

END OF TERM EXAM
COVERAGE GRADE 4
2025-2026

**FAHEEMA ABDULLAH IBN SINA
GRADE 4 SCIENCE**

How will the exam be set out?

Number of MCQ عدد الأسئلة الموضوعية	20
Marks of MCQ درجة الأسئلة الموضوعية	3
Number of FRQ عدد الأسئلة المقالية	4
Marks per FRQ الدرجات للأسئلة المقالية	(8-12)
Type of All Questions نوع كافة الأسئلة	MCQ/ الأسئلة الموضوعية FRQ/ الأسئلة المقالية
Maximum Overall Grade الدرجة القصوى الممكنة	100

TOTAL MARK 100

MULTIPLE CHOICE QUESTIONS-
20 questions

MARKS PER QUESTION- 3

FRQ FORMAL RESPONSE QUESTION-
4 questions

8-12 MARKS

Pages that will be covered
in the exam:

UNIT 3 DYNAMIC EARTH

Outcomes covered as per EOT coverage document UNIT 3

- 1 Students will be able to describe what a volcano is and what comes out of it.
- 11 Students will be able to identify how particles move in transverse and longitudinal waves.
- 12 Students will be able to identify and label the main parts of transverse and longitudinal waves, including wavelength and amplitude.
- 13 Students will be able to read and interpret data from tables to answer questions about earthquake magnitudes.
- 14 Students will understand that large land masses on Earth are called continents.
- 15 Students will be able to identify the physical feature that is found near the edge of a continent.
- 16 Students will be able to identify and name parts of the ocean floor.
- 17 Students will be able to recognize that underwater canyons can form on the continental slope
- 18 Students will know ways buildings are made strong to stay safe during earthquakes.
- 19 Students will be able to identify areas near fault lines or tectonic plate boundaries as regions where earthquakes are most likely to occur.
- 20 Students will be able to use pictures of fossils to identify which one is the youngest.
- 21 Students will be able to identify and name common landforms from diagrams. Students will be able to describe the characteristics of different landforms using simple language
- 22 Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways in which erosion and deposition occur. Students will be able to explain why fast-moving water changes land more than slow-moving water.
- 23 Students will be able to compare the wavelength and frequency of two waves travelling at the same speed. Students will be able to rank earthquake magnitudes by comparing their values.

Outcomes covered as per EOT coverage document UNIT 1

- 2 Students will be able to identify whether forces acting on an object are balanced or unbalanced.
- 3 Students will understand the concept of friction and its effects on moving objects.
- 4 Students will be able to identify the correct units used to measure a given quantity.
- 5 students will be able to define acceleration as a change in velocity.
- 6 Students will be able to define a force as a push or a pull.
- 7 Students will understand the concept of inertia as the tendency of objects to keep doing what they are doing
- 8 Students will understand how changing drag forces affect the motion of objects in motion
- 9 Students will be able to recognise when an object has only potential energy, only kinetic energy, or both at the same time.
- 10 Students will be able to recall the definition of energy
- 24 Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

- Students will be able to describe what a volcano is and what comes out of it. Unit 3 p.19 (2nd Paragraph).

A **volcano** is an opening on Earth's surface where melted rock or gases are forced out. Volcanoes can form on land or on the ocean floor, but they are located only in certain places on Earth's surface. Most volcanoes form at plate boundaries. For example, a ring of volcanoes called the *Ring of Fire* surrounds the Pacific Ocean. The Ring of Fire follows the boundaries of the plates that meet around the Pacific Ocean.

Students will be able to identify how particles move in transverse and longitudinal waves. Unit 3 p. 94 (2nd Paragraph)

Longitudinal waves, such as sound waves, move materials back and forth as the wave travels through it. You used the spring toy

to produce longitudinal waves. A **transverse wave** is a wave that

vibrates perpendicular to the direction that the energy moves.

Transverse waves move material up and down as they travel.

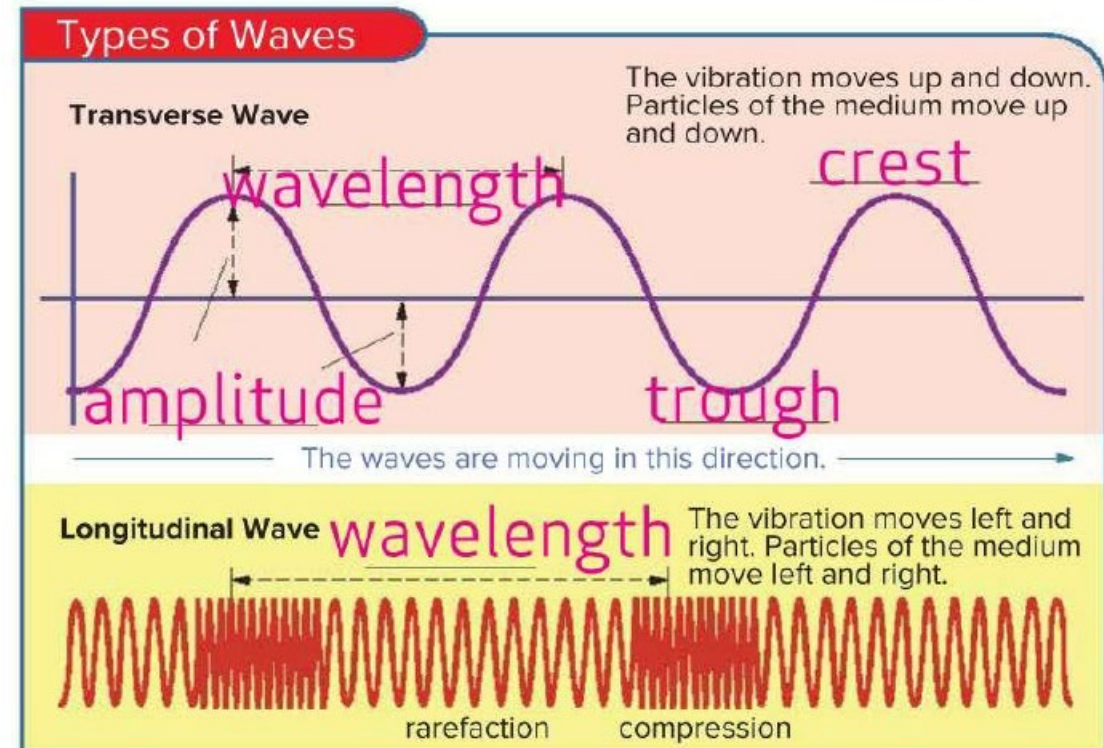
Earthquakes produce both longitudinal and transverse waves.

Students will be able to identify and label the main parts of transverse and longitudinal waves, including wavelength and amplitude.

Unit 3 p.95 Wavelength, Amplitude
p.96 Label diagram activity

direction, except when it is close to the shoreline. **Wavelength** is the distance between wave crests or troughs. Frequency is the measure of how many crests or troughs move through a given point in one unit of time. High-frequency waves have shorter wavelengths and transfer more energy. The frequency and speed of a wave are not the same. The speed of a wave depends on the material through which it travels.

Amplitude is the height of a wave from its crest or trough to its midpoint. It is a measure of the wave's strength.



Students will be able to read and interpret data from tables to answer questions about earthquake magnitudes. Unit 3 p.101

California Earthquake Data

Year	Location	Magnitude	Year	Location	Magnitude
1906	San Francisco	7.8	1980	Eureka	7.2
1911	Calaveras Fault	6.5	1984	Morgan Hill	6.2
1920	Los Angeles	4.9	1989	Loma Prieta	6.9
1923	Cape Mendocino	7.2	1992	Landers	7.3
1933	Long Beach	6.4	1994	Northridge	6.7
1940	Imperial Valley	7.1	2004	Parkfield	6.0
1954	Arcata	6.6	2010	Baja	7.2

How many earthquakes had a magnitude greater than 7.0? **6**

In which regions were there earthquakes of magnitude greater than 6.2 and under 7.3?

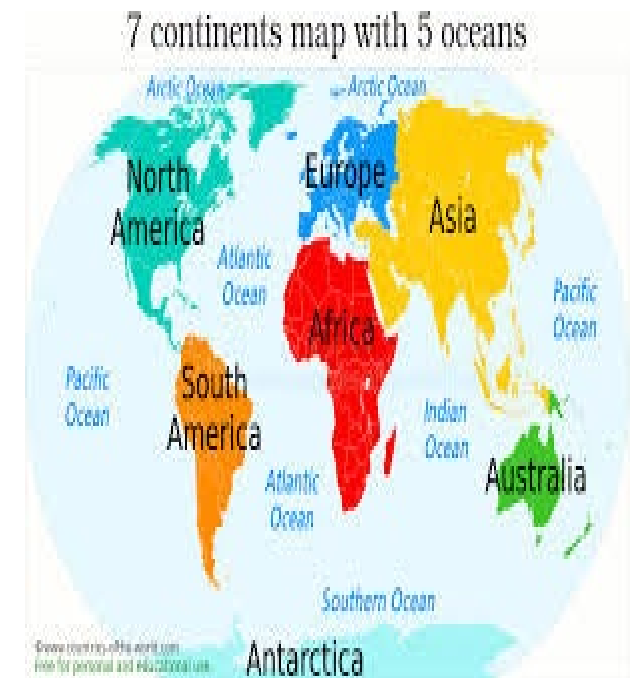
Calaveras Fault 6.5 Cape Mendocino 7.2 Imperial Valley 7.1 Long Beach 6.4 Arcata 6.6 Eureka 7.2 Loma Prieta 6.9 Northridge 6.7 Baja 7.2

How many earthquakes had a magnitude greater than 6.2 and under 7.2?

5

Students will understand that large land masses on Earth are called continents. Unit 3 p.14 (2nd Paragraph)

A **continent** is a large landmass. Along the coast of a continent, the ocean floor is called the *continental shelf*. Here, the ocean floor is covered by



Students will be able to identify the physical feature that is found near the edge of a continent. Unit 3 p.25



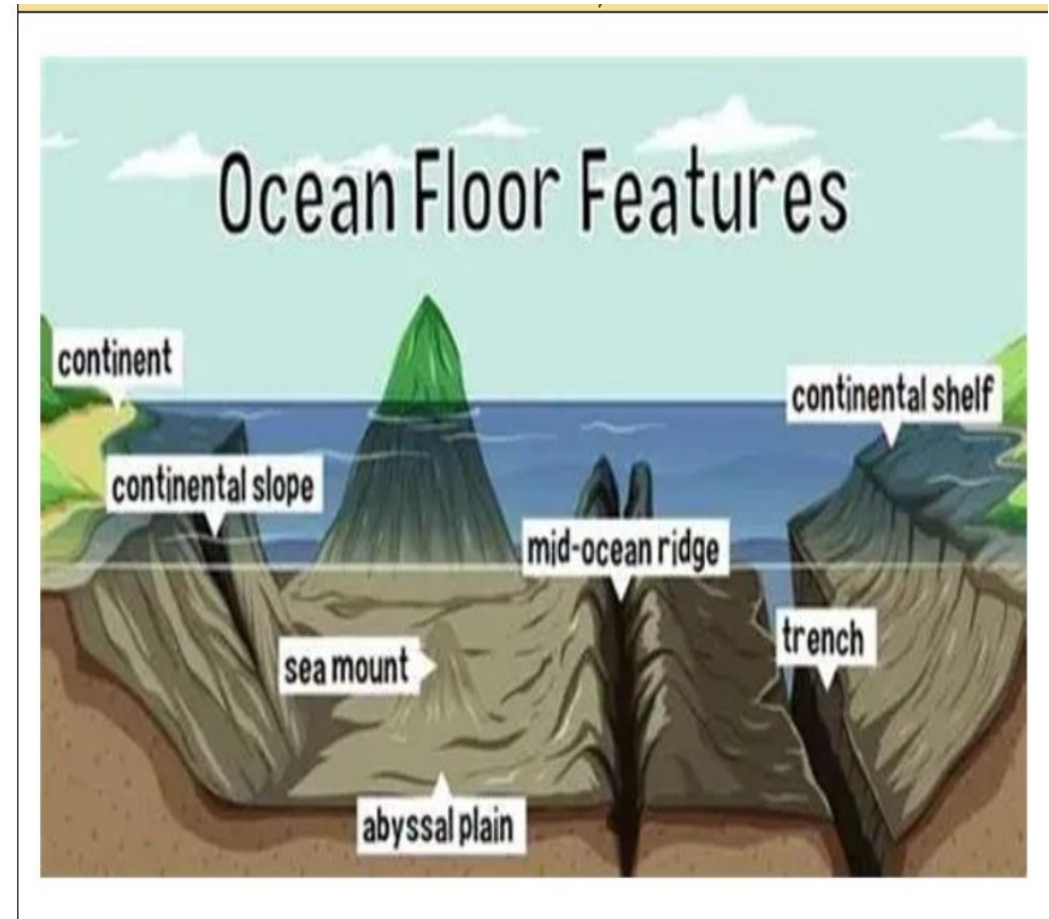
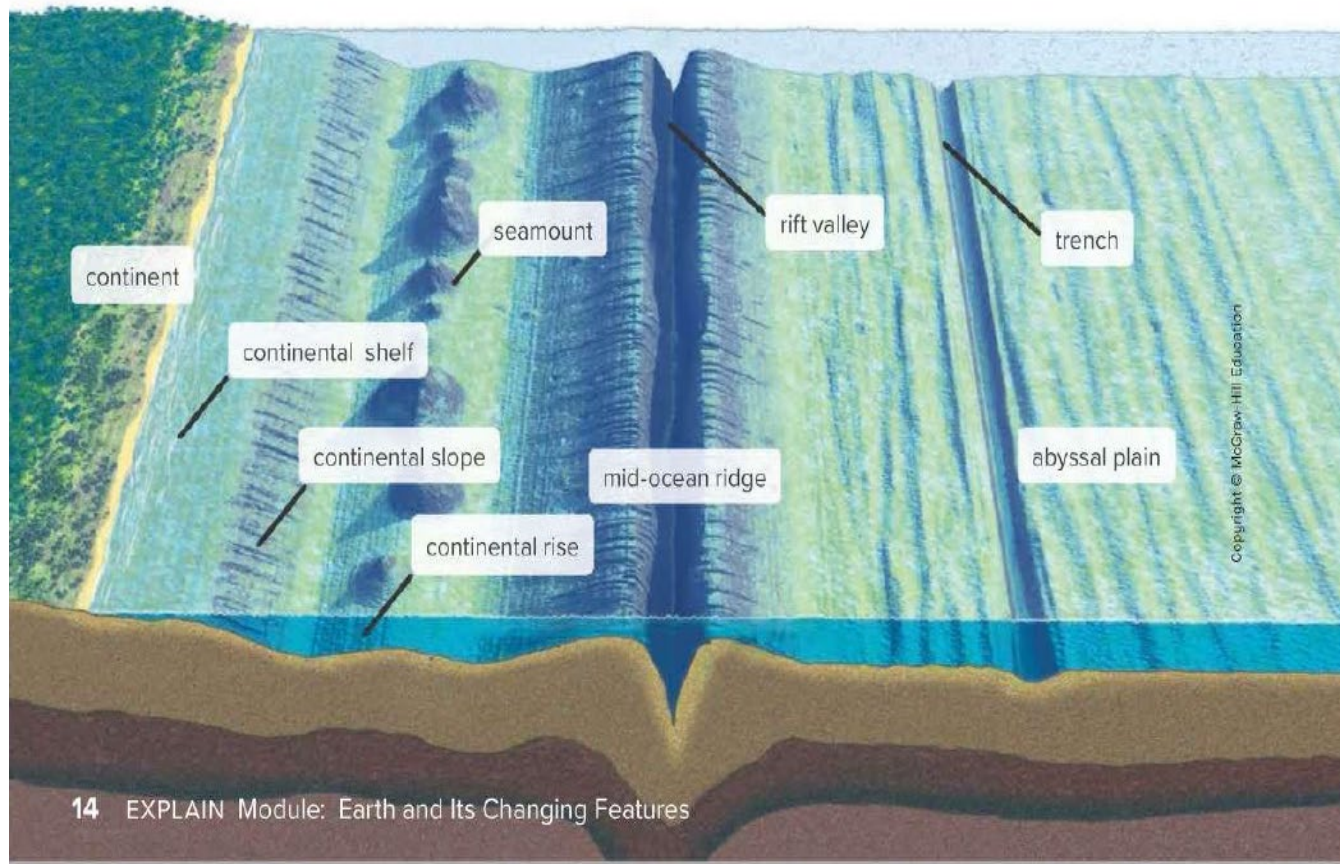
Three-Dimensional Thinking

1. Which feature is most likely to occur near the edge of a continent?
 - A. plain
 - ☒ B. mountain
 - C. lake
 - D. abyssal plain

Students will be able to identify and name parts of the ocean floor.

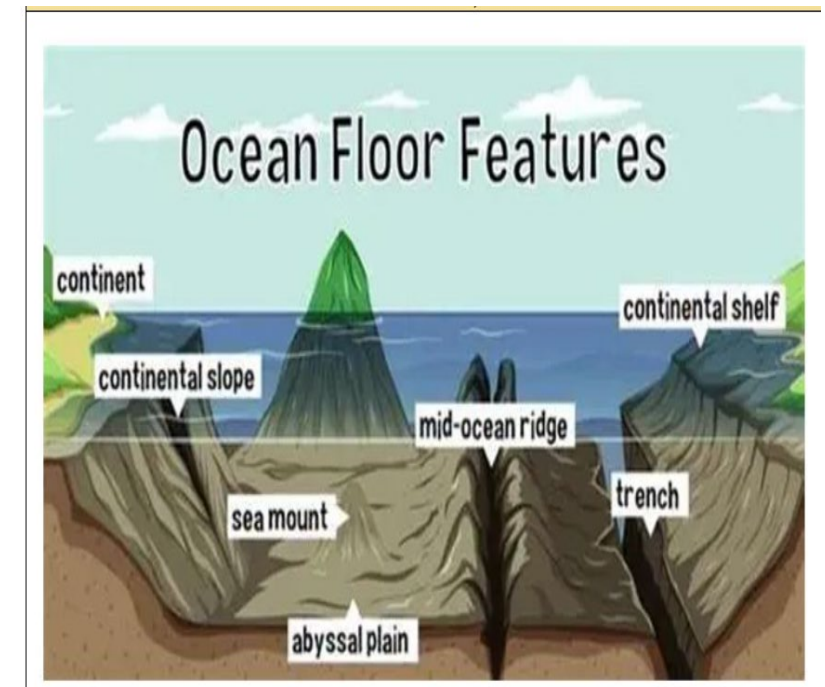
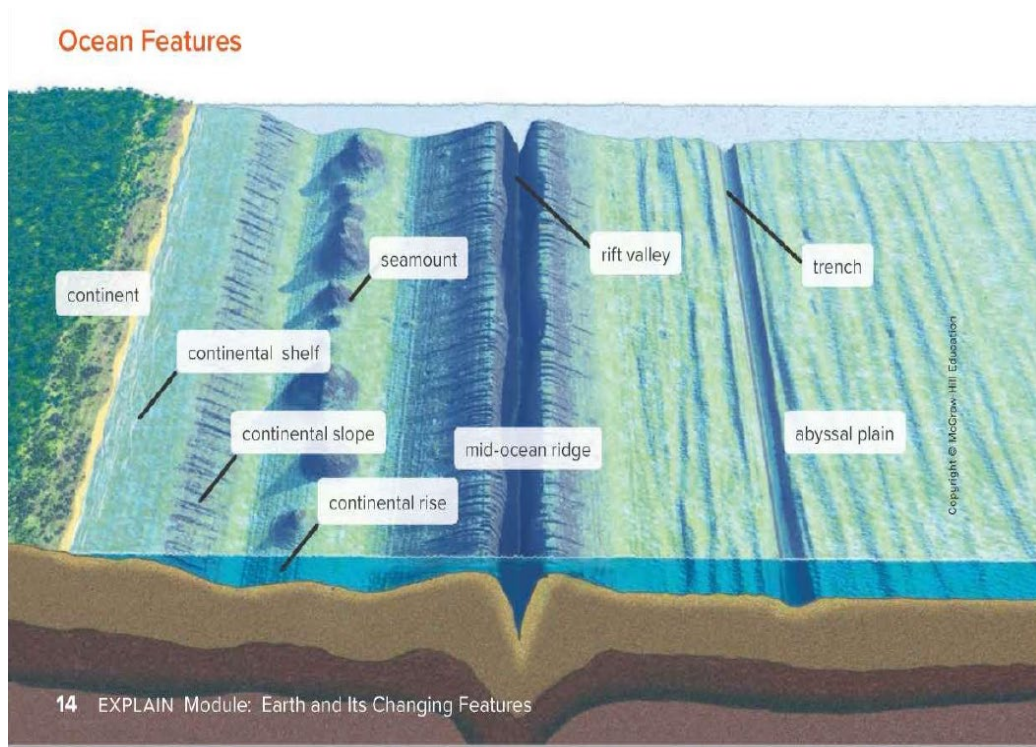
Unit 3 p.14-15 Section Ocean Features,

Ocean Features



Students will be able to recognize that underwater canyons can form on the continental slope Unit 3 p.14-15 Section Ocean Feature

at the point where a sharp downward slope begins. This is called the *continental slope*. This land is the steeper part of the continent that slopes down toward the ocean floor. Underwater canyons can form on the continental slope.



Students will know ways buildings are made strong to stay safe during earthquakes. Unit 3 pages 114-115

Architects and scientists study earthquakes to design safe buildings. A building needs to resist lateral forces during an earthquake. **Lateral forces** are forces that come from the side. Buildings have steel, wood, or concrete frames. Horizontal beams support the weight of roofs and floors.

Beams transfer forces to vertical columns. Columns transfer forces to the foundation. The foundation transfers forces to the ground. The frame of a building can resist lateral forces with bracing. **Bracing** is made of diagonal pieces connecting beams and columns. Bracing comes in several shapes. Some bracing looks like the letter X. Other bracing looks like the letter K.



Students will be able to identify areas near fault lines or tectonic plate boundaries as regions where earthquakes are most likely to occur. Unit 3 p.19 (3rd Paragraph), p.19 p.85

2. Describe the global patterns of volcanoes and earthquakes that are shown on the world map.

Both are likely to occur near plate boundaries.

1. The map below shows Earth's crust broken into 12 major plates. These plates are in constant motion, and Earth experiences earthquakes every day.



Think about patterns of earthquakes. Which number on the map shows where earthquakes are most likely to occur?

- A. 1
B. 2
C. 3
D. 4

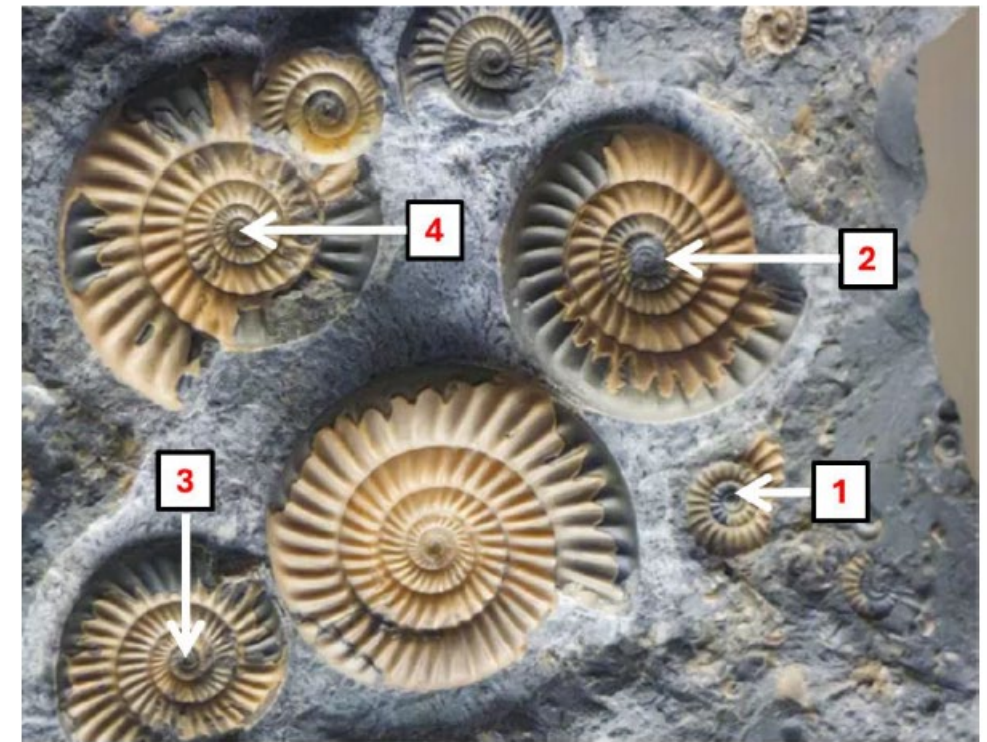
Students will be able to use pictures of fossils to identify which one is the youngest.
p.32 Section on Fossils (including image and paragraph that comes after)

Ammonites lived in water. These fossil ammonites were found on land.

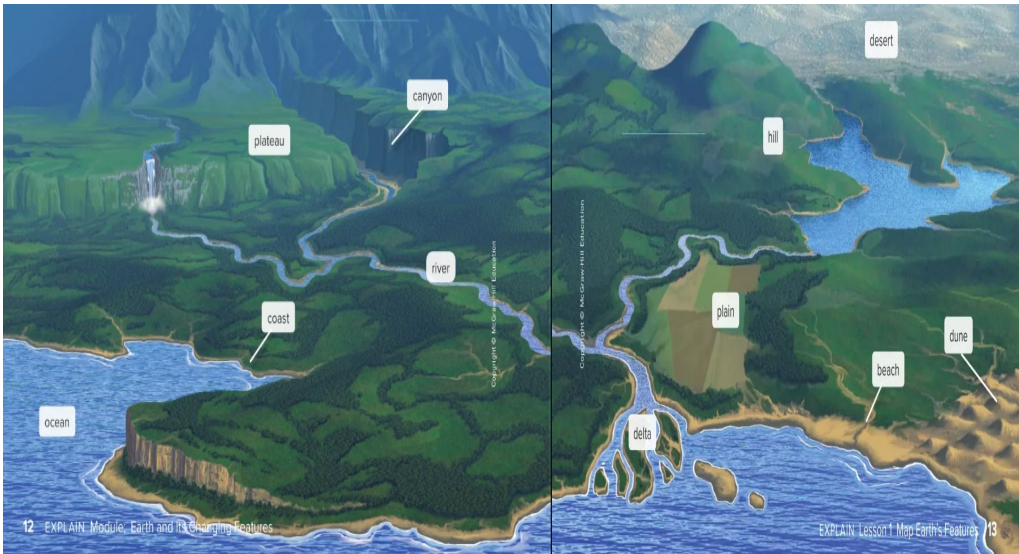


Scientists can also determine the relative age of fossils based on the layer of rock in which they are found. Some fossils also provide clues to a rock layer's relative age. How deep an organism is buried also gives clues as to when the organism lived. Fossils found in layers closest to the surface are usually younger than fossils that are found in deeper layers of rock.

Which fossil, 1, 2, 3 or 4, is most likely the youngest? **1**



Students will be able to identify and name common landforms from diagrams. Students will be able to describe the characteristics of different landforms using simple language. Unit3 p.12-13 Landforms



A	BEACH
B	PLAIN
C	CANYON
D	LAKE
E	MOUNTAIN
F	PLEATEAU
G	HILL
H	RIVER
I	OCEAN
J	VALLEY

Pages that will be covered
in the exam: FRQ formal
response

UNIT 3 DYNAMIC EARTH

Students will be able to identify and name common landforms from diagrams. Students will be able to describe the characteristics of different landforms using simple language. Unit 3 p.12-13 Landforms



- Mountain** A landform that rises high above the Earth's surface.
- Hill** A natural elevation of the Earth's surface, smaller than a mountain.
- Valley** A valley is the low land between hills or mountains.
- Canyon** A canyon is a deep valley with high, steep sides.
- Plain** A plain is a wide, flat area.
- Plateau** A plateau is flat land that is higher than the land around it.
- Desert** A desert is an area with very little precipitation.
- Beach** A beach is the land along the edge of a body of water.
- Dune** A dune is a mound of sand.
- Ocean** An ocean is a large body of salt water.
- Coast** A coast is where a body of water meets land.
- River** A river is a natural body of moving water.
- Lake** A lake is a body of water surrounded by land.
- Delta** A delta is the mass of land that forms at the mouth of a river.
- Inlet** An inlet is a narrow body of water off a larger body of water.

A	BEACH	Land along the edge of a body of water
B	PLAIN	Wide flat area
C	CANYON	Deep valley with high steep sides
D	LAKE	Body of water surrounded by land
E	MOUNTAIN	Rises high above earths surface
F	PLEATEAU	Flat land that is higher than the land around it
G	HILL	Smaller than a mountain
H	RIVER	Natural body of moving water
I	OCEAN	Large body of salt water
J	VALLEY	Low land between hills or mountains

Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways erosion and deposition happen. Students will be able to explain why fast-moving water changes land more than slow-moving water. Unit 3 p.48-52 Section Weathering + Erosion and Deposition, p.50 Erosion and Deposition by gravity, water and wind, p.51

Weathering

Recall the changes that you observed in the Inquiry Activity, *Shake, Rattle, and Roll*. You modeled weathering when you shook the jars. **Weathering** is the slow process that breaks down materials into smaller pieces. This process explains how rocks can change size and shape without changing their chemical properties.

Physical Weathering

Water can seep into cracks in a rock during warm weather. When the water freezes during cold weather, the water expands and makes the crack bigger. This process can also cause potholes and cracks in a road or sidewalk.

Abrasion is the action of rocks and sediments grinding against each other and wearing away surfaces. Abrasion can happen in many ways, such as when rocks and pebbles roll along the bottom of a river. Abrasion also occurs when rocks fall and tumble against one another. The force of the rocks hitting each other knocks off pieces of the rock. Wind causes abrasion. Sand blown by wind against exposed rock wears away the surface of the rock.

Many animals, like gophers, worms, and ants, can loosen and move soil and break apart rocks as they burrow in the ground. Plant roots can grow inside cracks in a rock and, over time, split the rock into pieces.

GO ONLINE Watch the video *Landscapes Change Over Time* to learn more about these processes.



The actions of living things, such as burrowing animals or growing plant roots, can cause weathering.

What type of force can cause abrasion?

Chemical Weathering

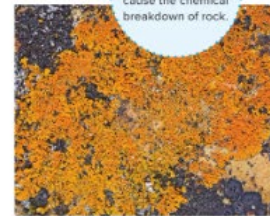
Chemical weathering changes the minerals that make up rocks. Water, living things, and oxygen can cause chemical weathering.

Acids from natural sources, such as volcanoes, can make water more acidic. These acids can speed the breakdown and weathering of rocks.

Iron combines with oxygen in the presence of water to form rust. Rocks that contain iron can rust. Rust makes rock soft and crumbly.

Plant roots give off a weak acid as they grow. Lichens, plant-like organisms that grow on rocks, also produce weak acids. Lichens are important to soil formation in cold climates.

Lichens produce acids that help cause the chemical breakdown of rock.



Erosion and Deposition

Erosion is the movement of weathered material from one place to another. The process of eroded soil and bits of rock being dropped off in another place is **deposition**. Erosion and deposition are two processes that change the shape of land.

Erosion and Deposition by Gravity

Gravity causes material to move. The sudden movement of large amounts of material down a slope can take the form of mudslides, landslides, and rockslides. Strategies such as building away from steep slopes, redirecting surface water away from landslide-prone areas, and planting ground cover to reduce water filtering into the ground can reduce hazardous events such as landslides.

Erosion and Deposition by Running Water

As water runs downhill, it can wash away soil and erode rock. The steeper the land, the faster the water moves. Fast-moving water has more energy. It can wash away larger amounts of heavier sediment. Rivers eventually flow into a larger body of water, such as a lake or an ocean. The sediment carried by the river is deposited on the bottom of the larger body of water. Over time, this sediment builds up into a landform called a delta.

Erosion and Deposition by Wind

Wind can move sand from one place to another. The stronger the wind blows, the larger the particles it can pick up. Deposition occurs when a clump of grass or rock traps the sediment. A sand dune is a deposit of wind-blown sand. Dunes move over time.

Plant roots can help keep a dune from moving.



Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways erosion and deposition happen. Students will be able to explain why fast-moving water changes land more than slow-moving water. Unit 3 p.48-52 Section Weathering + Erosion and Deposition, p.50 Erosion and Deposition by gravity, water and wind, p.51

Erosion and Deposition in Shorelines

Waves release a lot of energy when they hit the beach. A large wave can break solid rock or throw rocks back against the shore.

The rushing water in breaking waves can easily wash into cracks in the rocks, helping to break large boulders. The loose sand picked up by the waves polishes and wears down coastal rocks. Waves can also move sand and rocks and deposit them in other locations, forming beaches. A beach is any area of shoreline made of material deposited by waves. Some beach material is deposited by rivers.

A headland is an area that has water on three sides. Waves curve around a headland and erode the sides. Eventually, the waves change the headland into an arch.

GO ONLINE Watch the video *Weathering* to learn more about what shapes the land.

1. Why does fast-moving water have a greater effect on land?

2. What are the cause and effect of the changes observed in the photo below?



Erosion and Deposition by Glaciers

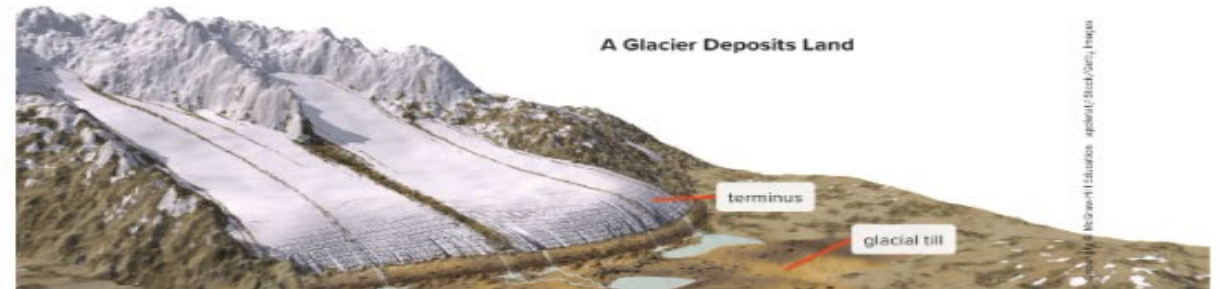
Glaciers form where snow collects quickly and melts slowly. As the snow builds higher, the weight of the ice increases, and the glacier starts to move. As it moves, it tears rock from the ground. Glacial till ends up mostly at the end, or terminus, of the glacier.

Erosion and Living Things

Factors such as heavy rainfalls, sparse vegetation, and steep inclines can cause land to erode at a faster rate. Heavy rainfalls can create new flooded habitats for migratory birds and other water dwellers. Fish lay eggs, and crayfish burrow in the fresh mud. Too much rain can also have negative effects on some wildlife. Heavy rains can destroy nests, burrows, and reduce food sources.

3. ENVIRONMENTAL Connection

How would the rate of erosion of a plain compare to the erosion of the side of a mountain if slope was the only factor to consider?



Revisit the Page Keeley Science Probe on page 43.

Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways erosion and deposition happen. Students will be able to explain why fast-moving water changes land more than slow-moving water. Unit 3 p.48-52 Section Weathering + Erosion and Deposition, p.50 Erosion and Deposition by gravity, water and wind, p.51

1. Weathering is a slow process that does not break down materials into smaller pieces **TRUE**
2. Physical weathering does not change the minerals that make up rocks. **TRUE**
3. Water, living things and oxygen can cause chemical weathering. **FALSE**
4. Erosion is the movement of weathered material from place to another. **TRUE**
5. Deposition is the process through which eroded soil and bits of rock are dropped off in another place. **TRUE**
6. Erosion and deposition change the land. **TRUE**

Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways erosion and deposition happen. Students will be able to explain why fast-moving water changes land more than slow-moving water. Unit 3 p.48-52 Section Weathering + Erosion and Deposition, p.50 Erosion and Deposition by gravity, water and wind, p.51

In what ways does erosion and deposition happen?

Gravity, wind, water, glaciers and living things cause erosion and deposition

Students will be able to identify true and false statements about weathering, erosion, and deposition. Students will be able to name common ways erosion and deposition happen. Students will be able to explain why fast-moving water changes land more than slow-moving water. Unit 3 p.48-52 Section Weathering + Erosion and Deposition, p.50 Erosion and Deposition by gravity, water and wind, p.51

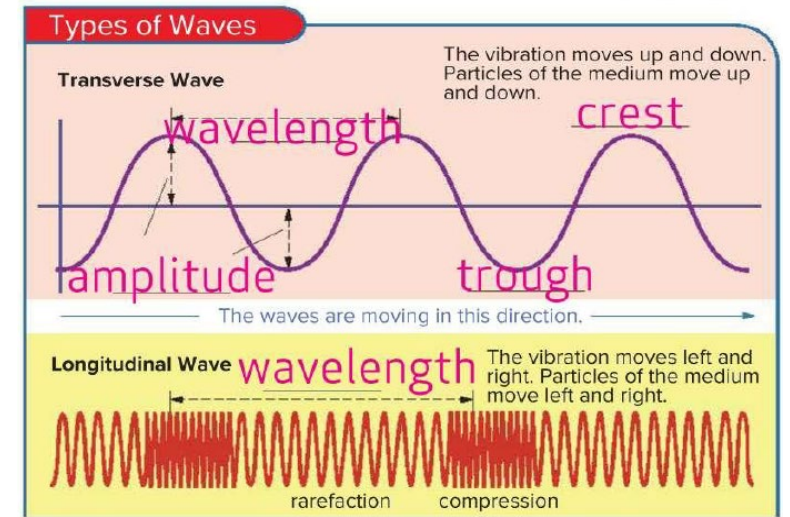
1. Why does fast-moving water have a greater effect on land?

fast moving water has more energy so it can take more sediment

Students will be able to compare the wavelength and frequency of two waves travelling at the same speed. Unit 3 p. 95 Section Feature of Waves (1st Paragraph), p.96

Features of Waves

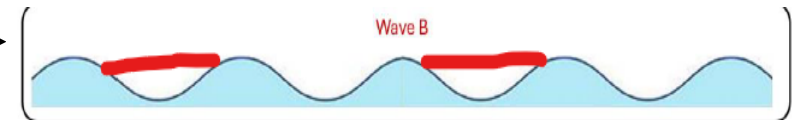
The crest of a transverse wave is its highest point. In a longitudinal wave, it is the point where the particles are closest together. Waves also have troughs. The trough of a transverse wave is its lowest point. In a longitudinal wave, it is the point where the particles are farthest apart.



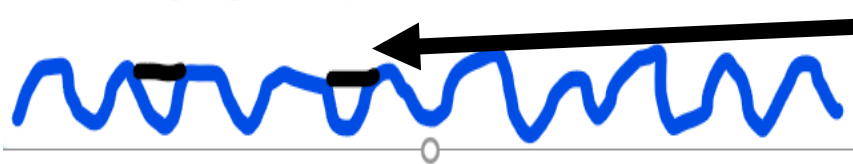
Long wavelength, low frequency:



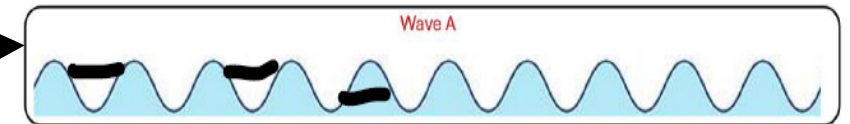
Long wavelength-
Distance between waves
is more



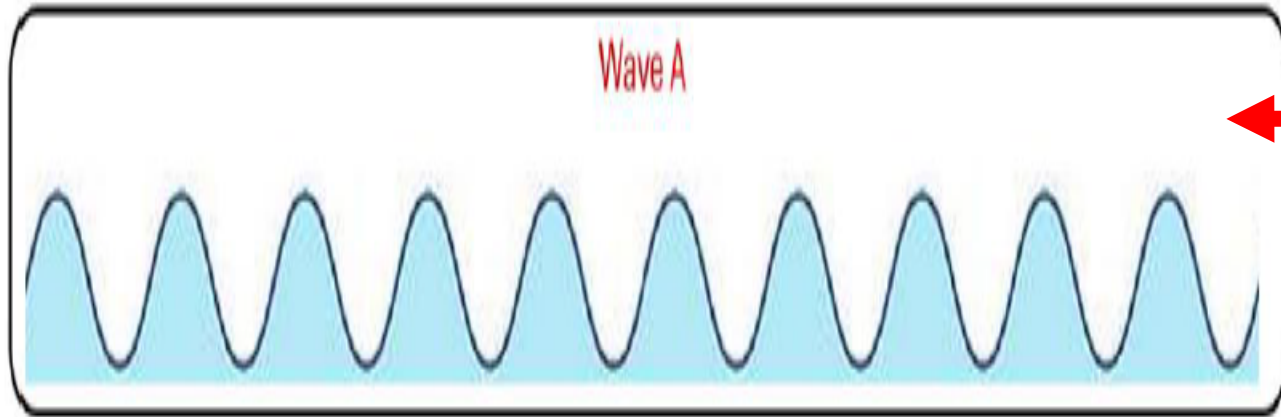
Short wavelength, high frequency:



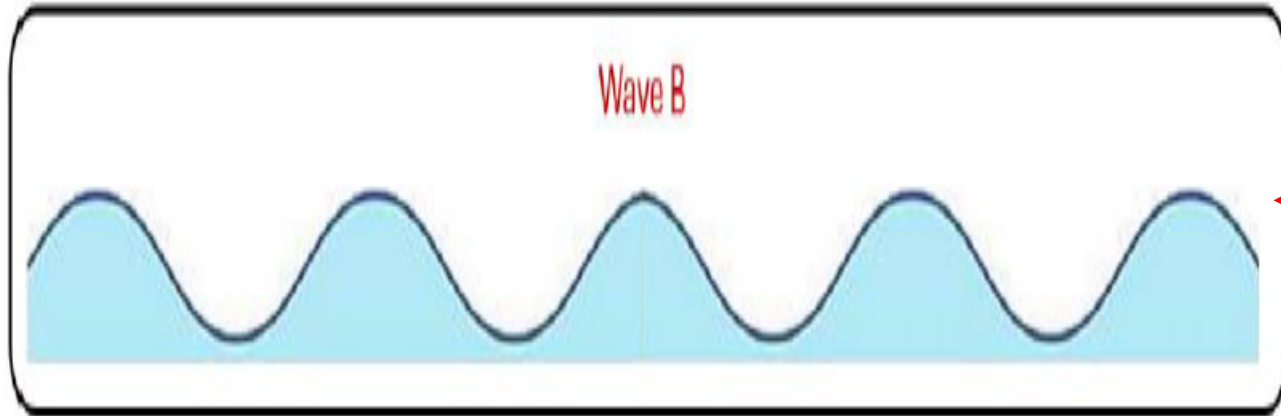
Short wavelength-
Distance between waves
is less



Students will be able to compare the wavelength and frequency of two waves travelling at the same speed. Unit 3 p. 95 Section Feature of Waves (1st Paragraph), p.96



Higher frequency



Lower frequency

Students will be able to rank earthquake magnitudes by comparing their values.

Arrange the earthquakes in the table below from strongest to weakest.

Earthquake	Magnitude
A	6.9
B	7.8
C	4.3

Strongest to weakest

7.8 6.9 4.3

Students will be able to rank earthquake magnitudes by comparing their values.

Arrange the earthquakes in the table below from weakest to strongest.

Earthquake	Magnitude
A	6.9
B	7.8
C	4.3

Weakest to strongest

4.3 6.9 7.8

Pages that will be covered
in the exam:

UNIT 1 FORCES AND
ENERGY

Students will be able to identify whether forces acting on an object are balanced or unbalanced. Unit 1 p.13

Section: Balanced and Unbalanced Forces

Balanced and Unbalanced Forces

The forces that act upon an object combine in different ways. Forces that act in the same direction add up to produce a stronger force. Forces that act in opposite directions produce a weaker force. The total force on an object is the sum of all of the forces acting on the object.



When forces act on an object without changing its motion, they are called balanced forces. If an object is at rest, the forces on it are balanced. Forces on a moving object can be balanced too. When ice skating, your feet push against the ice, moving you forward. That force can be balanced with forces from air against your body. When you skate in a straight line at the same speed, the forces are balanced. If the total force acting on an object equals zero, the object will not accelerate.

Talk About It

What other sports or activities can you think of that involve balanced forces? Discuss in a small group.

Forces that do not add up to zero are unbalanced. Unbalanced forces change the motion of an object. Unbalanced forces can also affect an object's speed, direction, or both. For example, a skier will not start skiing until an unbalanced force acts on her. Unbalanced forces cause the skier's speed and direction to change.

All objects have a property called inertia. **Inertia** is the tendency of an object in motion to stay in motion or of an object at rest to stay at rest.



Eventually, the skier's motion will come to a stop because of opposite forces acting against the skis.

The picture shows
**UNBALANCED
FORCES-** the lady is
moving

When forces act on an object without changing its motion, they are called balanced forces. If an object is at rest, the forces on it are

If an object **DOES NOT
MOVE- IT IS BALANCED
FORCES**

Forces that do not add up to zero are unbalanced. Unbalanced forces change the motion of an object.

If an object **DOES
MOVE- IT IS
UNBALANCED FORCES**

Students will be able to identify whether forces acting on an object are balanced or unbalanced. Unit 1 p.13

Section: Balanced and Unbalanced Forces

BALANCED and UNBALANCED Forces

KEY

For each of the following, circle whether the forces are balanced or unbalanced.

- 1) The boy dropped a ball.

Balanced

Unbalanced



- 2) A tower is sitting on a table.

Balanced

Unbalanced



- 3) The car is pushed on the floor.

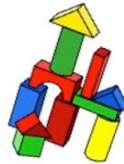
Balanced

Unbalanced

- 4) Two children are fighting over a teddy bear. The teddy bear is not moving.

Balanced

Unbalanced



- 5) The puzzle pieces are laying on the floor.

Balanced

Unbalanced

- 6) The blocks are knocked over and are falling to the floor.

Balanced

Unbalanced



- 7) The girl is rocking on the horse.

Balanced

Unbalanced

If an object DOES NOT
MOVE- IT IS BALANCED
FORCES

Gravity pulls the book down with force.
The table pushes the book up with an equal force.



Both teams pull with equal force in tug-of-war.

The rope doesn't move.



If an object DOES
MOVE- IT IS
UNBALANCED FORCES

The force you apply to push the cart is greater than the friction opposing it.



The force of the kick is greater than the forces keeping the ball at rest.



Students will understand the concept of friction and its effects on moving objects. Unit 1 p.15 Section: Friction

Friction

Hiking on an icy path can be dangerous because the ice is so slippery. Hiking on a rough path is easier because there is more friction between your boots and the path. **Friction is a force between surfaces that slows objects or stops them from moving.** Friction keeps your shoes from sliding out from under you on a regular sidewalk. Friction acts with solids against solids. Smooth surfaces usually have less friction than rough surfaces. Friction increases when surfaces are pressed together with greater force, so heavier objects have more friction.

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Real-life Examples of Friction

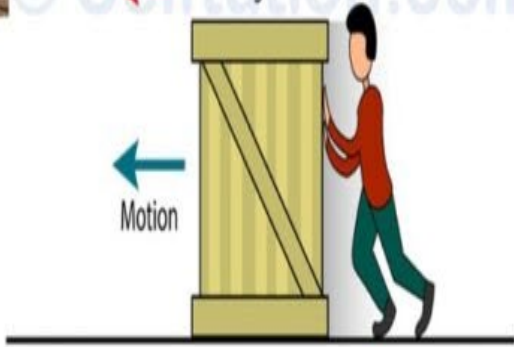
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Walking & writing is not possible without friction



When we apply break we increase friction



Pushing Force

Motion

Force of Friction



Rubbing of hands to generate heat



Friction slows you down on slide to land you safely

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Students will be able to identify the correct units used to measure a given quantity.

Unit 1 p.10 Section Speed

Position and Motion

The position of an object is its location. Certain words give us clues about location, like *left* and *right*, *above* and *below*, and *north*, *south*, *east*, and *west*. When we describe an object's position, we compare it to surrounding objects.

Motion

Motion is a change in an object's position. To describe motion more completely, you also need to find the amount of time it takes an object to move a certain distance. With measures of distance, direction, and time, you can describe motion and how it changes.

Speed

The **speed** of an object is how fast an object's position changes over time. Units of speed are units of distance per unit of time, such as meters per second (m/s), kilometers per hour (km/h), or miles per hour (mph). Suppose that in one hour, you pedal your bike 12 km (7.5 mi). Your speed is 12 km/h (7.5 mph).



In what units can you measure distance?
meters, kilometers and miles

In what units can you measure time?
Meters per hour kilometers per hour miles per hour

In what units can you measure speed?
Meters per second, kilometers per hour, miles per hour

Students will be able to define acceleration as a change in velocity. p.11

Section: Acceleration

Velocity

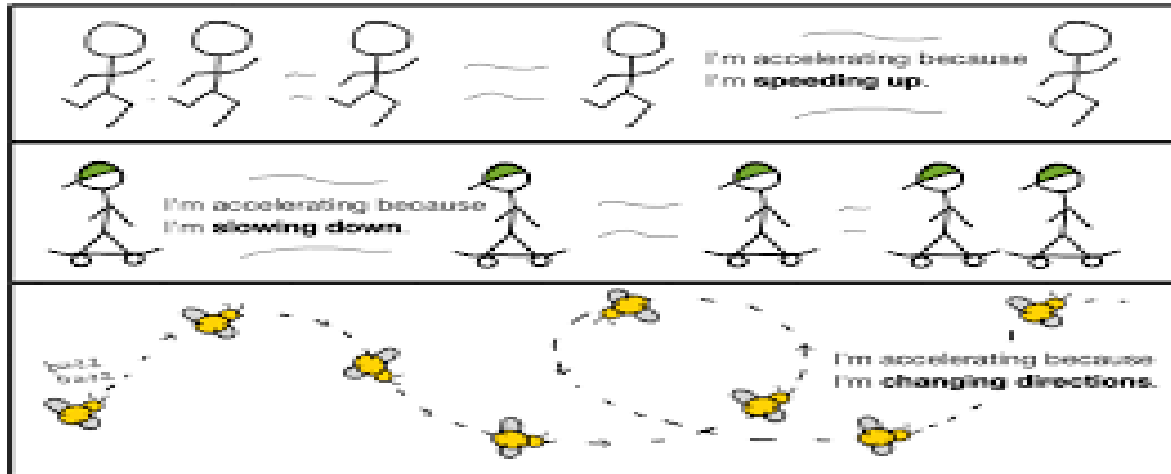
Velocity is the speed and direction of an object. The units of velocity are the same as the units of speed: distance per unit of time. Velocity, however, must also include a direction. If a plane flies 640 kilometers south in 2 hours, its average velocity is 320 km/h south.

Talk About It

How is velocity different than speed?

Acceleration

When a moving object speeds up, slows down, or changes direction, it accelerates. A change in velocity over time is called **acceleration**.



What is acceleration?
a change in velocity

What is velocity?
the speed and direction of an object

Speed is simply
how fast you are travelling



This car is travelling at a speed of 20 m/s

Velocity is
speed in a given direction



This car is travelling at a velocity of 20 m/s east

Students will be able to define a force as a push or a pull. Unit 1 p.12 (1st Paragraph)

Forces Change Motion

A **force** is any push or pull. A force can cause an object to start moving or change direction. It can also cause an object to speed up, slow down, or stop.

The acceleration of an object depends on the amount of force that acts upon the object. A greater force gives an object a greater acceleration. Acceleration also depends on the weight of the object. If you apply the same force to two objects of different weights, the greater weight accelerates more slowly.

Many forces occur as one object touches another. These are called contact forces. For example, when you hit a baseball, you apply a contact force. Other forces can occur without objects touching. These are called noncontact forces. Gravity is a noncontact force.

What is a force?
a push or a pull

Students will understand the concept of inertia as the tendency of objects to keep doing what they are doing Unit 1 p.13 (5th Paragraph)

All objects have a property called inertia. **Inertia** is the tendency of an object in motion to stay in motion or of an object at rest to stay at rest.

What is inertia?

an object in motion will stay in motion. An object at rest will rest.

Students will understand how changing drag forces affect the motion of objects in motion Unit 1 p.15 Section: Friction, p.21

Friction

Hiking on an icy path can be dangerous because the ice is so slippery. Hiking on a rough path is easier because there is more friction between your boots and the path. **Friction** is a force between surfaces that slows objects or stops them from moving. Friction keeps your shoes from sliding out from under you on a regular sidewalk. Friction acts with solids against solids. Smooth surfaces usually have less friction than rough surfaces. Friction increases when surfaces are pressed together with greater force, so heavier objects have more friction.

When objects move through air, the air hits the objects and slows them down. This *air resistance* increases with velocity. This is why a feather falls slower than a pencil. Without air, the two would fall at the same rate.

What is friction?

a force that slows objects down.

If drag forces are DECREASED the object will fall

A. more slowly

B.faster

C-at the same speed

D-rapidly and then slow down

3. If the drag forces are increased, then an object will fall _____.

☒ A. more slowly

B. faster

C. roughly at the same speed

D. rapidly and then slow down

Students will be able to recognize when an object has only potential energy, only kinetic energy, or both at the same time. Unit 1 p.30 Section: Stored Energy, p.31 Section Energy in Motion, p.39

Energy of Motion

Kinetic energy, or energy of motion, is the energy an object has because it is moving.

Unlike potential energy, energy of motion is not determined by an object's position above a surface. The energy of motion an object has depends in part on the object's speed. Suppose you are riding a bicycle. If you increase your speed, your kinetic energy increases. If you slow down, your energy of motion decreases. If you stop, then you no longer have energy of motion.

 **GO ONLINE** Watch the *Speed and Energy* to learn how speed and energy are

2. An airplane in flight has
- A. stored energy because it is above ground.
 - B. energy of motion because it is moving.
 - ☒ C. both stored energy and energy of motion.
 - D. None of the above



An airplane has kinetic energy and potential energy

Potential energy when it is NOT MOVING
Kinetic energy when it IS MOVING

Students will be able to recognize when an object has only potential energy, only kinetic energy, or both at the same time. Unit 1 p.30 Section: Stored Energy, p.31 Section Energy in Motion, p.39

What form of energy does a car in motion on a flat road have?

(Answer in terms of stored and/or kinetic energies.)

A car in motion has kinetic energy. When the car is not moving it has potential energy

What form of energy does an apple have on the branch of a tree?

(Answer in terms of stored and/or kinetic energies.)

It has stored energy because it is not moving

A ball is thrown upwards. What form or forms of energy does it have as it moves away from the ground? Explain your answer. (Answer in terms of stored and/or kinetic energies.)

When the ball moves up it has kinetic energy

Students will be able to recall the definition of energy Unit 1 p.30 (1st paragraph)

Energy and Motion

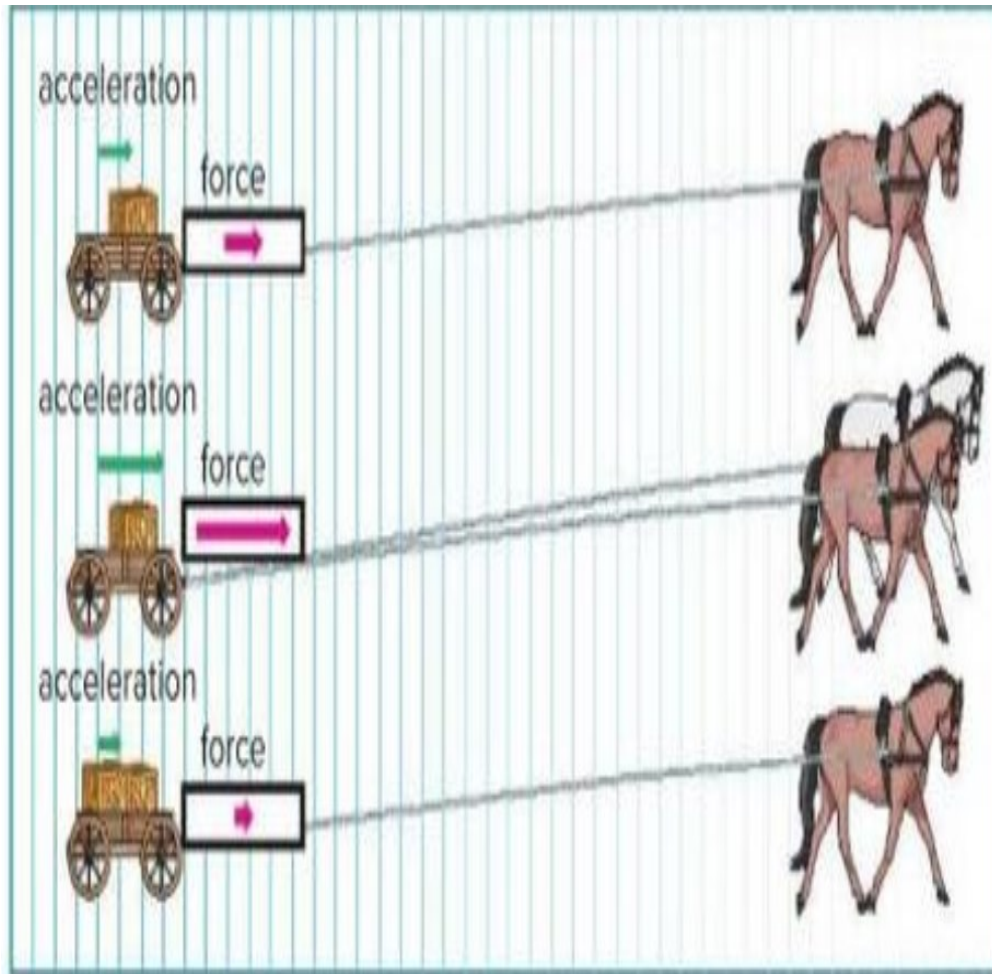
You just learned about how forces can change motion. Any force requires energy. **Energy is the ability to do work.** It can make an object move or change. Scientists classify energy into two main forms: stored energy and energy of motion.

What is energy?

Energy is the ability to do work

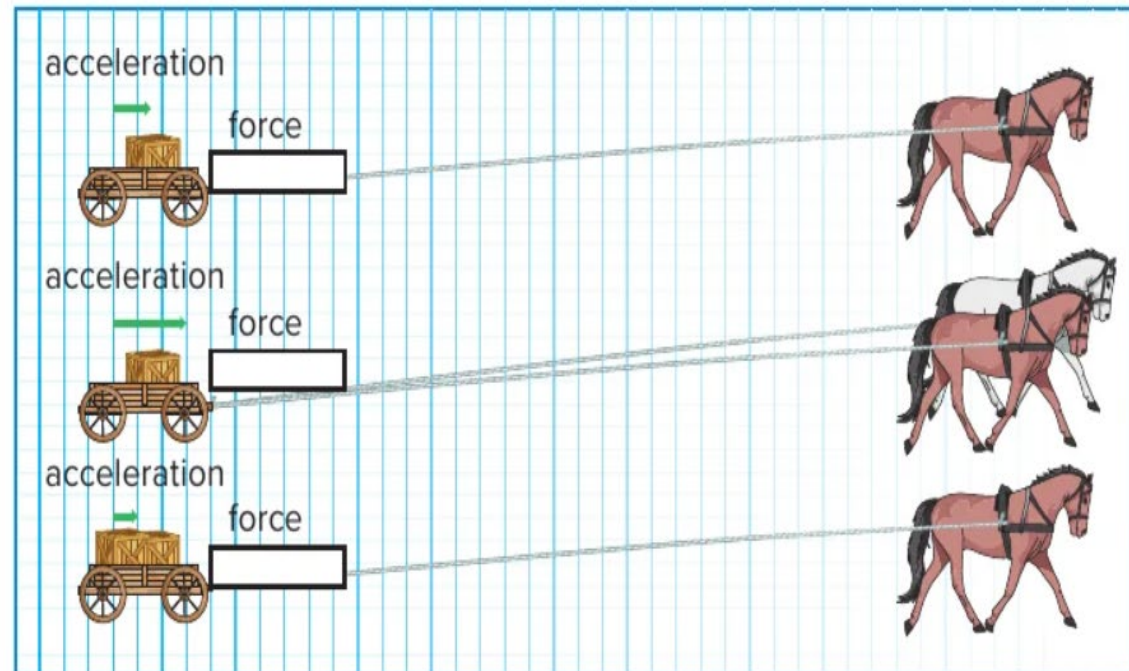
Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

Unit 1 p.12 Label a Diagram Activity



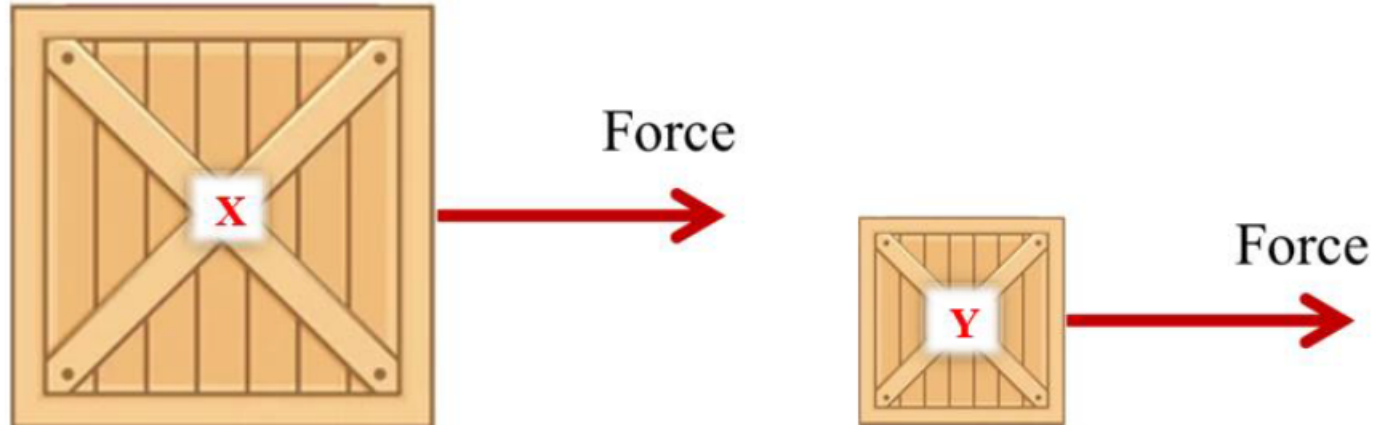
Label a Diagram: Force and Acceleration

Use what you learned in the paragraph above to draw arrows that show the acceleration of each cart. Draw a longer arrow to represent greater force and a shorter arrow to represent lesser force.



Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

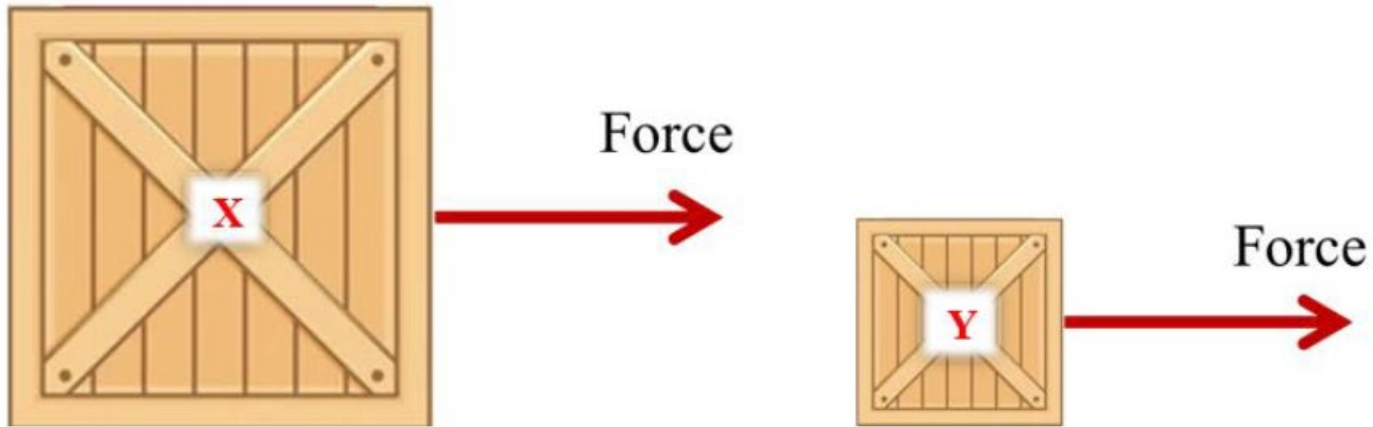
The image below shows two crates of different masses. The crates experience the same force. Which crate has larger acceleration? Why?



Y has a larger acceleration. it is smaller and lighter

Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

The image below shows two crates of different masses. The crates experience the same force. Which crate has lower acceleration? Why?



X has a lower acceleration. it is bigger and heavier

Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

DISTANCE

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

If a car travels **360 kilometers** in **3 hours**, what was the car's average speed?

TIME

SPEED = Distance ÷ Time

SPEED = 360 ÷ 3 = 120

The car's speed is 120km/hour

Students will understand the relationship between force, mass, and acceleration. Students will know how to calculate average speed using distance and time

DISTANCE

If a car travels **250 kilometers** in **2 hours**, what was the car's average speed?

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

TIME

SPEED = Distance ÷ Time

SPEED = 250 ÷ 2 = 125

The car's speed is 125km/hour