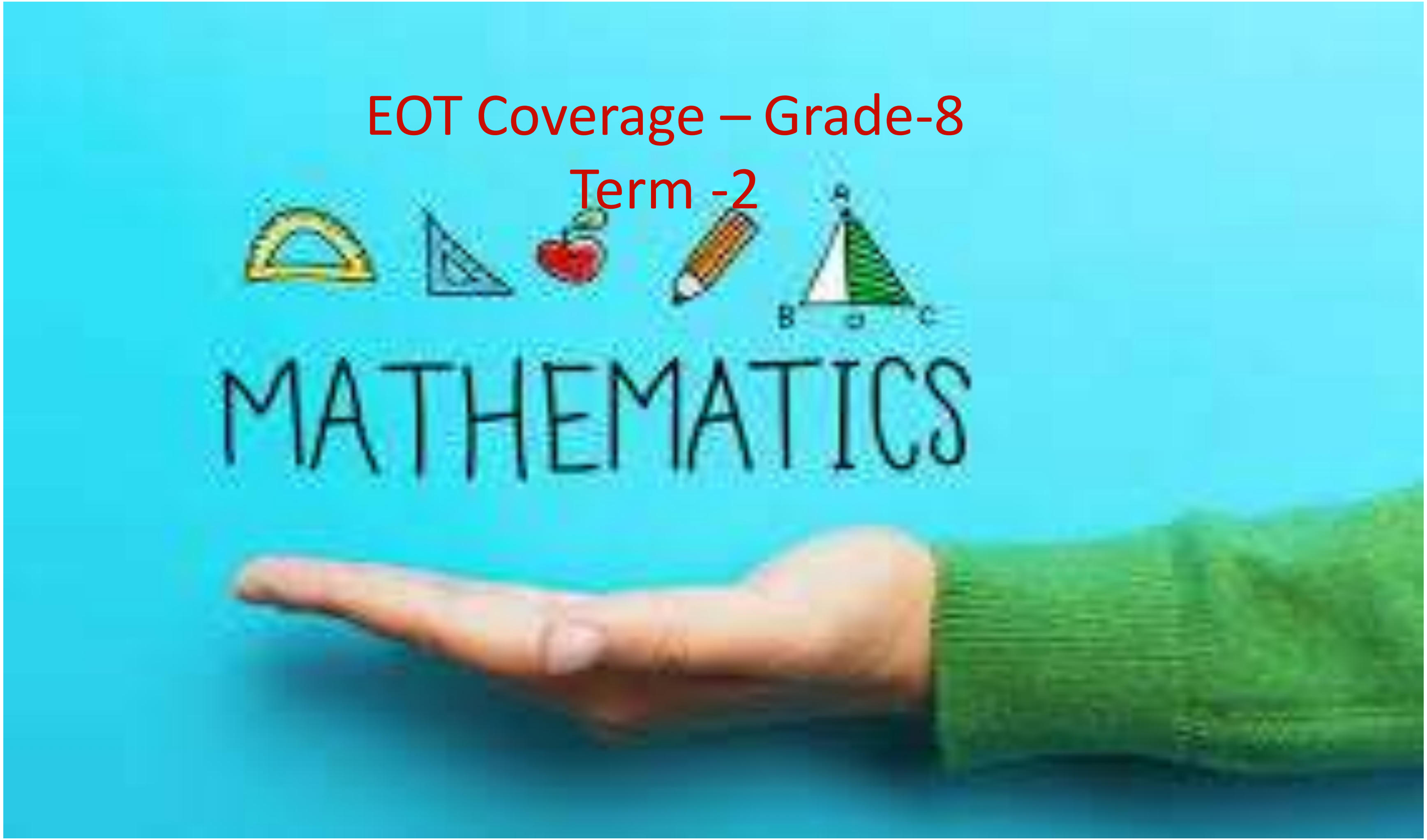
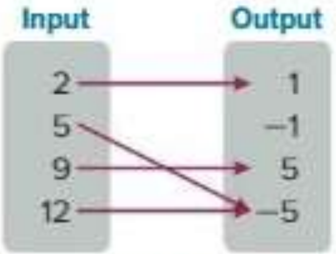
EOT Coverage – Grade-8
Term -2



1	Determine whether or not a relation is a function by identifying the number of outputs assigned to each input	1 to 5	261

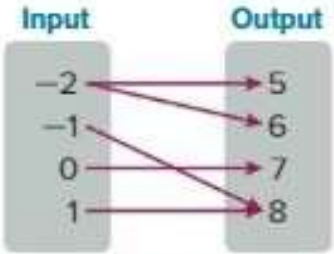
Determine whether each relation is a function. Explain. (Examples 1-3)

1.



The relation is a function because every input value is mapped to exactly one output value.

2.



The relation is not a function because the input value −2 is mapped to more than one output value.

3.

Input, x	Output, y
−10	4
−5	4
0	4
5	4

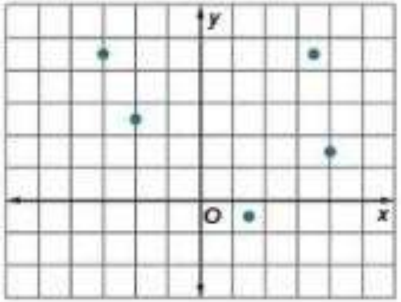
The relation is a function because every input value corresponds to exactly one output value.

4.

Input, x	Output, y
1	2
1	3
1	4
1	5

The relation is not a function because the input value 1 corresponds to more than one output value.

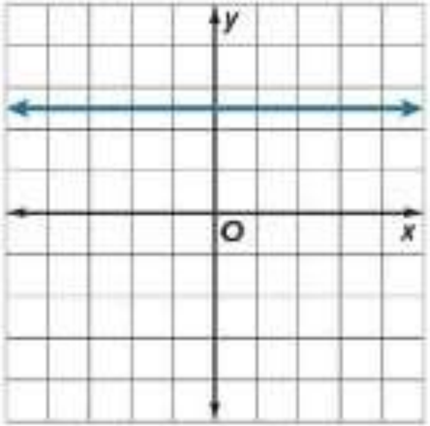
5.



The relation is a function because every input value corresponds to exactly one output value.

1	Determine whether or not a relation is a function by identifying the number of outputs assigned to each input	1 to 5	261

6. **Multiple Choice** Select the statement that correctly explains whether or not the relation shown in the graph is a function. (Example 4)



(A) The relation is a function because each input has exactly one output.

(B) The relation is a function because each output has exactly one input.

(C) The relation is not a function because at least one input has more than one output.

(D) The relation is not a function because at least one output has more than one input.

2	Write linear functions from graphs, tables, and verbal descriptions by finding the rate of change and initial value	1 to 4	283

1. A cleaning service charges an initial fee plus an hourly rate. The total cost for different numbers of hours, including the initial fee, is shown on the graph. Find and interpret the rate of change and initial value. Then write the equation of the function in the form $y = mx + b$. (Example 1)

The rate of change is 8, so the hourly rate is $8. The value for y when $x = 0$ is 20, so the initial fee is $20; $y = 8x + 20$

SOLUTION:

Find and interpret the rate of change.
Choose any two points from the graph.

$$\frac{\text{change in points}}{\text{change in pairs}} = \frac{36-28}{2-1}$$ Use the points (1, 28) and (2, 36).

$$= \frac{8}{1}$$ Simplify.

The rate of change is 8, so the hourly rate is $8.

Find and interpret the initial value
The value for y when $x = 0$ is 20, so the initial fee is $20.

Write the equation in the form $y = mx + b$.
$y = 8x + 20$ The rate of change m, is 8 and the initial value b, is 20.

2	Write linear functions from graphs, tables, and verbal descriptions by finding the rate of change and initial value	1 to 4	283

2. The table shows the distance Penelope is from the park as she walks to soccer practice. Assume the relationship between the two quantities is linear. Find and interpret the rate of change and initial value. Then write the equation of the function in the form $y = mx + b$. (Example 2)

Time (min), x	Distance (m), y
5	1,930
10	1,380
15	830
20	280

The rate of change is −110, so Penelope is 110 meters closer to the park every minute. The initial value is 2,480, so Penelope was initially 2,480 meters from the park; $y = -110x + 2,480$

SOLUTION:

Find and interpret the rate of change.
Use any two points to determine the rate of change.

$$\frac{\text{change in points}}{\text{change in pairs}} = \frac{1,380 - 1,930}{10 - 5}$$

Use the points (5, 1,930) and (10, 1,380).

$$= \frac{-550}{5} \text{ or } -110$$

Simplify.

The rate of change is −110, so Penelope is 110 meters closer to the park every minute.

Find and interpret the initial value.
Because the value for y when $x = 0$ is not listed in the table, use the slope-intercept form of a linear equation to find the y-intercept.

$y = mx + b$ Slope-intercept form

$y = -110x + b$ Replace m with the rate of change, −110.

$1,930 = -110(5) + b$ Use the point (5, 1,930). $x = 5$, $y = 1,930$

$1,930 = -550 + b$ Simplify.

$2,480 = b$ Add 550 to each side.

The initial value is 2,480, so Penelope was initially 2,480 meters from the park.

Write the equation in the form $y = mx + b$.

$y = -110x + 2,480$ The rate of change m, is –110 and the initial value b, is 2,480.

2	Write linear functions from graphs, tables, and verbal descriptions by finding the rate of change and initial value	1 to 4	283

3. A roller skating rink charges a skate rental fee and an hourly rate to skate. The total cost to skate for 2 hours is \$9.50 and for 5 hours is \$18.50. Assume the relationship is linear. Find and interpret the rate of change and initial value. Then write the equation of the function in the form $y = mx + b$, where x represents the number of hours and y represents the total cost. (Example 3)

The rate of change is 3, so the hourly cost is \$3. The initial value is 3.5, so the skate rental fee is \$3.50; $y = 3x + 3.50$

SOLUTION:

Find and interpret the rate of change.
Use the data values given.

$$\frac{\text{change in cost}}{\text{change in hours}} = \frac{18.50 - 9.50}{5 - 2}$$ Use the values (2, 9.50) and (5, 18.50).

$$= \frac{9}{3} \text{ or } 3$$ Simplify.

The rate of change is 3, so the hourly cost is \$3.

Find and interpret the initial value.
Because the value for y when $x = 0$ is not given, use the slope-intercept form of a linear equation to find the y-intercept.

$y = mx + b$ Slope-intercept form
$y = 3x + b$ Replace m with the rate of change, 3.
$9.50 = 3(2) + b$ Use the point (2, 9.50). $x = 2$, $y = 9.50$
$9.50 = 6 + b$ Simplify.
$3.50 = b$ Subtract 6 from each side.

The initial value is 3.5, so the skate rental fee is \$3.50.

Write the equation in the form $y = mx + b$.
$y = 3x + 3.50$ The rate of change m, is 3 and the initial value b, is 3.50

2	Write linear functions from graphs, tables, and verbal descriptions by finding the rate of change and initial value	1 to 4	283

4. Open Response A movie theater offers a reward program that charges a yearly membership fee and a discounted rate per movie ticket. The total cost for a reward program member to see 5 movies is \$40 and the total cost for 12 movies is \$75. Assume the relationship is linear. Write the equation of the function in the form $y = mx + b$, where x represents the number of movies and y represents the total cost.

$y = 5x + 15$

SOLUTION:

Find and interpret the rate of change.
Use the data values given.

$$\frac{\text{change in cost}}{\text{change in movies}} = \frac{75-40}{12-5}$$

Use the data values (5, 40) and (12, 75).

$$= \frac{35}{7} \text{ or } 5$$

Simplify.

The rate of change is 5, so the cost per movie is \$5.

Find and interpret the initial value.
Because the value for y when $x = 0$ is not given, use the slope-intercept form of a linear equation to find the y-intercept.

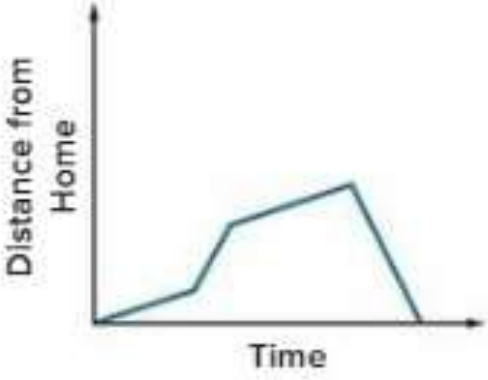
$y = mx + b$ — Slope-intercept form
$y = 5x + b$ — Replace m with the rate of change, 5.
$40 = 5(5) + b$ — Use the point (5, 40). $x = 5$, $y = 40$
$40 = 25 + b$ — Simplify.
$15 = b$ — Subtract 25 from each side.

The initial value is 15, so the membership fee is \$15.

Write the equation in the form $y = mx + b$.
$y = 5x + 15$ — The rate of change m, is 5 and the initial value b, is 15.

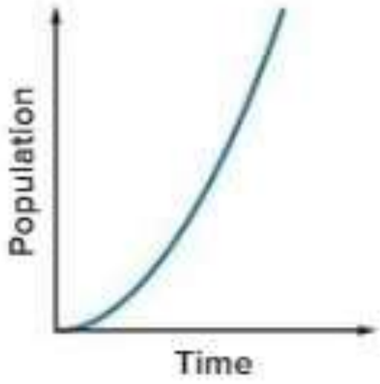
3	Recognize a qualitative graph and interpret the scenario it represents as well as create a qualitative graph.	1 to 7	311, 312

1. The graph displays the distance Wesley was from home as he ran in preparation for his cross-country meet. Describe the change in distance over time. (Example 1)



Sample answer: Wesley ran in a direction away from home, and then sped up as he continued away. He then slowed down while still continuing away from home. Finally, he headed back in the direction of home at a steady pace until he reached home.

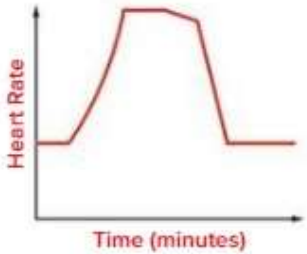
2. The graph displays the population of bacteria in a petri dish. Describe the change in population over time. (Example 1)



Sample answer: The population is increasing at a faster and faster pace over time.

3	Recognize a qualitative graph and interpret the scenario it represents as well as create a qualitative graph.	1 to 7	311, 312

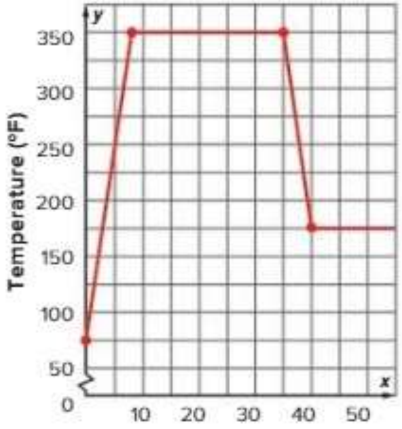
3. Ryan's heart rate was steady before exercising. While exercising, his heart rate increased rapidly and then steadied. During cool down, his heart rate decreased slowly then lowered quickly until becoming steady again. Sketch a qualitative graph to represent the situation. Determine if the graph is linear or nonlinear and where the graph is increasing or decreasing.
(Example 2)



Sample answer: The graph is nonlinear. The graph is increasing when his heart rate is increasing. The graph is decreasing when his heart rate is decreasing.

Slide5-6

4. An oven is being preheated. The temperature starts at 75°F and increases at a constant rate for 8 minutes until it reaches the desired temperature, 350°F. It remains the same temperature for 27 minutes. Then the temperature decreases at a constant rate for 5 minutes until it reaches 175°, where it remains steady to keep the food warm. Sketch a graph to represent the situation.
(Example 3)



3	Recognize a qualitative graph and interpret the scenario it represents as well as create a qualitative graph.	1 to 7	311, 312

Test Practice

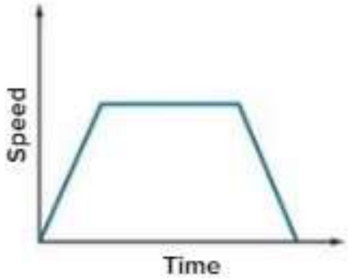
5. Open Response A well is being dug on a piece of land. The graph displays the depth of the well over time. Describe the change in the depth of the well over time.

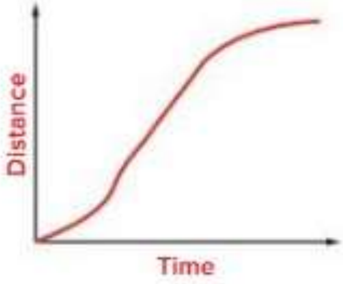
Sample answer: The team digs at a constant rate, takes a break for lunch, and then continues digging at a slower constant rate.

5-6

Higher-Order Thinking Problems

6. Persevere with Problems The graph shows the speed of a train as time increases. Draw a graph and describe how the distance of the train changes as time increases.

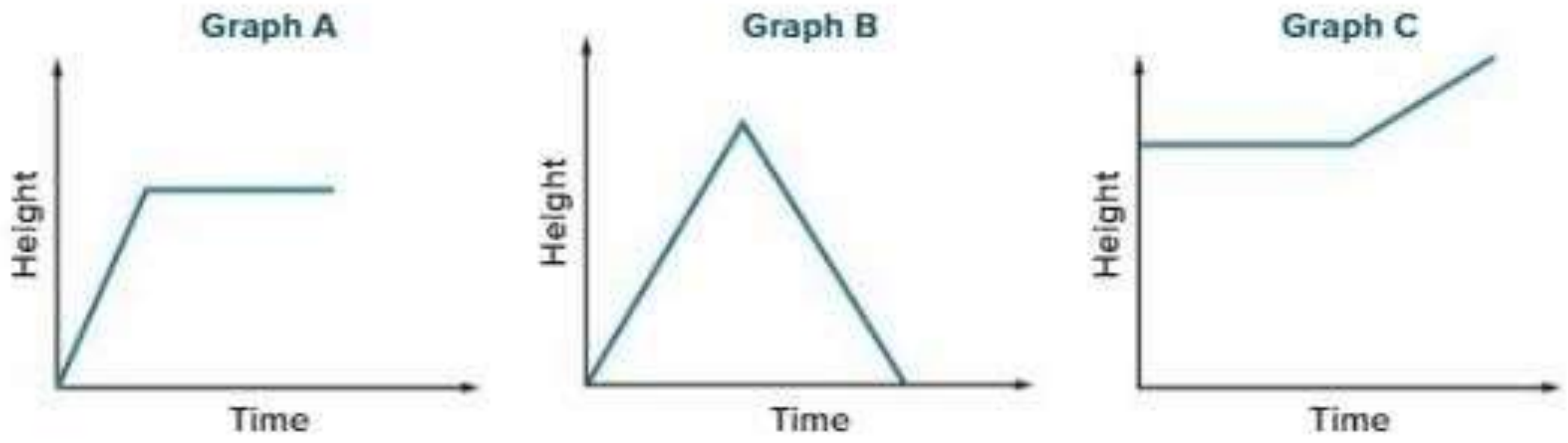




Sample answer: As time increases, the distance increases at a varied rate and then levels off when the train stops.

3	Recognize a qualitative graph and interpret the scenario it represents as well as create a qualitative graph.	1 to 7	311, 312

7. A plant grows steadily until it reaches its full height, at which time it stops growing. Which graph displays this relationship? Explain your reasoning.

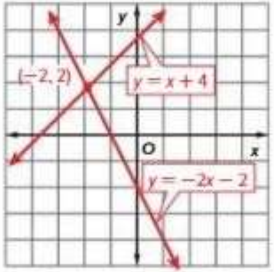


Graph A; Sample answer: The graph of this relationship should increase at a constant rate, and then remain level. Only Graph A does this.

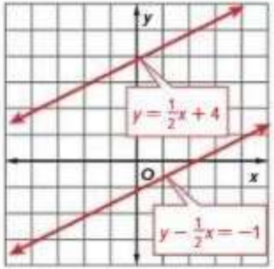
4	Write equations in slope-intercept form in order to graph them and use the graphs to solve a system of equations	1 to 5	329

Solve each system of equations by graphing. Check the solution. (Examples 1–4)

1. $y = x + 4$
$y = -2x - 2$ **(−2, 2)**



2. $y - \frac{1}{2}x = -1$
$y = \frac{1}{2}x + 4$ **no solution**



PDF 6-1

The point where the graphs of the lines appear to intersect is (−2, 2). So, the solution is (−2, 2).

Check your solution. Replace x with −2 and y with 2 in each equation.

$y = x + 4$	$y = -2x - 2$
$2 \stackrel{?}{=} -2 + 4$	$2 \stackrel{?}{=} -2(-2) - 2$
$2 = 2$	$2 = 2$

ANSWER:

(−2, 2);

SOLUTION:

Before graphing, write $y - \frac{1}{2}x = -1$ in slope-intercept form.

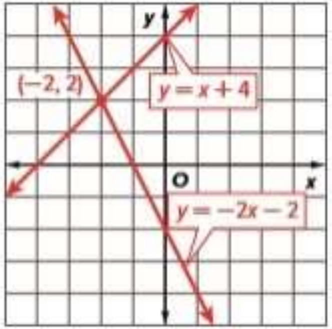
$y - \frac{1}{2}x = -1$	Write the equation.
$+\frac{1}{2}x \quad +\frac{1}{2}x$	Add $\frac{1}{2}x$ to each side.
$y = \frac{1}{2}x - 1$	Simplify.

Graph each equation on the same coordinate plane.

4	Write equations in slope-intercept form in order to graph them and use the graphs to solve a system of equations	1 to 5	329

SOLUTION:

Graph each equation on the same coordinate plane.



Q.1

The point where the graphs of the lines appear to intersect is (−2, 2). So, the solution is (−2, 2).

Check your solution. Replace x with −2 and y with 2 in each equation.

$y = x + 4$	$y = -2x - 2$
$2 \stackrel{?}{=} -2 + 4$	$2 \stackrel{?}{=} -2(-2) - 2$
$2 = 2$	$2 = 2$

ANSWER:

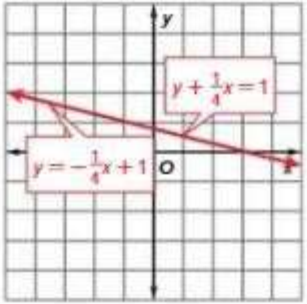
(−2, 2);

Refer to Slides 6-1 for the full solution

4	Write equations in slope-intercept form in order to graph them and use the graphs to solve a system of equations	1 to 5	329

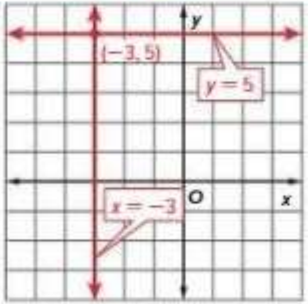
3. $y + \frac{1}{4}x = 1$

$y = -\frac{1}{4}x + 1$ an infinite number of solutions



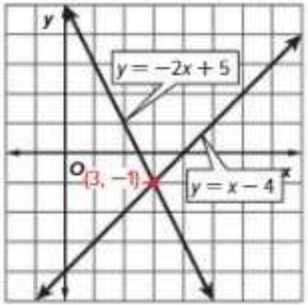
4. $x = -3$

$y = 5$ (−3, 5)



Slides 6-1

5. Grid The graph of a system of equations is shown. Plot and label the solution of the system on the graph.



5	Use the slope-intercept form of lines in order to determine whether a system of equations has zero, one, or infinitely many solutions	1 to 6	339

Determine if each system of equations has *no solution*, *one solution*, or *an infinite number of solutions*. (Examples 1–3)

1. $-5x + y = -1$
$-5x + y = 10$

no solution

2. $y = -4x + 9$
$y = \frac{2}{3}x - 5$

one solution

3. $y + 1 = 3x$
$2y = 6x - 2$

an infinite number of solutions

4. $y = -\frac{4}{5}x$
$4x + 5y = 0$

an infinite number of solutions

5. $y = \frac{1}{2}x + 6$
$2y = x - 8$

no solution

6. $y = -2x$
$y = x + 3$

one solution

Solution in the next slides

5	Use the slope-intercept form of lines in order to determine whether a system of equations has zero, one, or infinitely many solutions	1 to 6	339

1. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$-5x + y = -1$
$-5x + y = 10$

SOLUTION:

Write both equations in slope-intercept form.

$-5x + y = -1$ Write the equation.
$+5x \quad +5x$ Add $5x$ to each side.
$y = 5x - 1$ Simplify.

$-5x + y = 10$ Write the equation.
$+5x \quad +5x$ Add $5x$ to each side.
$y = 5x + 10$ Simplify.

Analyze the equations.

$y = 5x - 1$
$y = 5x + 10$

The equations have the same slopes. The equations have different y-intercepts. So, the lines are parallel. There is no solution of this system.

2. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$y = -4x + 9$
$y = \frac{2}{3}x - 5$

SOLUTION:

Analyze the equations.
The equations have different slopes. The equations have different y-intercepts. They intersect in exactly one point. The system of equations has one solution.

ANSWER:

one solution

3. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$y + 1 = 3x$
$2y = 6x - 2$

SOLUTION:

Write both equations in slope-intercept form.

$y + 1 = 3x$ Write the equation.
$-1 \quad -1$ Subtract 1 from each side.
$y = 3x - 1$ Simplify.

$2y = 6x - 2$ Write the equation.
$\frac{2y}{2} = \frac{6x}{2} - \frac{2}{2}$ Divide each side by 2.
$y = 3x - 1$ Simplify.

Analyze the equations.

$y = 3x - 1$
$y = 3x - 1$

The equations have the same slopes. The equations have the same y-intercepts. So, the lines are the same line. There are infinitely many solutions of this system.

4. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$y = -\frac{4}{5}x$

$4x + 5y = 0$

SOLUTION:

Write the equation $4x + 5y = 0$ in slope-intercept form.

$4x + 5y = 0$	Write the equation.
$-4x \quad -4x$	Subtract $4x$ from each side.
$5y = -4x$	Simplify.
$\frac{5y}{5} = \frac{-4x}{5}$	Divide both sides by 5.
$y = -\frac{4}{5}x$	Simplify.

Analyze the equations.

$y = -\frac{4}{5}x$

$y = -\frac{4}{5}x$

The equations have the same slopes. The equations have the same y-intercepts. So, the lines are the same line. There are infinitely many solutions of this system.

5. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$y = \frac{1}{2}x + 6$

$2y = x - 8$

SOLUTION:

Write the equation $2y = x - 8$ in slope-intercept form.

$2y = x - 8$	Write the equation
$\frac{2y}{5} = \frac{x}{2} - \frac{8}{2}$	Divide both sides by 2.
$y = \frac{1}{2}x - 4$	Simplify.

Analyze the equations.

$y = \frac{1}{2}x + 6$

$y = \frac{1}{2}x - 4$

The equations have the same slopes. The equations have different y-intercepts. So, the lines are parallel. There is no solution of this system.

ANSWER:

no solution

6. Determine if the system of equations has *no solution*, *one solution*, or *an infinite number of solutions*.

$y = -2x$

$y = x + 3$

SOLUTION:

Analyze the equations.

The equations have different slopes. The equations have different y-intercepts. They intersect in exactly one point. The system of equations has one solution.

ANSWER:

one solution

6	Use elimination to solve a system of linear equations	1 to 10	361

Solve each system of equations by elimination. Check the solution.

(Examples 1–4)

1. $-6x + y = -3$
$5x - 2y = -8$
(2, 9)

2. $-3x + 12y = 18$
$-6x + 24y = 36$
an infinite number of solutions

3. $-5x - 2y = -12$
$3x + 2y = 8$
(2, 1)

4. $5x + 5y = -10$
$2x - 3y = -9$
(−3, 1)

5. $x + 3y = 6$
$x - 3y = 12$
(9, −1)

6. $6x + 4y = 6$
$6x + 2y = 12$
(3, −3)

7. $3x - 5y = 11$
$x - 4y = -8$
(12, 5)

8. $-18x + 6y = -6$
$-24x + 6y = -18$
(2, 5)

9. $-4x - 8y = 8$
$3x - 5y = 16$
(2, −2)

10. Solve the system of equations by elimination.

$y = -\frac{1}{3}x - 5$

$\frac{1}{3}x + 5y = -9$

(−12, −1)

Solution in the next slides

6	Use elimination to solve a system of linear equations	1 to 10	361

1. Solve the system of equations by elimination. Check your solution.

$-6x + y = -3$
$5x - 2y = -8$

SOLUTION:

Multiply one equation by a constant.

$2(-6x + y) = 2(-3)$ Multiply both sides by 2.
$-12x + 2y = -6$

Add the equations to eliminate a variable. Then solve the equation.

$-12x + 2y = -6$
$(+)\ 5x - 2y = -8$ Align like terms.
$-7x + 0 = -14$ Add; the variable y is eliminated.
$x = 2$ Divide each side by -7.

Substitute 2 for x in either of the original equations to find the value of y.

$-6x + y = -3$ Write the equation.
$-6(2) + y = -3$ Replace x with 2.
$-12 + y = -3$ Simplify.
$y = 9$ Solve the equation.

So, the solution of this system of equations is (2, 9).

2. Solve the system of equations by elimination. Check your solution.

$-3x + 12y = 18$
$-6x + 24y = 36$

SOLUTION:

Multiply one equation by a constant.

$-2(-3x + 12y) = 18$ Multiply both sides by -2.
$6x - 24y = -36$

Add the equations to eliminate a variable. Then solve the equation.

$6x - 24y = -36$
$(+) - 6x + 24y = 36$ Align like terms.
$0 + 0 \quad = 0$ Add.
$0 = 0$ Simplify.

$0 = 0$ is a true statement. So, there is an infinite number of solutions.

ANSWER:

an infinite number of solutions

3. Solve the system of equations by elimination. Check your solution.

$-5x - 2y = -12$
$3x + 2y = 8$

SOLUTION:

Add the equations to eliminate a variable. Then solve the equation.

$-5x - 2y = -12$
$(+)\ 3x + 2y = 8$ Align like terms.
$-2x + 0 = -4$ Add; the variable y is eliminated.
$x = 2$ Divide each side by -2.

Substitute 2 for x in either of the original equations to find the value of y.

$3x + 2y = 8$ Write the equation.
$3(2) + 2y = 8$ Replace x with 2.
$6 + 2y = 8$ Simplify.
$-6 \quad -6$ Subtraction Property of Equality
$2y = 2$ Simplify.
$y = 1$ Solve the equation.

So, the solution of this system of equations is (2, 1).

ANSWER:

(2, 1)

4. Solve the system of equations by elimination. Check your solution.

$5x + 5y = -10$
$2x - 3y = -9$

SOLUTION:

Multiply both equations by a constant.

$3(5x + 5y) = 3(-10)$ Multiply both sides by 3.
$15x + 15y = -30$

$5(2x - 3y) = 5(-9)$ Multiply both sides by 5.
$10x - 15y = -45$

Add the equations to eliminate a variable. Then solve the equation.

$15x + 15y = -30$
$(+)\ 10x - 15y = -45$ Align like terms.
$25x + 0 = -75$ Add; the variable y is eliminated.
$x = -3$ Divide each side by 25.

Substitute -3 for x in either of the original equations to find the value of y.

$2x - 3y = -9$ Write the equation
$2(-3) - 3y = -9$ Replace x with -3.
$-6 - 3y = -9$ Simplify.
$+6 \quad +6$ Addition Property of Equality
$-3y = -3$ Simplify.
$y = 1$ Solve the equation.

So, the solution of this system of equations is $(-3, 1)$.

5. Solve the system of equations by elimination. Check your solution.

$x + 3y = 6$
$x - 3y = 12$

SOLUTION:

Add the equations to eliminate a variable. Then solve the equation.

$x + 3y = 6$
$(+)\ x - 3y = 12$ Align like terms.
$2x + 0 = 18$ Add; the variable y is eliminated.
$x = 9$ Divide each side by 2.

Substitute 9 for x in either of the original equations to find the value of y.

$x + 3y = 6$ Write the equation.
$9 + 3y = 6$ Replace x with 9.
$-9 \quad -9$ Subtraction Property of Equality
$3y = -3$ Simplify.
$y = -1$ Solve the equation.

So, the solution of this system of equations is $(9, -1)$.

ANSWER:

$(9, -1)$

6. Solve the system of equations by elimination. Check your solution.

$6x + 4y = 6$
$6x + 2y = 12$

SOLUTION:

Multiply one equation by a constant.

$-1(6x + 2y) = -1(12)$ Multiply both sides by -1.
$-6x - 2y = -12$

Add the equations to eliminate a variable. Then solve the equation.

$6x + 4y = 6$
$(+)\ -6x - 2y = -12$ Align like terms.
$0 + 2y = -6$ Add; the variable x is eliminated.
$y = -3$ Divide each side by -3.

Substitute -3 for y in either of the original equations to find the value of x.

$6x + 4y = 6$ Write the equation.
$6x + 4(-3) = 6$ Replace y with -3.
$6x - 12 = 6$ Simplify.
$+12 \quad +12$ Addition Property of Equality
$6x = 18$ Simplify.
$x = 3$ Divide each side by 6.

So, the solution of this system of equations is $(3, -3)$.

7. Solve the system of equations by elimination. Check your solution.

$3x - 5y = 11$
$x - 4y = -8$

SOLUTION:

Multiply one equation by a constant.
$-3(x - 4y) = -3(-8)$ Multiply both sides by −3.
$-3x + 12y = 24$

Add the equations to eliminate a variable. Then solve the equation.
$3x - 5y = 11$
$(+)\ -3x + 12y = 24$ Align like terms.
$0 + 7y = 35$ Add; the variable x is eliminated.
$y = 5$ Divide each side by 7.

Substitute 5 for y in either of the original equations to find the value of x.
$x - 4y = -8$ Write the equation.
$x - 4(5) = -8$ Replace y with 5.
$x - 20 = -8$ Simplify.
$+20\ \ +20$ Addition Property of Equality
$x = 12$ Simplify.

So, the solution of this system of equations is (12, 5).

ANSWER:
(12, 5)

8. Solve the system of equations by elimination. Check your solution.

$-18x + 6y = -6$
$-24x + 6y = -18$

SOLUTION:

Multiply one equation by a constant.
$-1(-24x + 6y) = -1(-18)$ Multiply both sides by −1.
$24x - 6y = 18$

Add the equations to eliminate a variable. Then solve the equation.
$-18x + 6y = -6$
$(+)\ 24x - 6y = 18$ Align like terms.
$6x + 0 = 12$ Add; the variable y is eliminated.
$x = 2$ Divide each side by 6.

Substitute 2 for x in either of the original equations to find the value of y.
$-18x + 6y = -6$ Write the equation.
$-18(2) + 6y = -6$ Replace x with 2.
$-36 + 6y = -6$ Simplify.
$+36\ \ \ +36$ Addition Property of Equality
$6y = 30$ Simplify.
$y = 5$ Solve the equation.

So, the solution of this system of equations is (2, 5).

9. Solve the system of equations by elimination. Check your solution.

$-4x - 8y = 8$
$3x - 5y = 16$

SOLUTION:

Multiply both equations by a constant.
$3(-4x - 8y) = 3(8)$ Multiply both sides by 3.
$-12x - 24y = 24$

$4(3x - 5y) = 4(16)$ Multiply both sides by 4.
$12x - 20y = 64$

Add the equations to eliminate a variable. Then solve the equation.
$-12x - 24y = 24$
$(+)\ 12x - 20y = 64$ Align like terms.
$0 - 44y = 88$ Add; the variable x is eliminated.
$y = -2$ Divide each side by −44.

Substitute −2 for y in either of the original equations to find the value of x.
$-4x - 8y = 8$ Write the equation.
$-4x - 8(-2) = 8$ Replace y with −2.
$-4x + 16 = 8$ Simplify.
$-16\ \ -16$ Subtraction Property of Equality
$-4x = -8$ Simplify.
$x = 2$ Solve the equation.

So, the solution of this system of equations is (2, −2).

10. Solve the system of equations by elimination.

$y = -\frac{1}{3}x - 5$

$\frac{1}{3}x + 5y = -9$

SOLUTION:

Rewrite $y = -\frac{1}{3}x - 5$ as $\frac{1}{3}x + y = -5$.

Multiply each term in one equation by a constant to create opposite coefficients.

$-1(\frac{1}{3}x + y) = -1(-5)$ Multiply each side by −1.

$-\frac{1}{3}x - y = 5$

Add the equations to eliminate a variable. Then solve the equation.

$-\frac{1}{3}x - y = 5$

$(+)\ \frac{1}{3}x + 5y = -9$ Align like terms.

$0 + 4y = -4$ Add; the variable x is eliminated.

$y = -1$ Divide each side by 4.

Substitute −1 for y in either of the original equations to find the value of x.

$y = -\frac{1}{3}x - 5$ Write the equation.

$-1 = -\frac{1}{3}x - 5$ Replace y with −1.

$+5 \qquad +5$ Addition Property of Equality

$4 = -\frac{1}{3}x$ Simplify.

$-12 = x$ Solve the equation.

So, the solution of this system of equations is (−12, −1).

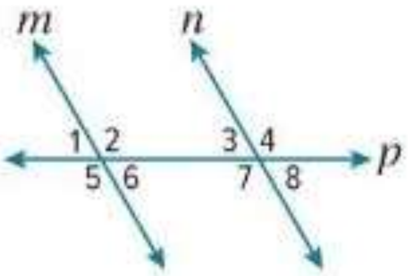
ANSWER:

(−12, −1)

7	Use the relationships between angles formed by two parallel lines cut by a transversal to find the measures of missing angles.	1 to 7	391

Practice

For Exercises 1–4, use the figure at the right. In the figure, line *m* is parallel to line *n*. For each pair of angles, classify the relationship in the figure as *alternate interior*, *alternate exterior*, or *corresponding*. (Examples 1 and 2)



1. ∠2 and ∠7 alternate interior

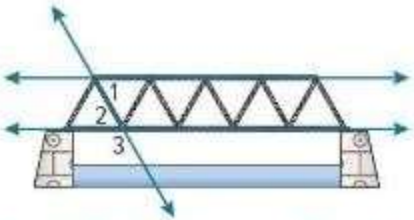
2. ∠1 and ∠3 corresponding

3. ∠4 and ∠5 alternate exterior

4. ∠5 and ∠7 corresponding

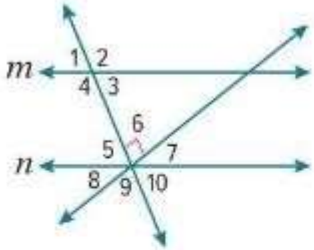
7	Use the relationships between angles formed by two parallel lines cut by a transversal to find the measures of missing angles.	1 to 7	391

5. Arturo is designing a bridge for science class using parallel supports for the top and bottom beam. Find $m\angle 2$ and $m\angle 3$ if $m\angle 1 = 60°$. Justify your answer. (Example 3)



$m\angle 2 = 60°$; Since $\angle 1$ and $\angle 2$ are alternate interior angles, they are equal. $m\angle 3 = 120°$; Since $\angle 2$ and $\angle 3$ are supplementary, the sum of their measures is 180°.

6. In the figure, line *m* is parallel to line *n*. The measure of $\angle 3$ is 58°. What is the measure of $\angle 7$? (Example 4)



32°

Because $\angle 3$ and $\angle 5$ are alternate interior angles, they are equal. The measure of $\angle 5$ is 58°. $\angle 5$, $\angle 6$ and $\angle 7$ form a straight line, the sum of their measures is 180°.

$m\angle 5 + m\angle 6 + m\angle 7 = 180°$ Write the equation.

$58° + 90° + m\angle 7 = 180°$

Replace $m\angle 5$ with 58° and $m\angle 6$ with 90°.

$148° + m\angle 7 = 180°$ Add.

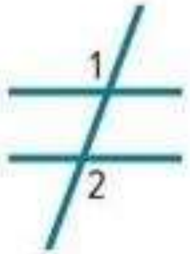
$-148° \qquad -148°$

Subtraction Property of Equality

$m\angle 7 = 32°$

8	Use the relationships between angles formed by two parallel lines cut by a transversal to find the measures of missing angles.	1 to 7	391

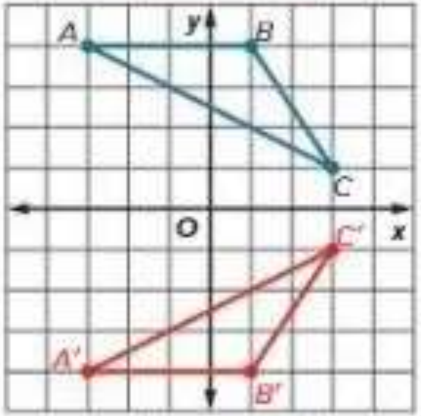
7. The symbol below is an equal sign with a slash through it. It is used to represent *not equal to* in math, as in $x \neq 5$. If $m\angle 1 = 108°$, classify the relationship between $\angle 1$ and $\angle 2$. Then find $m\angle 2$. Assume the equal sign consists of parallel lines.



alternate exterior angles; $m\angle 2 = 108°$

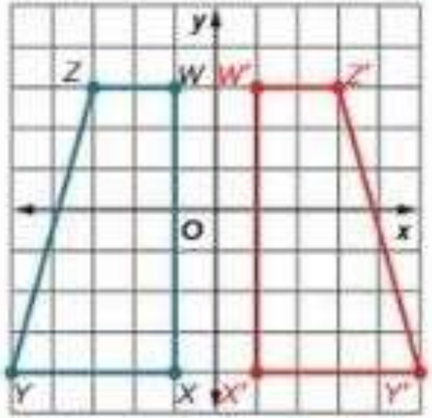
9	Describe reflections of figures on the coordinate plane using coordinates and coordinate notation	1 to 5	453

1. The graph of $\triangle ABC$ is shown. Graph the image of $\triangle ABC$ after a reflection across the x-axis. Write the coordinates of the reflected image. (Example 1)



$A'(-3, -4)$, $B'(1, -4)$, $C'(3, -1)$

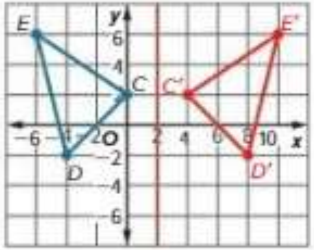
2. The graph of trapezoid $WXYZ$ is shown. Graph the image of $WXYZ$ after a reflection across the y-axis. Write the coordinates of the reflected image. (Example 1)



$W'(1, 3)$, $X'(1, -4)$, $Y'(5, -4)$, $Z'(3, 3)$

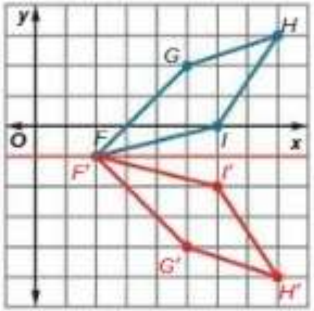
9	**Describe reflections of figures on the coordinate plane using coordinates and coordinate notation**	**1 to 5**	**453**

3. The graph of $\triangle CDE$ is shown. Graph the image of $\triangle CDE$ after a reflection across the line $x = 2$. Include the line of reflection. Then write the coordinates of the image. (Example 2)



$C'(4, 2), D'(8, -2), E'(10, 6)$

4. The graph of polygon *FGHI* is shown. Graph the image of *FGHI* after a reflection across the line $y = -1$. Include the line of reflection. Then write the coordinates of the image. (Example 2)



$F'(2, -1), G'(5, -4), H'(8, -5), I'(6, -2)$

5. Triangle *TUV* has coordinates $T(0, 3)$, $U(-3, 0)$, and $V(-4, 4)$. The triangle is reflected across the *y*-axis. Write the coordinate notation for a reflection across the *y*-axis. Then, write the coordinates of $\triangle T'U'V'$. (Example 3)

$(x, y) \rightarrow (-x, y)$; $T'(0, 3), U'(3, 0), V'(4, 4)$

6. The coordinates of $\triangle LMN$ and its image are shown. Describe the transformation. (Example 4)

$$L(0, 0) \rightarrow L'(0, 0)$$

$$M(-4, 1) \rightarrow M'(-4, -1)$$

$$N(-1, 3) \rightarrow N'(-1, -3)$$

The triangle is reflected across the *x*-axis.

11	Generate function tables from function rules and use the sets of ordered pairs to graph the functions	1 to 6	271

Complete the function table for each function given. (Example 1)

1. $y = 2.5x - 8$

Input, x	Output, y
−5	−20.5
0	−8
5	4.5
10	17

2. $y = -5x - 1$

Input, x	Output, y
−2	9
−1	4
0	−1
1	−6

3. $y = \frac{1}{2}x + 3$

Input, x	Output, y
−2	2
2	4
6	6
10	8

4. A single-engine plane can travel up to 140 miles per hour. The total number of miles m is represented by the function $m = 140h$, where h is the number of hours traveled. Determine appropriate input values for this situation. Then complete the function table for $m = 140h$. (Example 2)

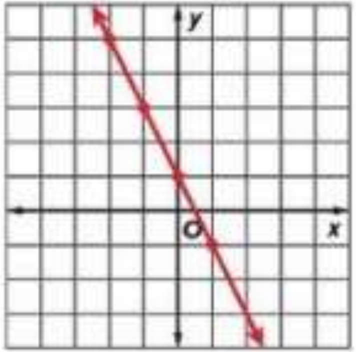
Only positive values make sense in this situation because you cannot fly negative hours. It does make sense to use fractional numbers because you can fly for part of an hour. Sample function table given.

Input, h	Output, m
1	140
1.5	210
2	280
2.5	350

12	Generate function tables from function rules and use the sets of ordered pairs to graph the functions	1 to 6	271

5. Create a function table for the function $y = -2x + 1$. Then graph the function.
(Example 3)

Input, x	Output, y
−2	5
−1	3
0	1
1	−1



Test Practice

6. **Multiselect** Select all of the possible types of numbers that are appropriate input values for the given situation.

A flower-delivery service charges $39.95 per flower arrangement and $2.99 for delivery. The total cost y is represented by the function $y = 39.95x + 2.99$, where x is the number of flower arrangements.

- [x] whole numbers
- [ ] integers
- [ ] rational numbers
- [x] positive integers
- [ ] negative numbers
- [ ] only zero

13	Compare functions that are represented in different ways using their initial values and rates of change.	1 to 3	291

1. Gennaro is considering two job offers as a part-time sales person. Company A will pay him $12.50 for each item he sells, plus a base salary of $500 at the end of the month. The amount Company B will pay him at the end of the month is shown in the table. Compare the functions' initial values and rates of change. Then determine how much more Gennaro would make at Company A if he sells 28 items by the end of the month. (Example 1)

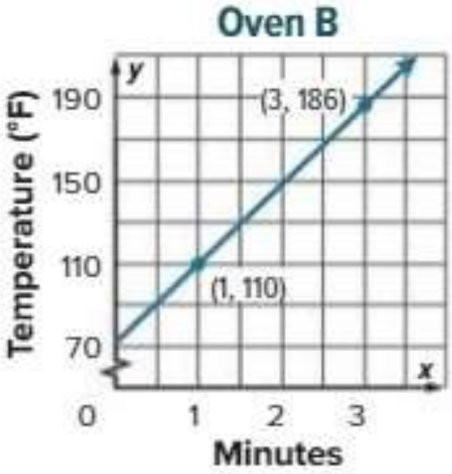
Number of Items Sold, x	Total Earned ($), y
5	425
10	500
15	575

The function for Company A has an initial value of 500, while Company B has an initial value of 350. Company A has the greater initial value. The function for Company A has a rate of change of 12.5, while Company B has a rate of change of 15, so Company B has the greater rate of change; $80

Refer to slides 5-4

13	Compare functions that are represented in different ways using their initial values and rates of change.	1 to 3	291

2. The temperature in two different ovens increased at a steady rate. The temperature in oven A is represented by the equation $y = 25x + 72$, where x represents the number of minutes and y represents the temperature in degrees Fahrenheit. The temperature of oven B is shown in the graph. Compare the functions' initial values and rates of change. Then determine how much greater the temperature in oven B will be than oven A after 8 minutes. (Example 1)

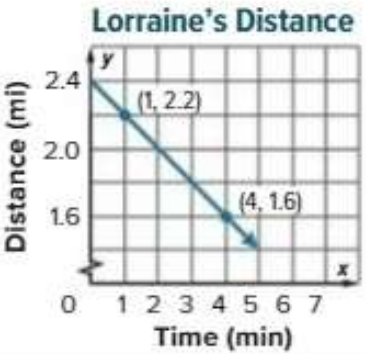


The function for oven A has an initial value of 72. Oven B also has an initial value of 72, so the initial values are the same. The function for oven A has a rate of change of 25, while oven B has a rate of change of 38, so oven B has the greater rate of change; 104°

Refer to slides 5-4

13	Compare functions that are represented in different ways using their initial values and rates of change.	1 to 3	291

3. **Open Response** Lorraine and Chila were riding their bikes to school. Lorraine's distance away from the school is shown in the graph. Chila's distance away from the school is shown in the table. Compare the functions' initial values and rates of change. Then determine Lorraine's and Chila's distance from school after 7 minutes. (Example 2)



Chila's Distance	
Time (min), x	Distance (mi), y
1	1.5
2	1.3
3	1.1

The function for Lorraine has an initial value of 2.4. The function for Chila has an initial value of 1.7, so Lorraine started from farther away. The function for Lorraine has a rate of change of −0.2, while Chila also has a rate of change of −0.2, so the rates of change are the same. After 7 minutes, Lorraine is 1 mile from school and Chila is 0.3 mile from school.

Refer to slides 5-4

14	Use substitution to solve a system of linear equations, including those that have zero or infinitely many solutions	1 to 10	349

Solve each system of equations by substitution. Check the solution.

(Examples 1–5)

1. $y = x - 14$
   $y = -6x$
   (2, −12)

2. $x - y = -5$
   $x - y = \frac{1}{3}$
   no solution

3. $y + 7 = 2x$
   $2y = 4x - 14$
   an infinite number of solutions

4. $y - 6x = 12$
   $y = 6x + 5$
   no solution

5. $y = 3x - 7$
   $4x + y = -14$
   (−1, −10)

6. $y = -6x + 8$
   $2y + 12x = 16$
   an infinite number of solutions

7. $-3x + 4y = 6$
   $-x + 2y = 8$
   (10, 9)

8. $y + 11 = 2x$
   $3y - 6x = -33$
   an infinite number of solutions

9. $9x + y = 9$
   $y + 9x = 5$
   no solution

10. Solve the system of equations by substitution. (−48, −13)

$$y = \frac{1}{4}x - 1$$

$$2y = \frac{2}{3}x + 6$$

Solution in the next slides

1. Solve the system of equations by substitution. Check your solution.

$y = x - 14$
$y = -6x$

SOLUTION:

Replace y with $-6x$ in the other equation, $y = x - 14$. Then solve the equation.

$y = x - 14$ Write the equation.
$-6x = x - 14$ Replace y with $-6x$.
$-x \quad -x$ Subtraction Property of Equality
$-7x = -14$ Simplify.
$\frac{-7x}{-7} = \frac{-14}{-2}$ Division Property of Equality
$x = 2$ Simplify.

Because $x = 2$, substitute 2 for x in either equation to find the value of y.

$y = -6x$ Write the equation.
$y = -6(2)$ Replace x with 2.
$y = -12$ Simplify.

So, the solution of this system of equations is (2, −12).

ANSWER:

(2, −12)

2. Solve the system of equations by substitution. Check your solution.

$x - y = -5$
$x - y = \frac{1}{3}$

SOLUTION:

First, solve either equation for x. Solve the equation $x - y = -5$ for x.

$x - y = -5$ Write the equation.
$+y \quad +y$ Addition Property of Equality
$x = y - 5$ Simplify.

Replace x with $y - 5$ in the other equation, $x - y = \frac{1}{3}$. Then solve the equation.

$x - y = \frac{1}{3}$ Write the equation.
$(y - 5) - y = \frac{1}{3}$ Replace x with $y - 5$.
$-5 = \frac{1}{3}$ Simplify.

The statement $-5 = \frac{1}{3}$ is never true. So, there is no solution.

ANSWER:

no solution

3. Solve the system of equations by substitution. Check your solution.

$y + 7 = 2x$
$2y = 4x - 14$

SOLUTION:

First, solve either equation for y. Solve the equation $y + 7 = 2x$ for y.

$y + 7 = 2x$ Write the equation.
$-7 \quad -7$ Subtraction Property of Equality
$y = 2x - 7$ Simplify.

Replace y with $2x - 7$ in the other equation, $2y = 4x - 14$. Then solve the equation.

$2y = 4x - 14$ Write the equation.
$2(2x - 7) = 4x - 14$ Replace y with 2x − 7.
$4x - 14 = 4x - 14$ Distributive Property
$-4x \quad = -4x$ Subtraction Property of Equality
$-14 = -14$ Simplify.

$-14 = -14$ is a true statement. So, there is an infinite number of solutions.

ANSWER:

an infinite number of solutions

14	Use substitution to solve a system of linear equations, including those that have zero or infinitely many solutions	1 to 10	349

4. Solve the system of equations by substitution. Check your solution.

$y - 6x = 12$
$y = 6x + 5$

SOLUTION:

Replace y with $6x + 5$ in the other equation, $y - 6x = 12$. Then solve the equation.

$y - 6x = 12$ Write the equation.
$(6x + 5) - 6x = 12$ Replace y with $6x + 5$.
$5 = 12$ Combine like terms.

The statement $5 = 12$ is never true. So, there is no solution.

ANSWER:

no solution

5. Solve the system of equations by substitution. Check your solution.

$y = 3x - 7$
$4x + y = -14$

SOLUTION:

Replace y with $3x - 7$ in the other equation, $4x + y = -14$. Then solve the equation.

$4x + y = -14$ Write the equation.
$4x + (3x - 7) = -14$ Replace y with $3x - 7$.
$7x - 7 = -14$ Combine like terms.
$\underline{+7 \quad +7}$ Addition Property of Equality
$7x = -7$ Simplify.
$\frac{7x}{7} = \frac{-7}{7}$ Division Property of Equality
$x = -1$ Simplify.

Since $x = -1$, substitute -1 for x in either equation to find the value of y.

$y = 3x - 7$ Write the equation.
$y = 3(-1) - 7$ Replace x with -1.
$y = -10$ Simplify.

So, the solution of this system of equations is $(-1, -10)$.

6. Solve the system of equations by substitution. Check your solution.

$y = -6x + 8$
$2y + 12x = 16$

SOLUTION:

Replace y with $-6x + 8$ in the other equation, $2y + 12x = 16$. Then solve the equation.

$2y + 12x = 16$ Write the equation.
$2(-6x + 8) + 12x = 16$ Replace y with $-6x + 8$.
$-12x + 16 + 12x = 16$ Distributive Property
$16 = 16$ Combine like terms.

$16 = 16$ is a true statement. So, there is an infinite number of solutions.

ANSWER:

an infinite number of solutions

14	Use substitution to solve a system of linear equations, including those that have zero or infinitely many solutions	1 to 10	349

7. Solve the system of equations by substitution. Check your solution.

$-3x + 4y = 6$
$-x + 2y = 8$

SOLUTION:

First, solve either equation for x. Solve the equation $-x + 2y = 8$ for x.

$-x + 2y = 8$ Write the equation.
$-2y \quad -2y$ Subtraction Property of Equality
$-x = -2y + 8$ Simplify.
$x = 2y - 8$ Divide each side by -1.

Replace x with $2y - 8$ in the other equation, $-3x + 4y = 6$. Then solve the equation.

$-3x + 4y = 6$ Write the equation.
$-3(2y - 8) + 4y = 6$ Replace x with $2y - 8$.
$-6y + 24 + 4y = 6$ Distributive Property
$-2y + 24 = 6$ Combine like terms.
$-24 \quad -24$ Subtraction Property of Equality
$-2y = -18$ Simplify.
$\frac{-2y}{-2} = \frac{-18}{-2}$ Division Property of Equality
$y = 9$ Simplify.

Replace y with 9 in the either equation and solve for x.

$-x + 2y = 8$ Write the equation.
$-x + 2(9) = 8$ Replace y with 9.
$-x + 18 = 8$ Distributive Property
$-18 \quad -18$ Subtraction Property of Equality
$-x = -10$ Simplify.
$x = 10$ Divide each side by -1.

So, the solution of this system of equations is (10, 9).

8. Solve the system of equations by substitution. Check your solution.

$y + 11 = 2x$
$3y - 6x = -33$

SOLUTION:

First, solve either equation for y. Solve the equation $y + 11 = 2x$ for y.

$y + 11 = 2x$ Write the equation.
$-11 \quad -11$ Subtraction Property of Equality
$y = 2x - 11$ Simplify.

Replace y with $2x - 11$ in the other equation, $3y - 6x = -33$. Then solve the equation.

$3y - 6x = -33$ Write the equation.
$3(2x - 11) - 6x = -33$ Replace y with $2x - 11$.
$6x - 33 - 6x = -33$ Distributive Property
$-33 = -33$ Combine like terms.

$-33 = -33$ is a true statement. So, there is an infinite number of solutions.

14	Use substitution to solve a system of linear equations, including those that have zero or infinitely many solutions	1 to 10	349

9. Solve the system of equations by substitution. Check your solution.

$9x + y = 9$
$y + 9x = 5$

SOLUTION:

First, solve either equation for y. Solve the equation $9x + y = 9$ for y.

$9x + y = 9$ Write the equation.
$-9x \quad -9x$ Subtraction Property of Equality
$y = -9x + 9$ Simplify.

Replace y with $-9x + 9$ in the other equation, $y + 9x = 5$. Then solve the equation.

$y + 9x = 5$ Write the equation.
$-9x + 9 + 9x = 5$ Replace y with $-9x + 9$.
$9 = 5$ Combine like terms.

The statement $9 = 5$ is never true. So, there is no solution.

10. Solve the system of equations by substituti

$y = \frac{1}{4}x - 1$

$2y = \frac{2}{3}x + 6$

$\frac{1}{2}x - 2 = \frac{2}{3}x + 6$ Distributive Property

$\underline{+2 \qquad +2}$ Addition Property of Equality

$\frac{1}{2}x = \frac{2}{3}x + 8$ Simplify.

$\underline{-\frac{2}{3}x \quad -\frac{2}{3}x}$ Subtraction Property of Equality

$-\frac{1}{6}x = 8$ Simplify.

$(-6) - x = 8(-6)$ Multiplication Property of Equality

$x = -48$ Simplify.

Replace x with -48 in the either equation to find y.

$y = \frac{1}{4}x - 1$ Write the equation.

$y = \frac{1}{4}(-48) - 1$ Replace x with -48.

$y = -13$ Simplify.

So, the solution of this system of equations is $(-48, -13)$.

15	Use elimination to solve a system of linear equations	1 to 10	361

Refer Question 6

16	Find the measures of interior and exterior angles in a triangle by using relationships between these angles	1 to 6	403

Find the value of x in each object. (Example 1)

1.

$x = 120$

SOLUTION:

$30 + 30 + x = 180$ Write the equation.

$60 + x = 180$ Add.

$-60 \quad -60$ Subtraction Property of Equality

$x = 120$ Simplify.

2.

$x = 50$

SOLUTION:

$40 + 90 + x = 180$ Write the equation.

$130 + x = 180$ Add.

$-130 \quad -130$ Subtraction Property of Equality

$x = 50$ Simplify.

3. In $\triangle FGH$, the measures of angles F, G, and H, respectively, are in the ratio 4:4:10. Find the measure of each angle. (Example 2)

$m\angle F = 40°, m\angle G = 40°, m\angle H = 100°$

SOLUTION:

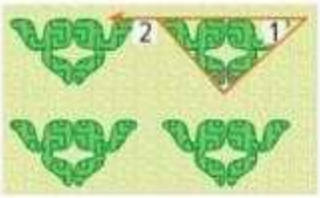
$4x + 4x + 10x = 180$ Write the equation.

$18x = 180$ Combine like terms.

$x = 10$ Simplify.

Because $x = 10$, the measure of $\angle F$ is $4x°$ or $4(10°)$ which is 40°. The measure of $\angle G$ is $4x°$ or $4(10°)$ which is 40°. The measure of $\angle H$ is $10x°$, or $10(10°)$, which is 100°.

4. In the knitting pattern, $m\angle 1 = 42°$. Find the measure of $\angle 2$. (Example 3)



132°

SOLUTION:

Angle 2 is an exterior angle. Its two remote interior angles are $\angle 1$ and the angle that measures 90°.

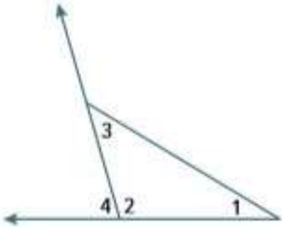
$m\angle 1 + 90° = m\angle 2$ Write the equation.

$42° + 90° = m\angle 2$ $m\angle 1 = 42°$

$132° = m\angle 2$ Simplify.

16	Find the measures of interior and exterior angles in a triangle by using relationships between these angles	1 to 6	403

5. In the figure, $m\angle 4 = 74°$ and $m\angle 3 = 43°$. Find the measures of $\angle 1$ and $\angle 2$.



SOLUTION:

Angle 4 is an exterior angle. Its two remote interior angles are $\angle 1$ and $\angle 3$.

$m\angle 1 + m\angle 3 = m\angle 4$ Write the equation.

$m\angle 1 + 43° = 74°$ $m\angle 3 = 43°$ and $m\angle 4 = 74°$

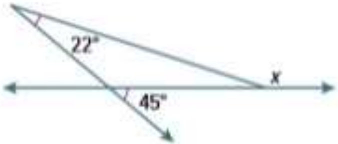
$m\angle 1 = 31°$ Subtraction Property of Equality

Because $m\angle 2$ and $m\angle 4$ are supplementary angles, the sum of their measures is 180°. So, $m\angle 2$ is $180° - 74°$ or $106°$.

ANSWER:

$m\angle 1 = 31°$, $m\angle 2 = 106°$

6. **Open Response** What is the measure of $\angle x$, in degrees, in the figure shown?



SOLUTION:

Because the 45° angle and its adjacent angle are supplementary angles, the sum of their measures is 180°. So, the adjacent angle is $180° - 45°$ or $135°$

Angle x is an exterior angle. Its two remote interior angles are the angle that measures 22° and the angl that measures 135°.

$22° + 135° = m\angle x$ Write the equation.

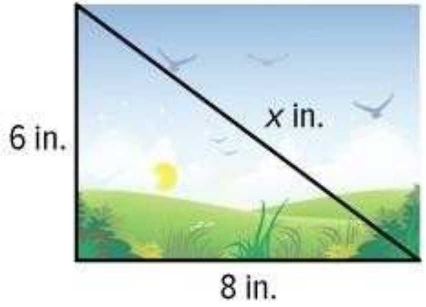
$157° = m\angle x$ Add.

ANSWER:

157°

17	Find the measures of the sides of a right triangle using the Pythagorean Theorem and square roots	1 to 6	415

1. What is the length of a diagonal of a rectangular picture whose sides are 6 inches by 8 inches? Round to the nearest tenth.



SOLUTION:

$a^2 + b^2 = c^2$ Pythagorean Theorem

$6^2 + 8^2 = c^2$ Replace a with 6 and b with 8.

$36 + 64 = c^2$ Evaluate.

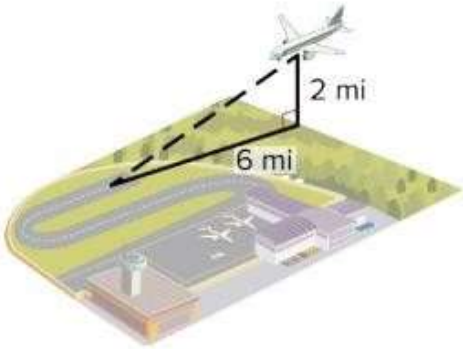
$100 = c^2$ Add.

$\pm\sqrt{100} = c$ Definition of square root

$\pm 10 = c$ Simplify. Round to the nearest tenth.

Because the length cannot be negative the length is 10 inches.

2. How far is the airplane from the runway? Round to the nearest tenth.



SOLUTION:

$a^2 + b^2 = c^2$ Pythagorean Theorem

$2^2 + 6^2 = c^2$ Replace a with 2 and b with 6.

$4 + 36 = c^2$ Evaluate.

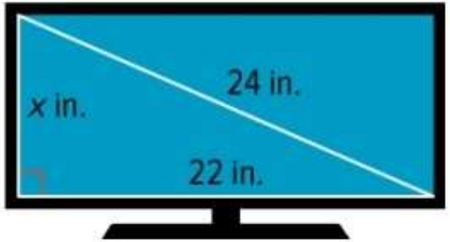
$40 = c^2$ Add.

$\pm\sqrt{40} = c$ Definition of square root

$\pm 6.3 \approx c$ Simplify.

Because the length cannot be negative the distance is 6.3 miles.

3. The diagonal of a television measures 24 inches. If the width is 22 inches, calculate its height to the nearest tenth of an inch.



SOLUTION:

$a^2 + b^2 = c^2$ Pythagorean Theorem

$22^2 + x^2 = 24^2$ Replace the variables with side lengths.

$484 + x^2 = 576$ Evaluate.

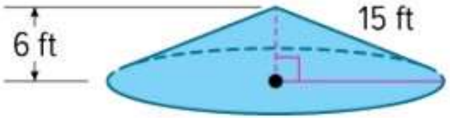
$x^2 = 92$ Subtraction Property of Equality

$x = \pm\sqrt{92}$ Definition of square root

$x \approx 9.6$ Round to the nearest tenth of an inch.

Because the height cannot be negative the height is 9.6 inches.

4. The distance from the top of the cone to the edge is 15 feet. The height of the cone is 6 feet. What is the radius of the cone? Round to the nearest tenth.



SOLUTION:

$a^2 + b^2 = c^2$ Pythagorean Theorem

$6^2 + b^2 = 15^2$ Replace the variables with side lengths.

$36 + b^2 = 225$ Evaluate.

$b^2 = 189$ Subtraction Property of Equality

$b = \pm\sqrt{189}$ Definition of square root

$b \approx 13.7$ Round to the nearest tenth.

Because the radius cannot be negative the radius is 13.7 feet.

ANSWER:

13.7 ft

17	Find the measures of the sides of a right triangle using the Pythagorean Theorem and square roots	1 to 6	415

5. What is the perimeter of a right triangle if the hypotenuse is 15 centimeters and one of the legs is 9 centimeters?

36 cm

Find the length of the other leg.

$a^2 + b^2 = c^2$ Pythagorean Theorem

$9^2 + b^2 = 15^2$ Replace the variables with side lengths.

$81 + b^2 = 225$ Evaluate.

$b^2 = 144$ Subtraction Property of Equality

$b = \pm\sqrt{144}$ Definition of square root

$b = 12$ Simplify.

The other side length is 12 centimeters.

Add the side lengths of the triangle to find the perimeter.

$15 + 9 + 12 = 36$

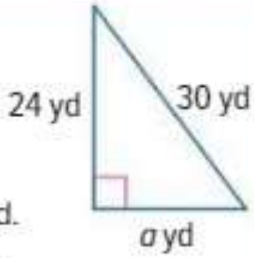
The perimeter is 36 centimeters.

ANSWER:

36 cm

Test Practice

6. **Multiselect** Select all of the following statements that are true about the right triangle shown.

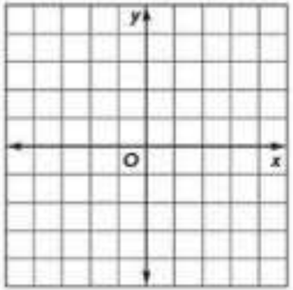


- [x] The hypotenuse is 30 yd.
- [x] The missing leg is 18 yd.
- [ ] The missing leg is 24 yd.
- [x] The formula $24^2 + a^2 = 30^2$ can be used to find the missing leg measure.
- [ ] The formula $30^2 + a^2 = 24^2$ can be used to find the missing leg measure.

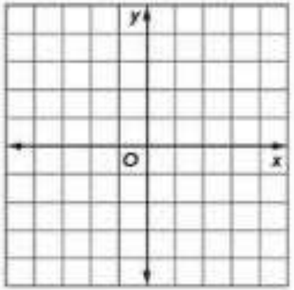
18	Find the distance between two points on a coordinate plane using the Pythagorean Theorem	1 to 6	427

Find the distance, c, between each pair of points on the coordinate plane. Round to the nearest tenth if necessary. (Example 1)

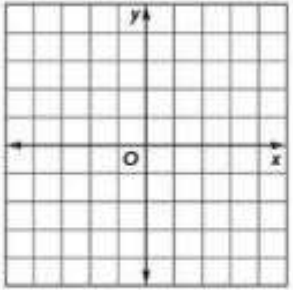
1. (−4, −3), (2, 1) **7.2 units**



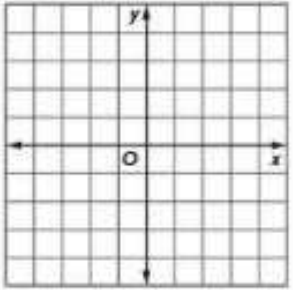
2. (0, 2), (5, −2) **6.4 units**



3. (0, 0), (−4, −3) **5 units**



4. (−3, 4), (2, −3) **8.6 units**



5. An archaeologist at a dig sets up a coordinate system using string. Two similar artifacts are found—one at position (1, 4) and the other at (5, 2). How far apart were the two artifacts? Round to the nearest tenth of a unit if necessary.

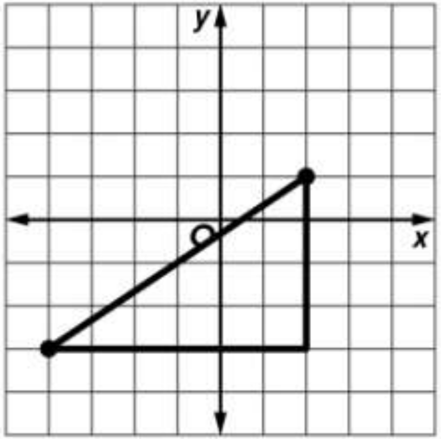
4.5 units

6. Equation Editor The coordinates of points *A* and *B* are (−7, 5) and (4, −3), respectively. What is the distance, in units, between the points? Round to the nearest tenth.

13.6

18	Find the distance between two points on a coordinate plane using the Pythagorean Theorem	1 to 6	427

Plot the points (−4, −3) and (2, 1). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$ Pythagorean Theorem

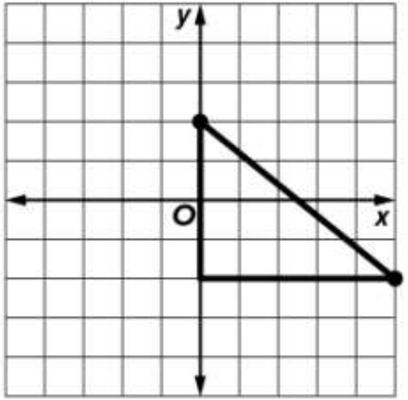
$6^2 + 4^2 = c^2$ Replace *a* with 6 and *b* with 4.

$52 = c^2$ Evaluate.

$\pm\sqrt{52} = c$ Definition of square root

$\pm 7.2 \approx c$ Use a calculator.

Plot the points (0, 2) and (5, −2). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$ Pythagorean Theorem

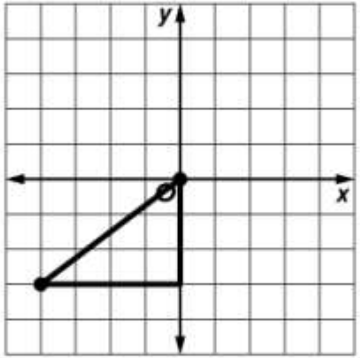
$4^2 + 5^2 = c^2$ Replace *a* with 4 and *b* with 5.

$41 = c^2$ Add.

$\pm\sqrt{41} = c$ Definition of square root

$\pm 6.4 \approx c$ Use a calculator.

Plot the points (0, 0) and (−4, −3). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$ Pythagorean Theorem

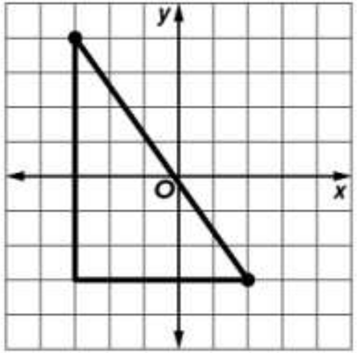
$4^2 + 3^2 = c^2$ Replace *a* with 4 and *b* with 3.

$25 = c^2$ Evaluate.

$\pm\sqrt{25} = c$ Definition of square root

$\pm 5 = c$ Simplify.

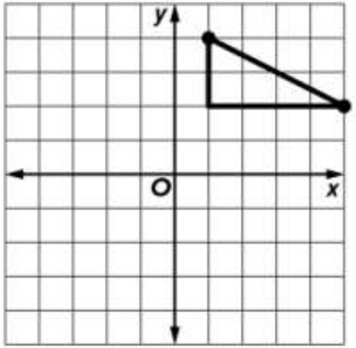
4 Plot the points (−3, 4) and (2, −3). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$	Pythagorean Theorem
$7^2 + 5^2 = c^2$	Replace *a* with 7 and *b* with 5.
$74 = c^2$	Evaluate.
$\pm\sqrt{74} = c$	Definition of square root
$\pm 8.6 \approx c$	Use a calculator.

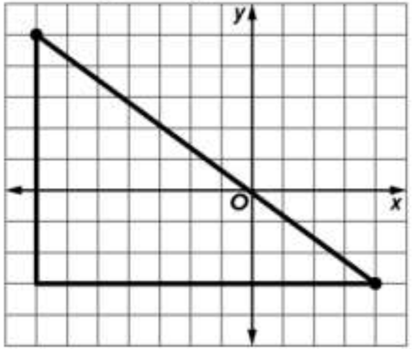
5 Plot the points (1, 4) and (5, 2). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$	Pythagorean Theorem
$2^2 + 4^2 = c^2$	Replace *a* with 2 and *b* with 4.
$20 = c^2$	Evaluate.
$\pm\sqrt{20} = c$	Definition of square root
$\pm 4.5 \approx c$	Use a calculator.

6 Plot the points (−7, 5) and (4, −3). Connect with a segment. This segment will be the hypotenuse of the right triangle. Then draw two other segments to form a right triangle.



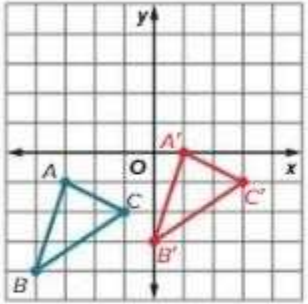
Find the length of the hypotenuse, which is the distance between the two points.

$a^2 + b^2 = c^2$	Pythagorean Theorem
$8^2 + 11^2 = c^2$	Replace *a* with 8 and *b* with 11.
$185 = c^2$	Evaluate.
$\pm\sqrt{185} = c$	Definition of square root
$\pm 13.6 \approx c$	Use a calculator.

The points are about 13.6 units apart.

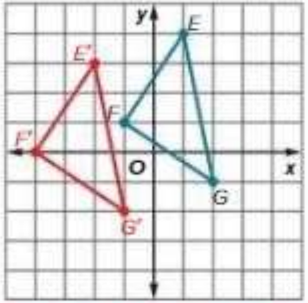
19	Translate figures on the coordinate plane and use coordinate notation to describe translations	1 to 6	443

1. The graph of $\triangle ABC$ is shown. Graph the image of $\triangle ABC$ after a translation of 4 units right and 1 unit up. Write the coordinates of the image. (Example 1)



$A'(1, 0), B'(0, -3), C'(3, -1)$

2. The graph of $\triangle EFG$ is shown. Graph the image of $\triangle EFG$ after a translation of 3 units left and 1 unit down. Write the coordinates of the image. (Example 1)



$E'(-2, 3), F'(-4, 0), G'(-1, -2)$

Triangle *QRS* has vertices $Q(-2, 2)$, $R(-3, -4)$, and $S(1, -2)$. Write the coordinate notation for each translation given. Then write the coordinates of $\triangle Q'R'S'$ after each translation. (Example 2)

3. 7 units right and 4 units down

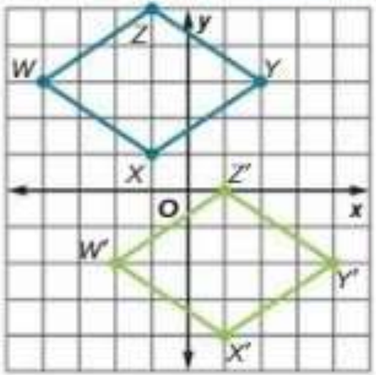
$(x, y) \rightarrow (x + 7, y - 4)$;
$Q'(5, -2), R'(4, -8), S'(8, -6)$

4. 2 units left and 3 units up

$(x, y) \rightarrow (x - 2, y + 3)$;
$Q'(-4, 5), R'(-5, -1), S'(-1, 1)$

20	Translate figures on the coordinate plane and use coordinate notation to describe translations	1 to 6	443

5. The preimage and image of *WXYZ* are shown. Use coordinate notation to describe the translation. (Example 3)



$(x, y) \rightarrow (x + 2, y - 5)$

Test Practice

6. **Open Response** Triangle *JKL* has vertices $J(-2, 2)$, $K(-3, -4)$, and $L(1, -2)$. Write the coordinate notation for a translation of 8 units right and 1 unit up.

$(x, y) \rightarrow (x + 8, y + 1)$

21	Write linear functions from graphs, tables, and verbal descriptions by finding the rate of change and initial value	1 to 4	283

Refer question 2

22	Write and solve a system of equations that models a real-world scenario	1 to 5	373

1. The sum of two numbers is 20.5. Their difference is 6.5. Find the two numbers.

Sample answer: $x + y = 20.5$ and $x - y = 6.5$; (13.5, 7); The two numbers are 13.5 and 7.

2. Tadeo volunteered at the library 6 times as many hours over the weekend as Dylan. Together, they volunteered a total of 14 hours. How many hours did each person volunteer over the weekend?

Sample answer: $y = 6x$ and $x + y = 14$; (2, 12); Tadeo volunteered 12 hours and Dylan volunteered 2 hours.

3. Tiana placed two orders for flowers and bushes. The first order was for 24 flowers and 6 bushes. The total of the first order was $144. The second order was for 18 flowers and 3 bushes. The total of the second order was $90. What is the cost of each plant?

Sample answer: $24x + 6y = 144$ and $18x + 3y = 90$; (3, 12); It costs $3 for each flower and $12 for each bush.

4. Mrs. Adesso wants to take her class on a trip to either the science center or natural history museum. The science center charges $7 per student, plus $75 for a guided tour. The natural history museum charges $8 per student, plus $50 for a guided tour. For what number of students is the cost of the trip the same at each museum?

Sample answer: $y = 7x + 75$ and $y = 8x + 50$; (25, 250); When the number of students going on the trip is 25, the cost for both museums is $250.

Solution in the next slides

22	Write and solve a system of equations that models a real-world scenario	1 to 5	373

5. Open Response It costs $5 per hour to rent a snowboard from a certain ski rental company, plus a $50 deposit. Another ski rental company charges $10 per hour to rent a snowboard, plus a $25 deposit. For what number of hours is the cost to rent a snowboard the same at each company? What is the cost of renting a snowboard for this number of hours?

Hours, *x*: 5 hours

Cost, *y*: $75

Solution in the next slides

22	Write and solve a system of equations that models a real-world scenario	1 to 5	373

1. The sum of two numbers is 20.5. Find the two numbers. Write and solve a system of equations that represents the situation. Interpret the solution.

SOLUTION:

Sample solution:

Write a system of equations that represents the situation. Let x = one number. Let y = the other number.

The sum of two numbers is 20.5: $x + y = 20.5$

Their difference is 6.5: $x - y = 6.5$

Solve the system of equations by elimination. Add the equations to eliminate a variable. Then solve the equation.

$x + y = 20.5$

$(+)\ x - y = 6.5$ Align like terms.

$2x = 14$ Add; the variable y is eliminated.

$x = 7$ Divide each side by 2.

Substitute 7 for x in either of the original equations to find the value of y.

$x + y = 20.5$ Write the equation.

$7 + y = 20.5$ Replace x with 7.

$y = 13.5$ Subtract 7 from each side.

So, the solution of this system of equations is (7, 13.5).

Interpret the solution.

The two numbers are 7 and 13.5.

ANSWER:

Sample answer: $x + y = 20.5$ and $x - y = 6.5$; (13.5, 7); The two numbers are 13.5 and 7.

2. Tadeo volunteered at the library 6 times as many hours over the weekend as Dylan. Together, they volunteered a total of 14 hours. How many hours did each person volunteer over the weekend? Write and solve a system of equations that represents the situation. Interpret the solution.

SOLUTION:

Sample solution:

Write a system of equations that represents the situation. Let x = the number of hours Dylan volunteered. Let y = the number of hours Tadeo volunteered.

Tadeo volunteered 6 times as many hours as Dylan: $y = 6x$

Together, they volunteered a total of 14 hours: $x + y = 14$

Solve the system of equations by substitution. Replace y with $6x$ in the other equation, $x + y = 14$. Then solve the equation.

$x + y = 14$ Write the equation.

$x + 6x = 14$ Replace y with $6x$.

$7x = 14$ Combine like terms.

$x = 2$ Division Property of Equality

Because $x = 2$, substitute 2 for x in either equation to find the value of y.

$y = 6x$ Write the equation.

$y = 6(2)$ Replace x with 2.

$y = 12$ Simplify.

So, the solution of this system of equations is (2, 12).

Interpret the solution.

Recall x = Dylan's hours and y = Tadeo's hours. So, Tadeo volunteered 12 hours and Dylan volunteered 2 hours.

3. Tiana placed two orders for flowers and bushes. The first order was for 24 flowers and 6 bushes. The total of the first order was $144. The second order was for 18 flowers and 3 bushes. The total of the second order was $90. What is the cost of each plant?

SOLUTION:

Sample solution:

Write a system of equations that represents the situation. Let x = cost per flower. Let y = cost per bush.

24 flowers and 6 bushes cost $144: $24x + 6y = 144$

18 flowers and 3 bushes cost $90: $18x + 3y = 90$

Solve the system of equations by elimination. Multiply one equation by a constant.

$-2(18x + 3y) = -2(90)$ Multiply both sides by −2.

$-36x - 6y = -180$

Add the equations to eliminate a variable. Then solve the equation.

$24x + 6y = 144$

$(+)\ -36x - 6y = -180$ Align like terms.

$-12x = -36$ Add; the variable y is eliminated.

$x = 3$ Divide each side by −12.

Substitute 3 for x in either of the original equations to find the value of y.

$18x + 3y = 90$ Write the equation.

$18(3) + 3y = 90$ Replace x with 3.

$54 + 3y = 90$

$3y = 36$ from each side.

$y = 12$ Divide each side by 3.

So, the solution of this system of equations is (3,

Interpret the solution.

Recall x = cost per flower and y = cost per bush. It costs $3 for each flower and $12 for each bush.

22	Write and solve a system of equations that models a real-world scenario	1 to 5	373

4. Mrs. Adesso wants to take her class on a trip to either the science center or natural history museum. The science center charges \$7 per student, plus \$75 for a guided tour. The natural history museum charges \$8 per student, plus \$50 for a guided tour. For what number of students is the cost of the trip the same at each museum?

SOLUTION:

Sample solution:

Write a system of equations that represents the situation. Let x = number of students. Let y = total cost.

Total cost at the science center is equal to \$7 times the number of students, plus \$75 for a guided tour: $y = 7x + 75$

Total cost at the history museum is equal to \$8 times the number of students, plus \$50 for a guided tour: $y = 8x + 50$

Solve the system of equations by substitution. Replace y with $7x + 75$ in the other equation, $y = 8x + 50$. Then solve the equation.

$y = 8x + 50$ Write the equation.

$7x + 75 = 8x + 50$ Replace y with $7x + 75$.

$\underline{-8x \quad -8x}$ Subtraction Property of Equality

$-x + 75 = 50$ Simplify.

$\underline{-75 \quad -75}$ Subtraction Property of Equality

$-x = -25$ Simplify.

$x = 25$ Divide each side by -1.

Because $x = 25$, substitute 25 for x in either equation to find the value of y.

$y = 7x + 75$ Write the equation.

$y = 7(25) + 75$ Replace x with 25.

$y = 175 + 75$ Simplify.

$y = 250$ Add.

So, the solution of this system of equations is (25, 250).

Interpret the solution.

Recall x = number of students and y = total cost. When the number of students going on the trip is 25, the cost for both museums is \$250.

ANSWER:

Sample answer: $y = 7x + 75$ and $y = 8x + 50$; (25, 250); When the number of students going on the trip is 25, the cost for both museums is \$250.

Slides 5-6

5. **Open Response** It costs \$5 per hour to rent a snowboard from a certain ski rental company, plus a \$50 deposit. Another ski rental company charges \$10 per hour to rent a snowboard, plus a \$25 deposit. For what number of hours is the cost to rent a snowboard the same at each company? What is the cost of renting a snowboard for this number of hours?

Hours, x:

Cost, y:

SOLUTION:

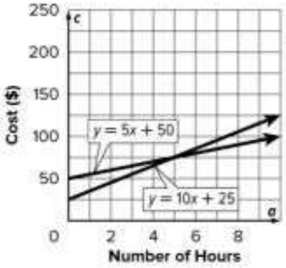
Sample solution:

Write a system of equations that represents the situation. Let x = number hours. Let y = total cost.

Total cost for Company 1 is equal to \$5 times the number of hours, plus \$50: $y = 5x + 50$

Total cost for Company 2 is equal to \$10 times the number of hours, plus \$25: $y = 10x + 25$

Solve the system of equations by graphing. Graph both equations on the same coordinate plane.



The graphs of the lines appear to intersect at (5, 75).

Interpret the solution.

For 5 hours, the cost is \$75

23	Find the measures of interior and exterior angles in a triangle by using relationships between these angles	1 to 6	403

Refer question 16


ALL THE BEST
FOR YOUR
EXAM
AND
DO THE BEST