follow when evaluating expressions. The order of operations says: 1. Evaluate numerical expressions inside grouping symbols first. 2. Multiply and divide in order, from left to right. 3. Add and subtract in order, from left to right.	orden de la operaciones Reglas que indican qué orden seguir al evaluar una expresión: 1. Evalúa dentro de los paréntesis ( ). 2. Multiplica o divide de izquierda a derecha. 3. Suma o resta de izquierda a derecha.
ordered pair A pair of numbers that are the coordinates of a point in a coordinate plane or grid in this order (horizontal coordinate, vertical coordinate). Example: (4, 3)	par ordenado Par de números que son coordenadas de un punto en un plano de coordenadas o un cuadriculado, en este orden (coordenada horizontal, coordenada vertical). Ejemplo: (4, 3)
origin The point (0, 0) on a coordinate graph where the vertical axis meets the horizontal axis.	origen El punto (0,0) en una gráfica de coordenadas donde el eje vertical interseca el eje horizontal.

Glossary G3



English	Spanish/Español

Pp

power of 10 A number obtained by raising 10 to a given exponent.	potencia de 10 Un número que se obtiene elevando 10 a un exponente dado.
$10^2 = 10 \times 10 = 100$	$10^2 = 10 \times 10 = 100$

Rr

range The difference between the greatest and the least numbers in a set of data.	rango La diferencia entre los números mayores y menores en un conjunto de datos.

Ss

subcategory Common properties within a larger category.	subcategoría Propiedades comunes dentro de una categoría más amplia.

Vv

volume The number of cubic units needed to fill a 3-dimensional figure or solid figure.	volumen Número de unidades cúbicas necesarias para llenar una figura tridimensional o sólida.

Xx

x-axis The horizontal axis in a coordinate plane.	eje x Eje horizontal en una coordenada.

English	Spanish/Español
x-coordinate The first part of an ordered pair that indicates how far to the left or the right of the y-axis the corresponding point is.	coordenada x Primera parte de un par ordenado que indica la distancia a que está el punto correspondiente a la izquierda o a la derecha del eje y.
(1, 2): 1 unit to the right of the y-axis	(1, 2): 1 unidad a la derecha del eje y

Yy

y-axis The vertical axis in a coordinate plane.	eje y El eje vertical en una coordenada.

y-coordinate The second part of an ordered pair that indicates how far above or below the x-axis the corresponding point is.	coordenada y Segunda parte de un par ordenado que indica la distancia a que está el punto correspondiente por encima o por debajo del eje x.
(1, 2): 2 units above the x-axis	(1, 2): 2 unidades por encima del eje x

Reveal MATH

Be Curious

What do you notice?

What do you wonder?

mheducation.com/prek-12

MHID 0-07-683919-2
978-0-07-683919-3

McGraw Hill