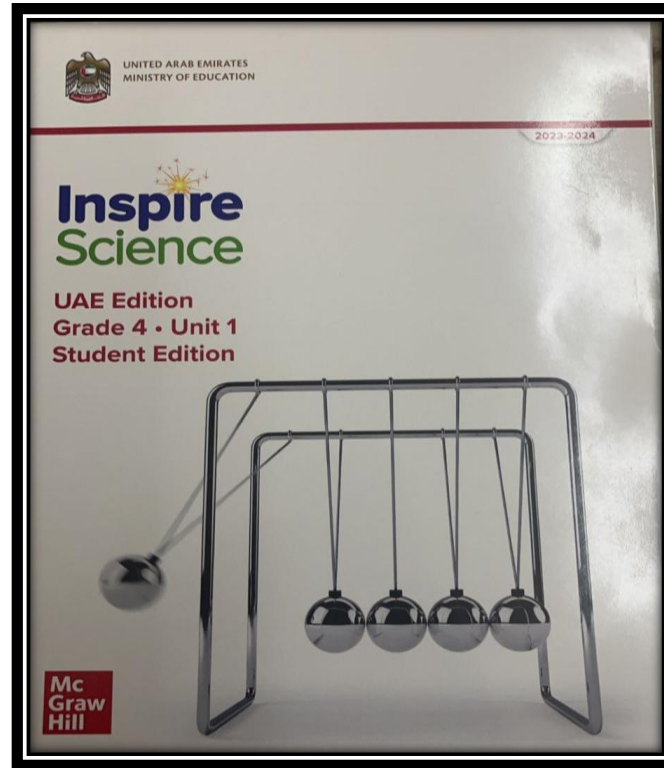
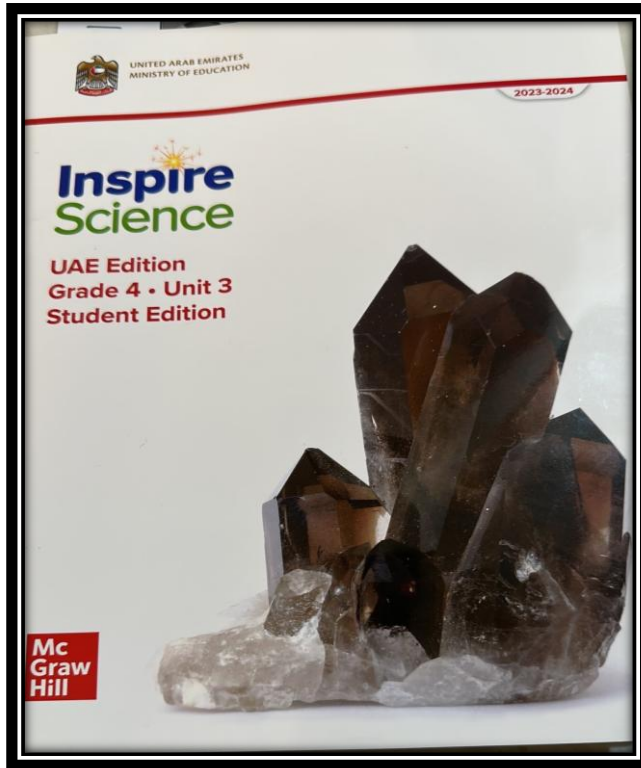




Ahmed Ben Zayed School / cycle 1



End of Term 1 Exam
Revision
Science Grade 4

Done by science teachers:
Mouza Aldhaheri & Mouza Alshamsi

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

أسئلة اختيار من متعدد MCQ

عدد الأسئلة الموضوعية 20 سؤال
كل سؤال عليه 3 درجات
المجموع 60 درجة

1. What is Volcano?

- A. Sudden movement of earth's crust.
- B. An opening on earth's surface.
- C. A large Landmass.
- D. Physical features on earth.

2. What is forced out of volcano?

- A. Melted rock and gases.
- B. Water.
- C. Sand.
- D. Ash.

Tension, or forces that pull things apart, moves Earth's plates. Plates can also be moved by pushing forces. Mountains form when plates push together or past each other along plate boundaries. Many earthquakes and volcanoes also happen at plate boundaries.

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.

An **earthquake** is a sudden movement of Earth's crust. Like volcanoes, most earthquakes occur because of moving plates. Also, like volcanoes, earthquakes are most likely to occur near plate boundaries. You will learn more about earthquakes in the next module.

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

Both are likely to occur near plate boundaries.

Think about the ocean floor features from page 14. Some of these features, like ocean trenches, occur where two plates push together. Mid-ocean ridges occur where two plates spread apart. As the two plates move apart, new crust forms. The mid-ocean ridges are all connected and form the most extensive underwater mountain system on Earth.

3. Use the graphic organizer to classify the location of the following features: abyssal plains, earthquakes, mountains, volcanoes.

Near Plate Boundaries	Not Near Plate Boundaries
earthquakes, mountains, volcanoes	abyssal plains

Talk About It

Explain to a classmate where you would most likely find mountain ranges on the ocean floor.



3. An object that is **sitting** has ----- force acting on it.

- A. Unbalanced
- B. Balanced
- C. Motion
- D. Speed

4. A boy Pushes on a box and **moves it** in room. This is-----

- A. Physical reaction.
- B. Unbalanced force
- C. Chemical reaction
- D. Balanced force

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.



5. What is friction?

- A. Force that pulls all object down.
- B. Force between surfaces that slows or stop object.
- C. Change in velocity over time.
- D. Change in an object's position.

6. What causes heat when rubbing your hands together?

- A. Force
- B. Gravity
- C. Friction
- D. Acceleration

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.

Drag forces act with solids against gases or fluids. Larger surfaces have more drag. This is why water can slow down a rock that is dropped into water.

What effects do gravity and friction have on roller coaster cars?

Sample answer: Gravity pulls the cars down the hills. Friction between the wheels and the track slows the cars down and works against motion.

Make Connections
Talk About It
Talk with a partner about how gravity and air resistance affected the motion of the falling balls in the Inquiry Activity, *An Object's Motion*.

GO ONLINE Watch the video *Gravity and Friction* to learn more about forces and motion.

Notes

Friction between the hiking boots and the ground keep the hiker from slipping.

REVISIT Revisit the Page Keeley Science Probe on page 5.

PAGE KEELEY SCIENCE PROBES

EXPLAIN Lesson 1 Forces and Motion 15

7. Which force will **stop** a moving truck?

- A. Friction
- B. Inertia
- C. Newtons
- D. Balanced forces

Friction

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Friction between the hiking boots and the ground keep the hiker from slipping.



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REVISIT Revisit the Page Keeley Science Probe on page 5.



8. What units can you measure **distance**?

- A. Hour
- B. Meter per second
- C. Kilometers
- D. second

9. What example show unit of **time** ?

- A. 2 Hour
- B. 600 Meter per second
- C. 5 Kilometers
- D. 9 miles

VOCABULARY

Look for these words as you read:

acceleration
force
friction
inertia
motion
speed
velocity

Position and Motion

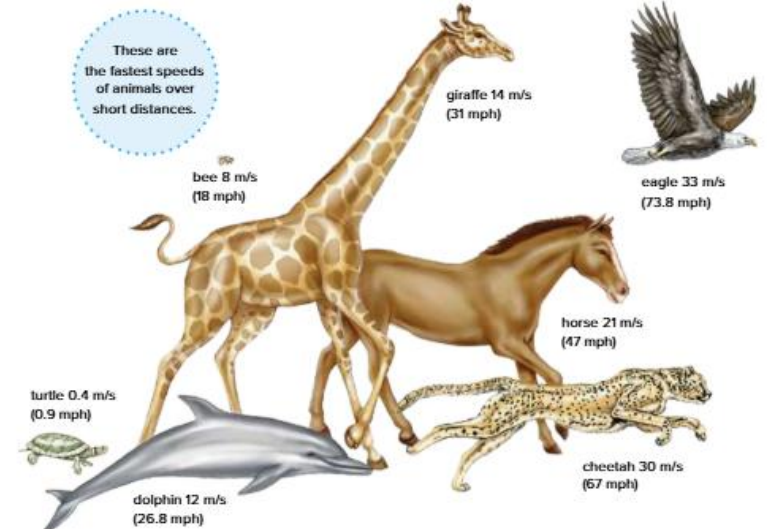
The position of an object is its location. Certain words give us clues about location, like *left* and *right*, *above* and *below*, and *north*, *south*, *east*, and *west*. When we describe an object's position, we compare it to surrounding objects.

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).



10. What is the **speed** of horse ?

- A. 21 m
- B. 21m/s
- C. 33 m/s
- D. 21 hour

11. Suppose that in 1 hour, you pedal your bike 12 km. what is your **speed**?

- A. 1 km/h
- B. 13 m/s
- C. 12 km/h
- D. 12 m/s

VOCABULARY

Look for these words as you read:

acceleration
force
friction
inertia
motion
speed
velocity

Position and Motion

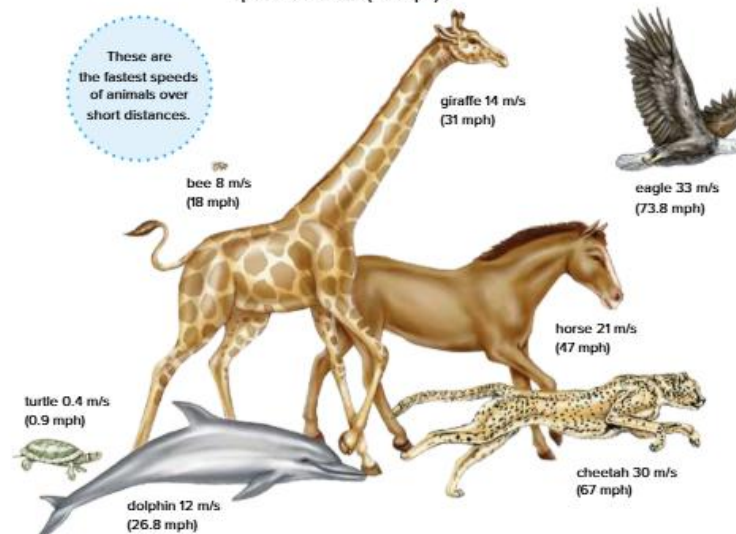
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Speed

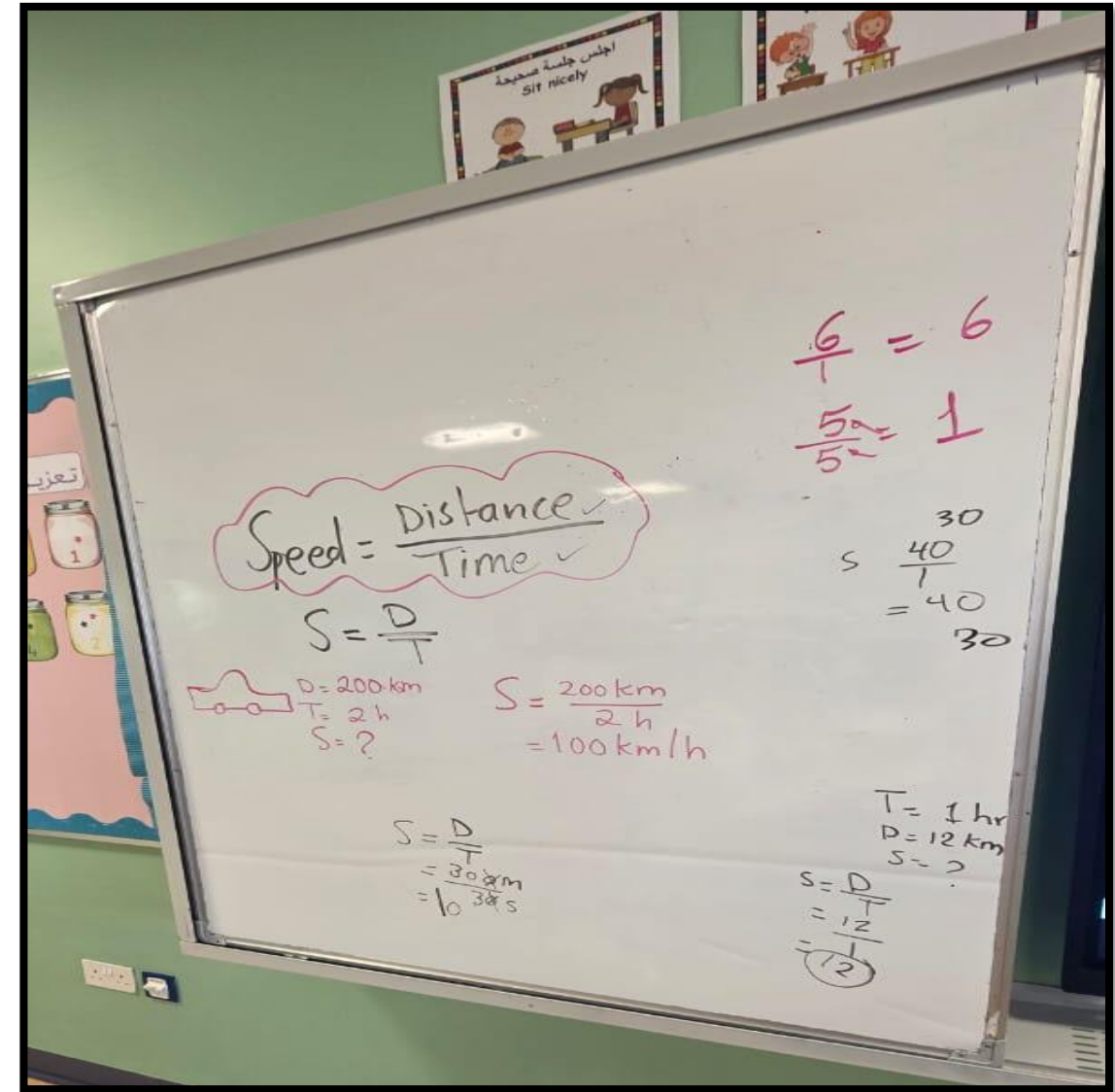
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- How to calculate speed:

Speed = distance / time

- If we divide the number on 1 the answer will be the same number of distance.
- **If we divide the number on itself the answer will be 1.**
- If we have zero on the up and down on equation, we cancel the zero.
- **If we have zero on the up only, we put the zero in answer.**



12. What is **acceleration**?

- A. Change in speed.
- B. Change in direction.
- C. Change in position.
- D. Change in velocity.

13. What is **a change in velocity** called?

- A. Acceleration.
- B. Force.
- C. Speed.
- D. Distance.

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.

GO ONLINE Watch *Acceleration* to learn about how objects move.

Talk About It

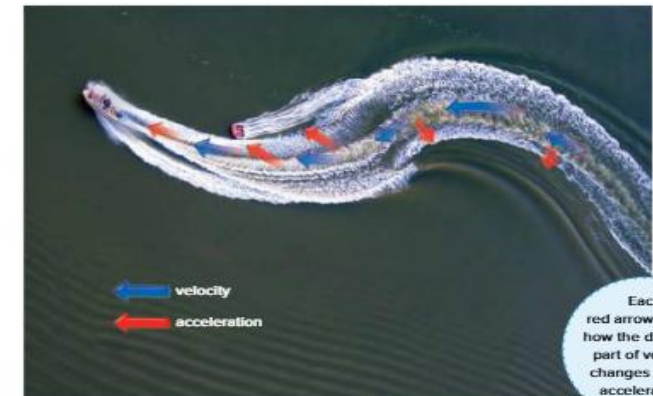
How is velocity different than speed?

Acceleration

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

You also accelerate by changing only direction. When you travel around a curve, the direction of your motion changes. It doesn't matter whether your speed is constant or changing. As long as your direction of motion is changing, you are still accelerating.

Label a Diagram Velocity and acceleration can both be represented by arrows. Look at the diagram below. Circle the pair of arrows that show when the boat's velocity and acceleration have the same direction.



14. What is **Force**?

- A. Change in speed.
- B. Any push or pull.
- C. How fast an object move.
- D. Change in velocity.

15. **A force** can cause an object to ---

- A. Start moving.
- B. Change direction and speed
- C. Stop moving.
- D. All of the above.

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.



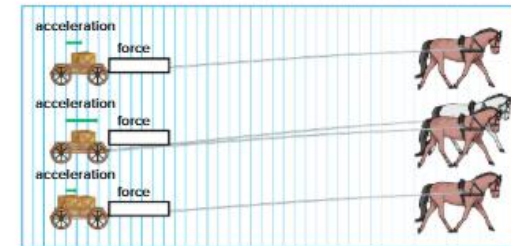
The contact force from the baseball bat accelerates the ball.

- What two factors affect the acceleration of an object?

- How could you increase the speed of a toy car?

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.



16. What is Inertia?

- A. The position of an object.
- B. Any push or pull.
- C. The tendency of an object in motion to stay in motion or at rest to stay at rest.
- D. Change in velocity.

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.



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Talk About It

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

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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.



17. 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

18. If drag forces are **INCREASED** the object will fall-----

- A. more slowly
- B. faster
- C. at the same speed
- D. rapidly and then slow down

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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Drag forces act with solids against gases or fluids. Larger surfaces have more drag. This is why water can slow down a rock that is dropped into water.

What effects do gravity and friction have on roller coaster cars?

Make Connections

Talk About It

Talk with a partner about how gravity and air resistance affected the motion of the falling balls in the Inquiry Activity, *An Object's Motion*.

GO ONLINE Watch the video *Gravity and Friction* to learn more about forces and motion.

Notes

Friction between the hiking boots and the ground keep the hiker from slipping.



Revisit the Page Keeley Science Probe on page 5.

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

- A. Sound energy.
- B. Light energy.
- C. Stored energy.
- D. Kinetic energy.

VOCABULARY

Look for these words as you read:
energy

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.

Stored Energy

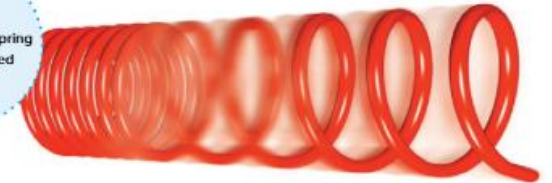
Energy that is stored inside an object is called potential energy. An object with potential energy is not using the energy now. Instead, the energy is stored in the object and can be used later. One form of potential energy is present when objects are above a surface.

Talk About It

Refer to the Inquiry Activity, *The Moving Ball*. When did the ball have the most stored energy? Discuss your observations with a partner.

Objects can also store energy because of their elasticity. Suppose you are jumping on a trampoline. When you press down on the trampoline, the trampoline gains stored energy because it is stretched. The trampoline uses this energy to push you back up.

Releasing a compressed spring releases stored energy.



1. What happens to the potential energy of an object when it is raised higher?

Talk About It

Look at the photo of a spring. Compare how a trampoline and a spring change stored energy to energy of motion. Explain your thinking to a partner.

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

- A. Sound energy.
- B. Light energy.
- C. Stored energy.
- D. Kinetic energy.

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 video *Speed and Energy* to learn more about how speed and energy are related.

Talk About It

Describe another activity where you have to change your energy of motion to complete a task. Discuss with a small group.

Kinetic energy also depends on mass. If two objects with different masses are traveling at the same speed, the object with the greater mass has more energy of motion.

You give objects energy by applying a force to them. A pitcher applies force to a baseball as he or she throws it. This causes the ball to start moving, so the ball has kinetic energy. Gravity also acts on the ball causing it to move downward. The catcher applies another force to the ball as he or she catches it. The catcher decreases the speed of the ball, so the kinetic energy decreases.

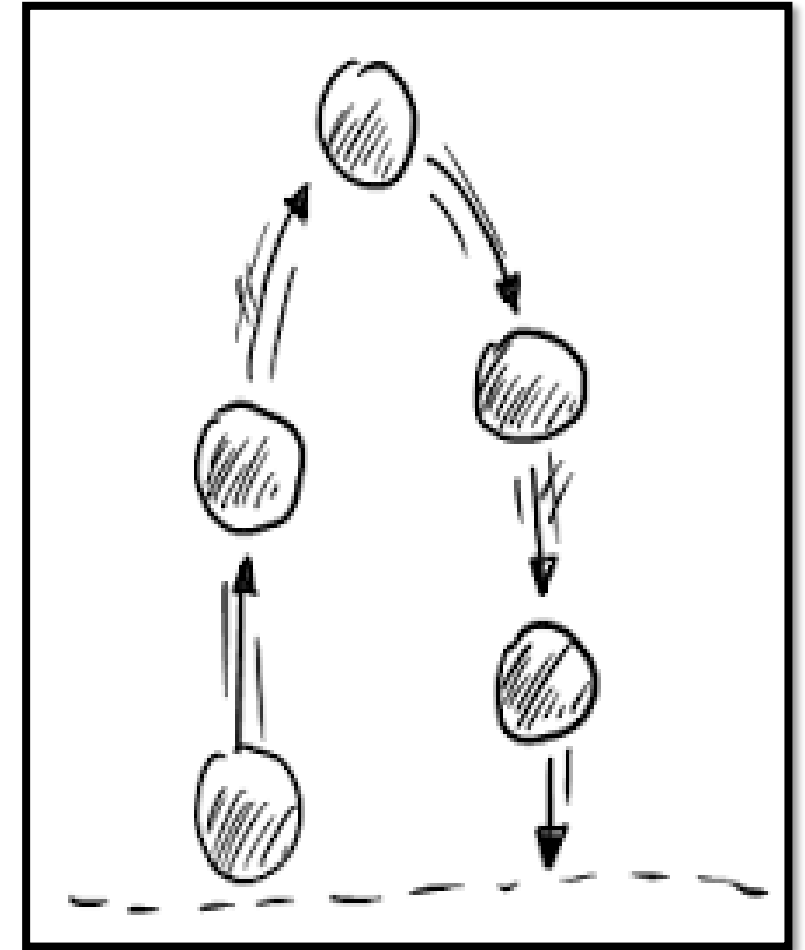
2. How are energy of motion and speed related?



The airplane has stored energy because it is above the ground. It also has energy of motion because it is moving.

21. A ball is **thrown upwards**. What form or forms of energy does it have as it **move away from ground**?

- A. Sound energy.
- B. Kinetic energy.
- C. Stored energy.
- D. Both B and C.



22. What is **energy**?

- A. Ability to do work.
- B. Any push or pull.
- C. Change in velocity.
- D. How fast an object move.

VOCABULARY

Look for these words as you read:
energy

Energy and Motion

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Stored Energy

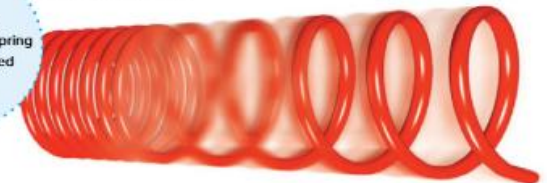
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1. What happens to the potential energy of an object when it is raised higher?

Talk About It

Look at the photo of a spring. Compare how a trampoline and a spring change stored energy to energy of motion. Explain your thinking to a partner.

23. How do particles move in a transverse wave?

- A. Back and forth.
- B. Up and down.
- C. straight line.
- D. round and round.

24. How do particles move in a longitudinal wave?

- A. Up and down.
- B. Round and round.
- C. Back and forth.
- D. straight line.

VOCABULARY

Look for these words as you read:

amplitude
magnitude
seismic wave
seismograph
transverse wave
wavelength

Waves

What do the waves that you just modeled have to do with earthquakes? Earthquakes produce waves. Think back to the lesson phenomenon. The drop disturbed the surface when it hit the still water. The disturbance produced a series of circles that grew larger as they moved away from the center. These circles are waves. Recall that a wave is a disturbance that transfers energy from one point to another. Just like the drop of water, earthquakes produce waves that ripple outward from the place where the disturbance begins. The sudden movement of an earthquake causes rocks to vibrate. A vibration that travels through Earth and is produced by an earthquake is called a **seismic wave**. Seismic waves spread out in all directions from the focus, the point where an earthquake begins.

The movement of particles by waves is called vibration. Waves are classified by the type of vibration they cause in materials. 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.

The way these students move the spring toy creates a transverse wave.



All waves transfer energy without permanently moving the material through which they travel. This means that after a wave has passed, particles end up in about the same position they started in.

2. Draw waves with the characteristics indicated below.

Long wavelength, low frequency:

Drawing should show same height peaks and narrower waves.

Short wavelength, high frequency:

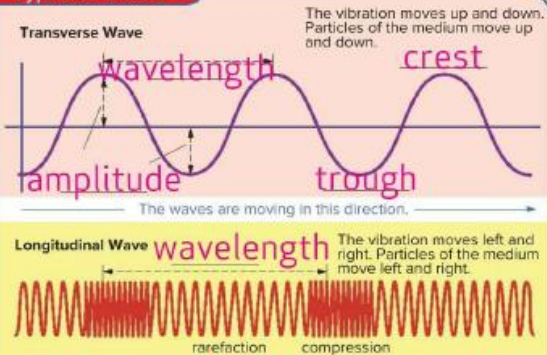
Drawing should show same height peaks and wider waves.

Label a Diagram: Parts of Waves

Use what you learned to label the wavelength, amplitude, crest, and trough of each wave.

GO ONLINE Watch the video *Earthquake Movement* to see how earthquake waves move.

Types of Waves



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1. In what ways could you use a spring to model a transverse wave?
A longitudinal wave?

Sample answer: I could model a transverse wave by moving the spring up and down or side to side. I could compress sections to model a longitudinal wave.

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. For example, the highest point of an ocean wave is the crest, and the lowest point is the trough. Consider a boat on the water. As a wave goes by, the boat rises with the crest and falls with the trough. The boat moves up and down with the wave motion but it doesn't really move in any 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.

PRIMARY SOURCE



Scientists working on the ShakeAlert Earthquake Early Warning System. This system will help keep people safe when the next big earthquake occurs on the West Coast.

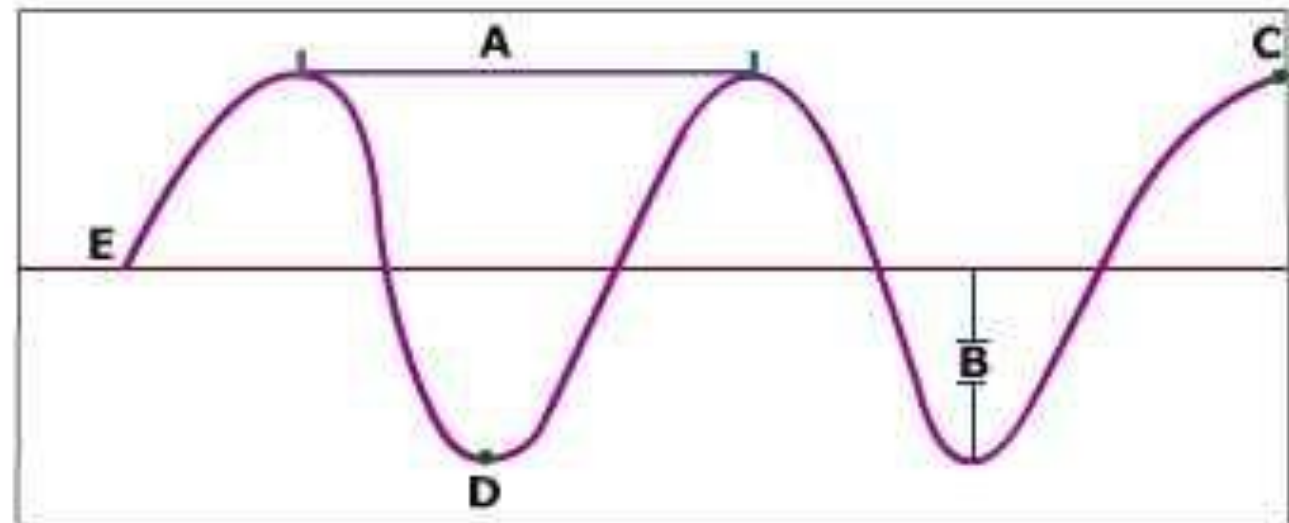
25. Which letter is **wavelength**?

A. A.

B. B.

C. C.

D. D.



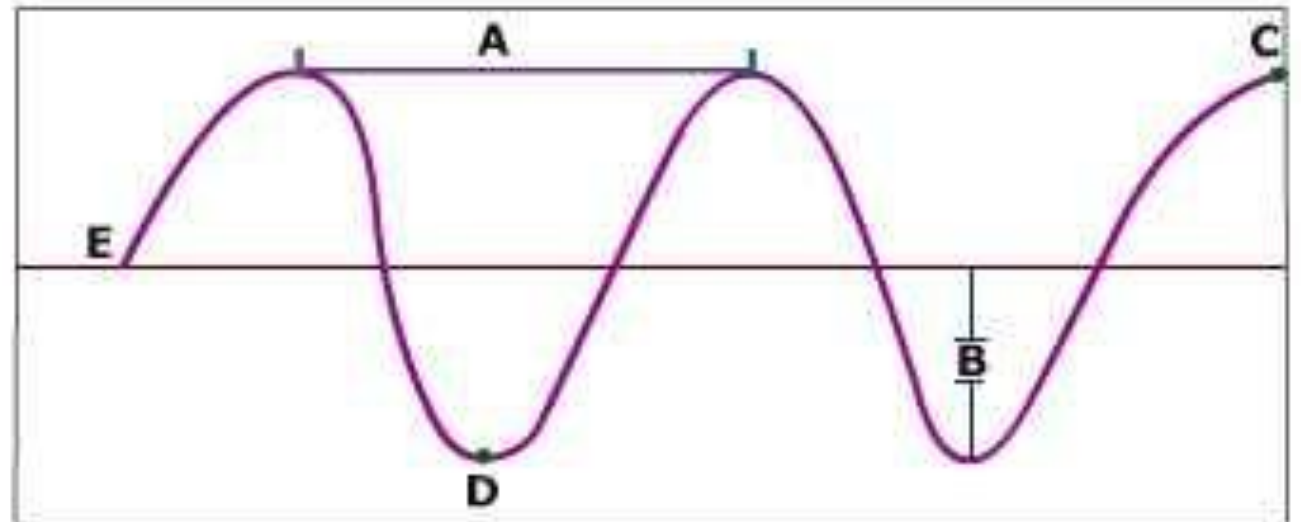
26. Which letter is **Amplitude**?

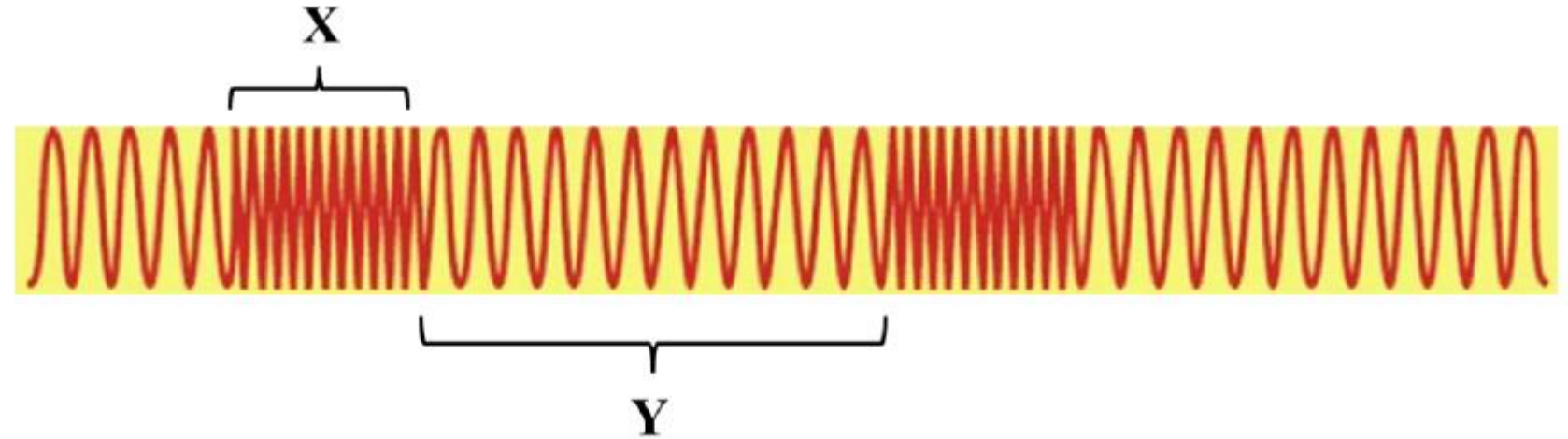
A. A.

B. B.

C. C.

D. D.





27. What is letter **X** ?

- A. Frequency
- B. Compression
- C. Rarefaction
- D. Crest

28. Which letter is **Y** ?

- A. Frequency
- B. Compression
- C. Rarefaction
- D. Crest

California Earthquake Data

Year	Location	Magnitude
1980	Eureka	7.2
1984	Morgan Hill	6.2
1989	Loma Prieta	6.9
1992	Landers	7.3
1994	Northridge	6.7
2004	Parkfield	6.0
2010	Baja	7.2

29. How many earthquakes had a magnitude greater than 7.0 ?

- A. 5
- B. 1
- C. 3
- D. 2

Historical Earthquakes in California

California has experienced a great number of earthquakes throughout its history. On a separate sheet of graph paper, plot the points in the table. Analyze and interpret your data to answer the questions below.

PRIMARY SOURCE



1994
Northridge,
California
earthquake

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

1. According to the data, which decade experienced the most earthquakes?

The 1980s experienced the most earthquakes.

2. What patterns can you identify in the intensity of past earthquakes?

About every 20 years, we have a major earthquake.

California Earthquake Data

Year	Location	Magnitude
1980	Eureka	7.2
1984	Morgan Hill	6.2
1989	Loma Prieta	6.9
1992	Landers	7.3
1994	Northridge	6.7
2004	Parkfield	6.0
2010	Baja	7.2

30. How many earthquakes had a magnitude less than 7.0?

- A. 5
- B. 4
- C. 3
- D. 2

Historical Earthquakes in California

California has experienced a great number of earthquakes throughout its history. On a separate sheet of graph paper, plot the points in the table. Analyze and interpret your data to answer the questions below.

PRIMARY SOURCE



1994
Northridge,
California
earthquake

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
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1984	Morgan Hill	6.2
1989	✓ Loma Prieta	6.9
1992	Landers	7.3
1994	✓ Northridge	6.7
2004	Parkfield	6.0
2010	✓ Baja	7.2

31. Which regions were their earthquakes of magnitude greater than 6.2 and under 7.3?

- A. 5
- B. 1
- C. 4
- D. 2

Historical Earthquakes in California

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PRIMARY SOURCE



1994
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California
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1989	✓ Loma Prieta	6.9
1992	Landers	7.3
1994	✓ Northridge	6.7
2004	Parkfield	6.0
2010	Baja	7.2

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

- A. 5
- B. 1
- C. 4
- D. 2

Historical Earthquakes in California

California has experienced a great number of earthquakes throughout its history. On a separate sheet of graph paper, plot the points in the table. Analyze and interpret your data to answer the questions below.

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1. According to the data, which decade experienced the most earthquakes?

The 1980s experienced the most earthquakes.

2. What patterns can you identify in the intensity of past earthquakes?

About every 20 years, we have a major earthquake.



33. The **land masses** in the picture are examples of -----

- A. Ocean
- B. Landforms
- C. Ocean floor features
- D. Continent

Earth's Ocean Features

Oceans are large bodies of salt water. They make up more than 70 percent of Earth's surface. If you could travel deep below the ocean's surface, you would find features on the ocean floor that look like the mountains, plains, and valleys on Earth's surface.

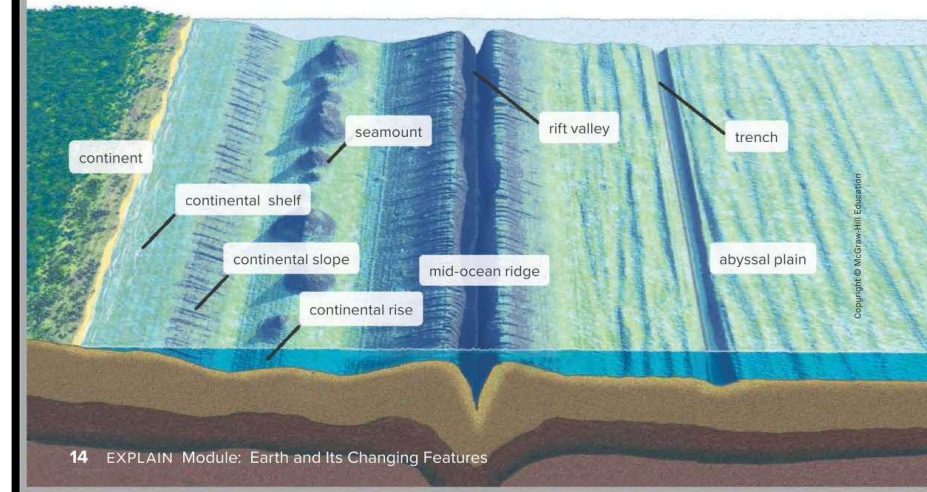
A **continent** is a large landmass. Along the coast of a continent, the ocean floor is called the *continental shelf*. Here, the ocean floor is covered by shallow water and gradually slopes down. The continental shelf ends at the point where a sharp downward slope begins. This is called the *continental 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.

At the base of the continental slope is the *continental rise*. The continental rise connects the continent with the ocean floor.

1. What is the flattest part of the ocean floor?

The abyssal plain is the flattest part of the ocean.

Ocean Features



34. Which feature is most likely to occur near the edge of a continent?

- A. Plain
- B. Mountain
- C. Lake
- D. Abyssal plain



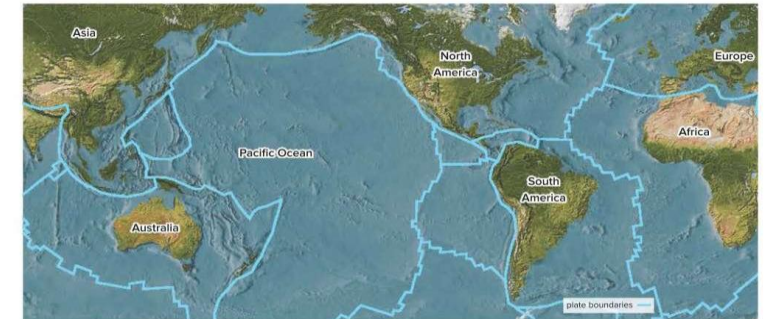
Three-Dimensional Thinking

1. Which feature is most likely to occur near the edge of a continent?

- A. plain
- ☒ B. mountain
- C. lake
- D. abyssal plain

2. Where would you most likely find volcanoes?

Sample answer: Volcanoes are usually found near two plates that are pushing together.



3. Observe the photo above. What ocean features can be mostly found away from plate boundaries?

- A. trenches
- B. seamounts
- C. mid-ocean ridges
- ☒ D. abyssal plains

Earth's Ocean Features

Oceans are large bodies of salt water. They make up more than 70 percent of Earth's surface. If you could travel deep below the ocean's surface, you would find features on the ocean floor that look like the mountains, plains, and valleys on Earth's surface.

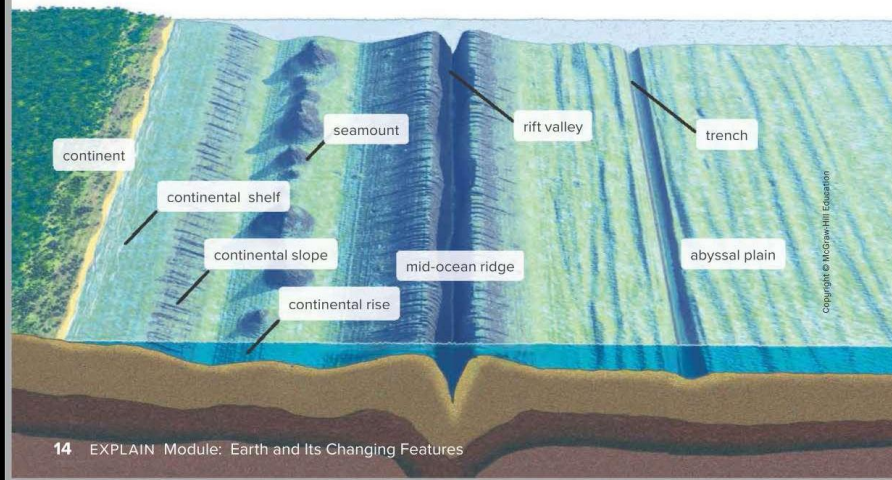
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At the base of the continental slope is the *continental rise*. The continental rise connects the continent with the ocean floor.

1. What is the flattest part of the ocean floor?

The abyssal plain is the flattest part of the ocean.

Ocean Features



Most of the ocean floor is flat and without features. An abyssal plain is a very flat area of the deep ocean floor. These plains cover about 60 percent of the Earth's surface.

GO ONLINE Watch the video *Ocean Floor* to learn more about these features.

Long mountain ranges stretch through the middle of some oceans. These mountain ranges are called *mid-ocean ridges*. The valley down the center of a mid-ocean ridge is called a *rift valley*.

Other ocean floor features include trenches and seamounts. *Trenches* are the deepest parts of the ocean floor. They are usually long and narrow. A *seamount* is an underwater mountain that rises from the ocean floor but stops before it reaches the surface of the ocean.

Scientists can tell the depth of the ocean floor by sending sounds and waiting for the echo to come back. They also use underwater vehicles to study the ocean floor.

2. Which ocean floor features are underwater mountains?

Sample answer: Mid-ocean ridges and seamounts are both examples of ocean floor features.



35. What is the flattest part of the ocean floor?

- A. Continental slope
- B. Mountain
- C. Lake
- D. Abyssal plain

36. Which ocean floor features are underwater mountain?

- A. Continental rise
- B. Seamount and mid ocean ridge
- C. Trench
- D. Abyssal plain

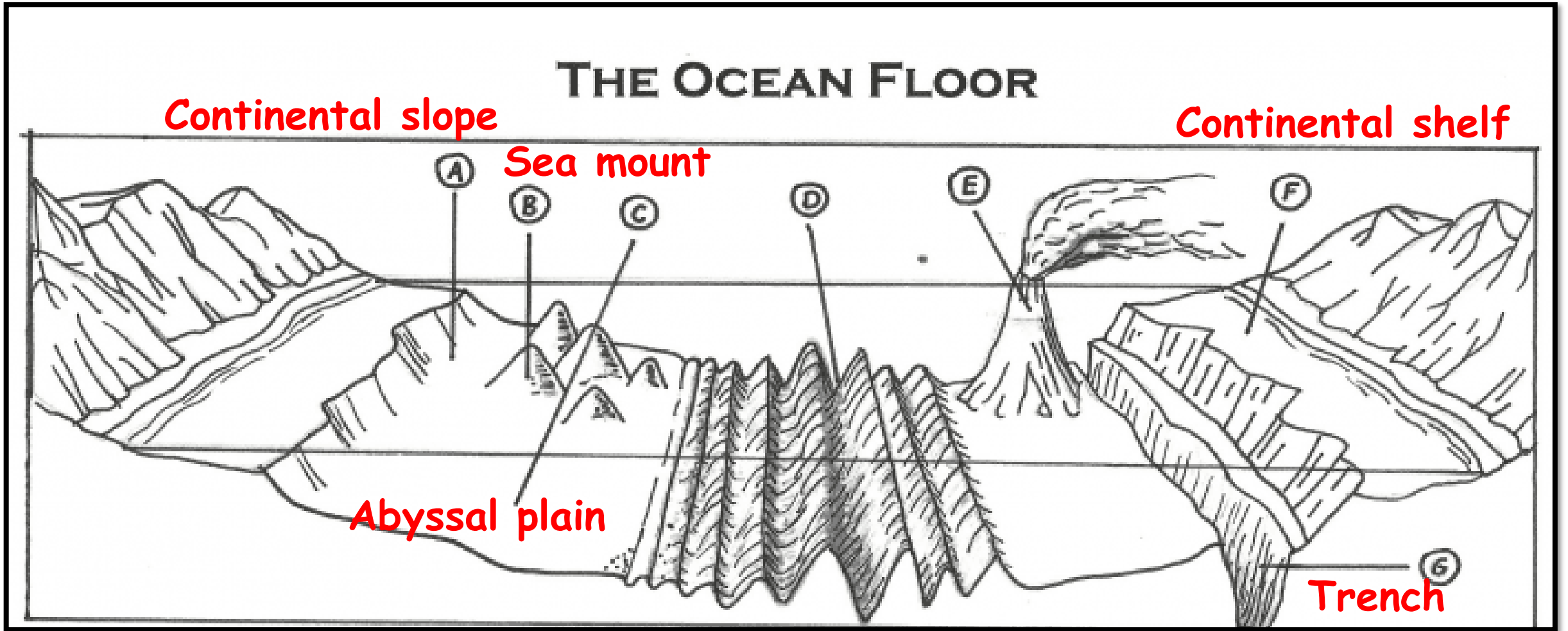
Continental shelf

Continental shelf

Abyssal plain

Mid-ocean ridge

Trench



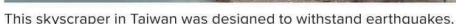
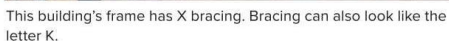
READING

Read this passage from the Investigator article *Designing Strong Buildings*. Underline text evidence that tells how bracing supports an earthquake-resistant building.

Reread Highlight text evidence that tells how buildings can resist lateral forces.

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.

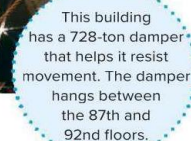


Copyright © McGraw-Hill Education (1)Malcolm Fife/Pixtal/age fotostock, (2)xia xuan/Moment Open/Getty Images

A **shear wall** is a stiff wall made of braced panels. Some tall buildings have a shear core. A shear core is usually a stairwell or elevator shaft with a shear wall on each side. Architects and engineers determine the size of a shear wall based on their calculations of potential lateral forces.

Another way for very tall buildings to resist lateral forces is with a **damper**. The damper is a mass that can weigh over a million pounds. It is attached to the building on the inside of the top floors, but it moves independently from the building. The damper makes the building move less from lateral forces.

Sample answer: Bracing and shear walls help a building to stand up to the lateral forces of an earthquake.



 **GO ONLINE** Watch the video *Earthquake Damage* to see more earthquake-resistant building features.

REVISIT Revisit the Page Keeley Science Probe on page 105.

 Talk About It

How could a structural engineer and cartographer work together when building earthquake resistant buildings?

37. How do **bracing and shear walls** help a building?

- A. Break building
- B. Support building
- C. Destroy building
- D. Separate building

38. ----- are forces that come from **the side**.

- A. Bracing
- B. Shear wall
- C. Lateral forces
- D. Metal materials

39. ----- is made of diagonal pieces connecting beams and columns.

- A. Bracing
- B. Shear wall
- C. Lateral forces
- D. Metal materials

40. ----- is stiff wall made of braced panels.

- A. Bracing
- B. Shear wall
- C. Lateral forces
- D. Metal materials

Tension, or forces that pull things apart, moves Earth's plates. Plates can also be moved by pushing forces. Mountains form when plates push together or past each other along plate boundaries. Many earthquakes and volcanoes also happen at plate boundaries.

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.

An **earthquake** is a sudden movement of Earth's crust. Like volcanoes, most earthquakes occur because of moving plates. Also, like volcanoes, earthquakes are most likely to occur near plate boundaries. You will learn more about earthquakes in the next module.

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

Both are likely to occur near plate boundaries.

Think about the ocean floor features from page 14. Some of these features, like ocean trenches, occur where two plates push together. Mid-ocean ridges occur where two plates spread apart. As the two plates move apart, new crust forms. The mid-ocean ridges are all connected and form the most extensive underwater mountain system on Earth.

3. Use the graphic organizer to classify the location of the following features: abyssal plains, earthquakes, mountains, volcanoes.

Near Plate Boundaries	Not Near Plate Boundaries
earthquakes, mountains, volcanoes	abyssal plains

Talk About It

Explain to a classmate where you would most likely find mountain ranges on the ocean floor.



Three-Dimensional Thinking

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

2. Looking at the map above, explain what you know about the pattern of where earthquakes occur.

Sample answer: Although earthquakes occur all over the world, there is a definite pattern. Most earthquakes occur in the same areas as volcanoes and along the boundaries of oceans and continents.

41. Which number on the map shows where earthquakes are most likely to occur?

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



Three-Dimensional Thinking

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.



42. Scientists can tell which fossils are the oldest by looking at the bedrock. Which layer contains the **oldest** fossils?

- A. A
- B. B
- C. C
- D. D



VOCABULARY

Look for these words as you read:

fossil

sediment

sedimentary rock

What Fossils Tell Us

Sedimentary rock forms from sediments that are pressed together in layers. **Sediments** are tiny bits of soil or rock that have been broken down and deposited. Wind and water deposit most of the sediments. Over time, layers of sediment are formed with new sediments, which are deposited on top of older layers. Sedimentary rocks are formed by the weight of the top layers, or of water covering the sediment, pressing the sediment together. It can take millions of years for sediment to become rock.

Fossils, remains or imprints of living things from the past, are preserved in sedimentary rocks. Fossils give scientists information about environments of the past. Ammonites once lived in Earth's oceans. Ammonite fossils are found in rock that is now on dry land. This indicates that the land was once covered by water.

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.

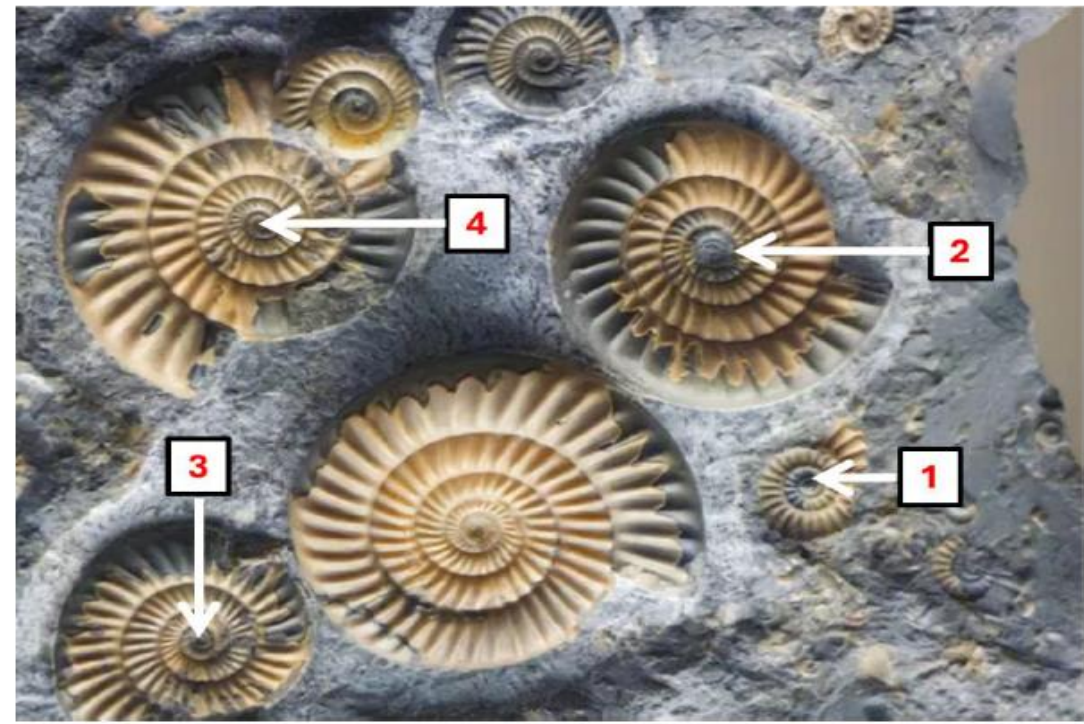
GO Watch the video *Fossils* to learn more about how they form.

Talk About It

What are the differences and similarities between sediment and sedimentary rock? Discuss with a partner.

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

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



44. If a fern fossil is found in a rock layer lower than a fossil of a small fish, the small fish is probably -----

- A. Older
- B. Younger
- C. Came age
- D. new

Answers Key

1. B	11. C	21. D	31. C	41. A
2. A	12. D	22. A	32. D	42. D
3. B	13. A	23. B	33. D	43. A
4. B	14. B	24. C	34. B	44. B
5. B	15. D	25. A	35. D	
6. C	16. C	26. B	36. B	
7. A	17. B	27. B	37. B	
8. C	18. A	28. C	38. C	
9. A	19. C	29. C	39. A	
10. B	20. D	30. B	40. B	

FRQ الأسئلة المقالية

عدد الأسئلة المقالية 4 أسئلة
كل سؤال عليه من (8-12) درجات
المجموع 40 درجة

VOCABULARY

Look for these words as you read:

continent
earthquake
landform
latitude
longitude
plate
topographic map
volcano

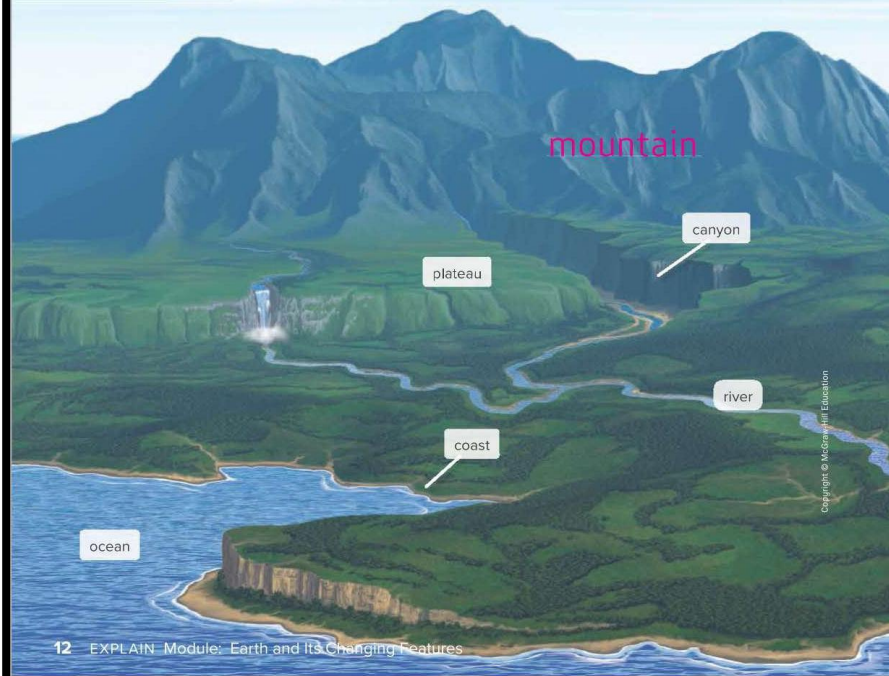
Landforms

In the Inquiry Activity, *Map California's Features*, you represented different landforms on a three-dimensional map. A **landform** is a physical feature on Earth's surface. Landforms vary greatly in shape and size. They include features such as level plains, rounded hills, and jagged mountains. Each landform has specific characteristics and is formed in a specific way.

Label a Diagram: Earth's Land and Water Features

Use the labels on the image below and descriptions on the next page to learn more about common landforms. Fill in the missing labels using the descriptions.

GO ONLINE Watch the video *Landforms* to see various landforms around the world.



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.

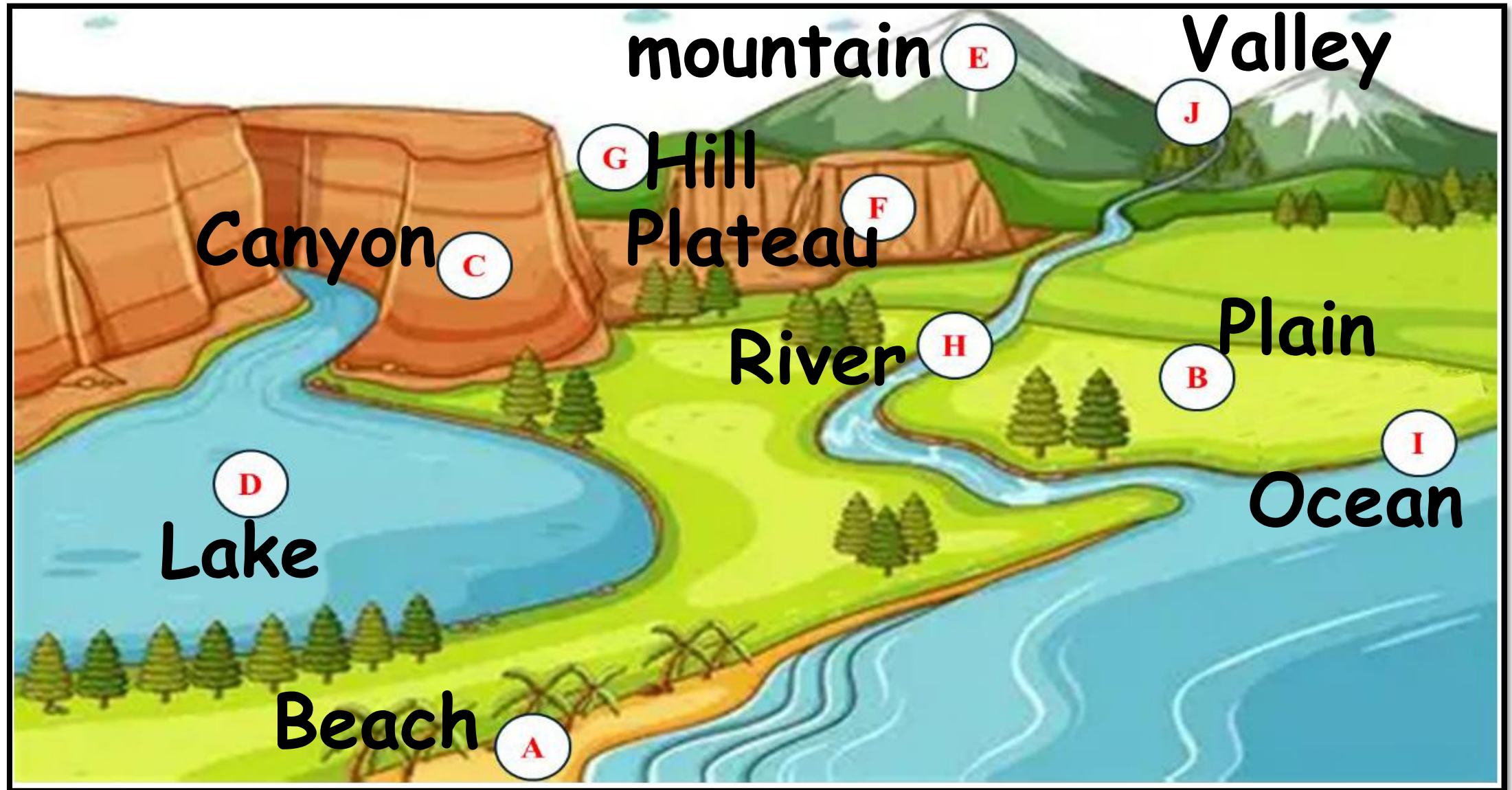
Inlet An inlet is a narrow body of water off a larger body of water.

1. What landforms are near you?

Sample answer: Some landforms that are near me are mountains, valleys, and plains.



Label all landforms in the picture



Describe any 5 landforms in the image

Mountain A landform that rises high above the Earth's surface.

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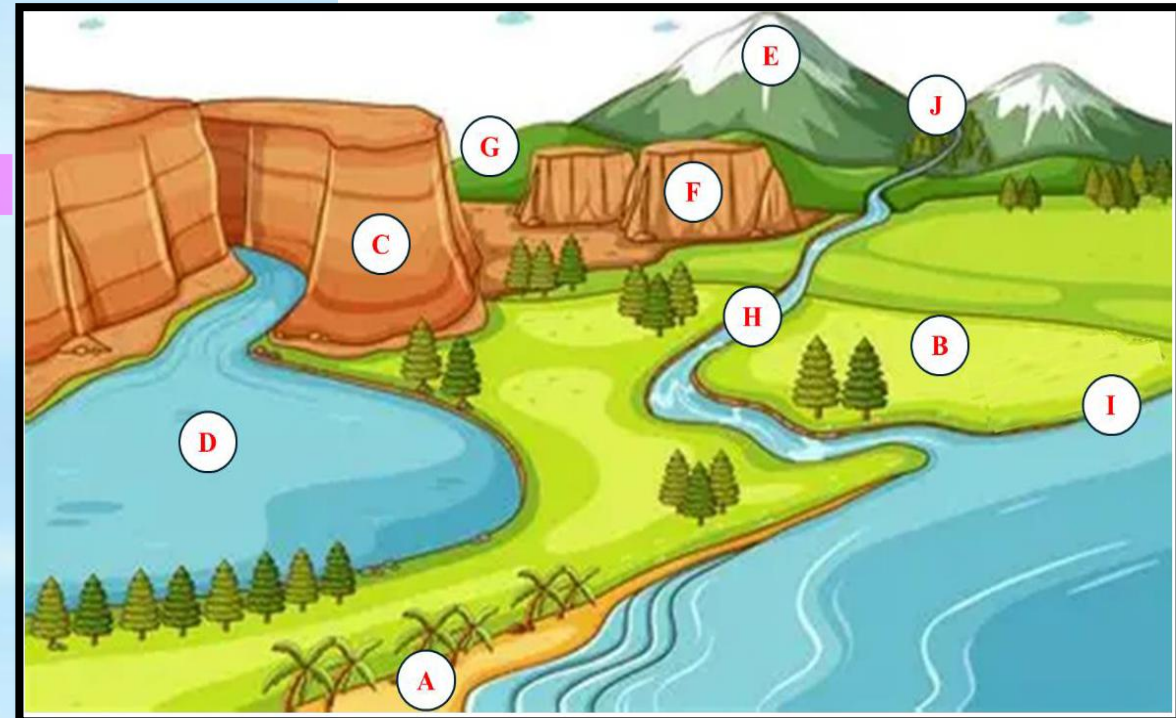
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Inlet An inlet is a narrow body of water off a larger body of water.



Students will be able to identify true and false statements about weathering and 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 + Section
Erosion and Deposition, p.50 Erosion and
Deposition by gravity, water and wind, p.51 Q.1

VOCABULARY

Look for these words as you read:

deposition
erosion
vegetation
weathering

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.

Rocks crashing together in a rockslide causes abrasion, a type of physical weathering.



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.

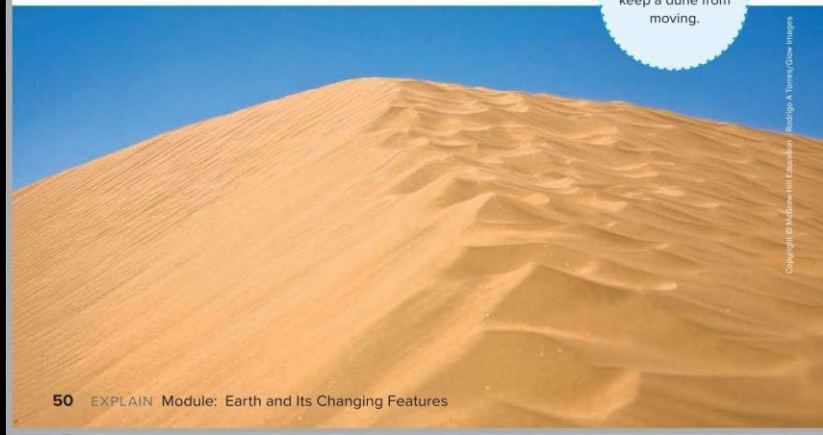
Erosion and Deposition by Running Water

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.



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.

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

Sample answer: Fast-moving water has more energy so it can carry larger amounts of heavier sediment.

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

Sample answer: Waves cause the erosion of the rock and affect the formation of arches.

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



True or False

1. Weathering is a slow process that does not break down materials into smaller pieces **False**

2. Physical weathering does not change the minerals that make up rocks. **True**

3. Water, living things and oxygen can cause chemical weathering. **True**

True or 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**

1. In what ways does erosion and deposition happen?

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

2. 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 traveling at the same speed. Students will be able to rank earthquake magnitudes by comparing their values.

Unit 3 p. 55 Section Feature of Waves (1st Paragraph), p.56 Q.2,

23a, 23b, 23c, 23d

1. In what ways could you use a spring to model a transverse wave?
A longitudinal wave?

Sample answer: I could model a transverse wave by moving the spring up and down or side to side. I could compress sections to model a longitudinal wave.

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. For example, the highest point of an ocean wave is the crest, and the lowest point is the trough. Consider a boat on the water. As a wave goes by, the boat rises with the crest and falls with the trough. The boat moves up and down with the wave motion but it doesn't really move in any 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.

PRIMARY SOURCE



Scientists working on the ShakeAlert Earthquake Early Warning System. This system will help keep people safe when the next big earthquake occurs on the West Coast.

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All waves transfer energy without permanently moving the material through which they travel. This means that after a wave has passed, particles end up in about the same position they started in.

2. Draw waves with the characteristics indicated below.

Long wavelength, low frequency:

Drawing should show same height peaks and narrower waves.

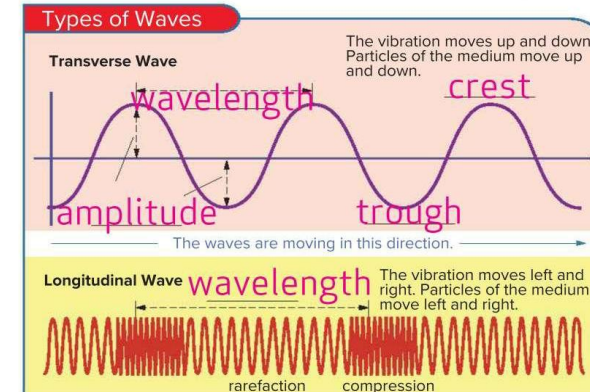
Short wavelength, high frequency:

Drawing should show same height peaks and wider waves.

Label a Diagram: Parts of Waves

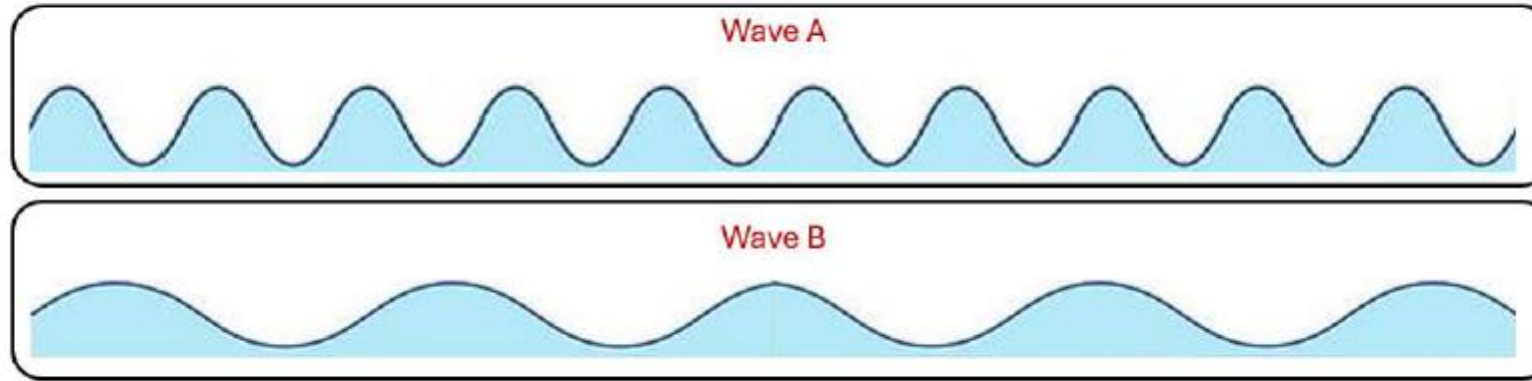
Use what you learned to label the wavelength, amplitude, crest, and trough of each wave.

GO ONLINE Watch the video *Earthquake Movement* to see how earthquake waves move.



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The two waves shown below travel with the same speed.

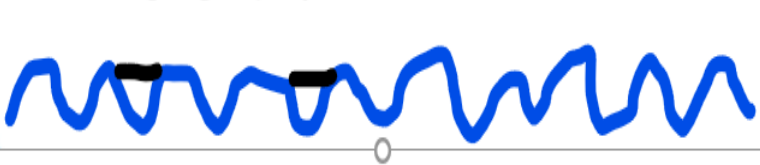


Which wave has the longer wavelength? Explain your answer.

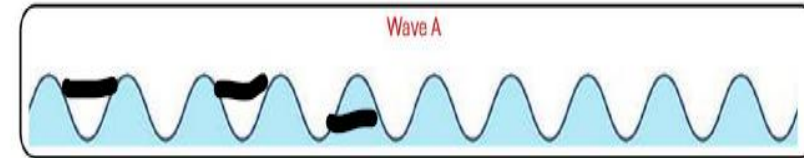
Long wavelength, low frequency:



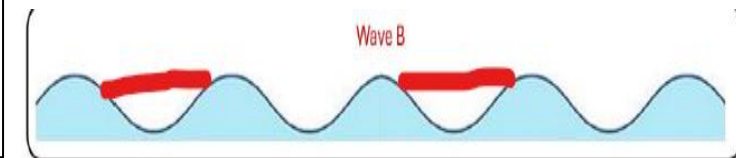
Short wavelength, high frequency:



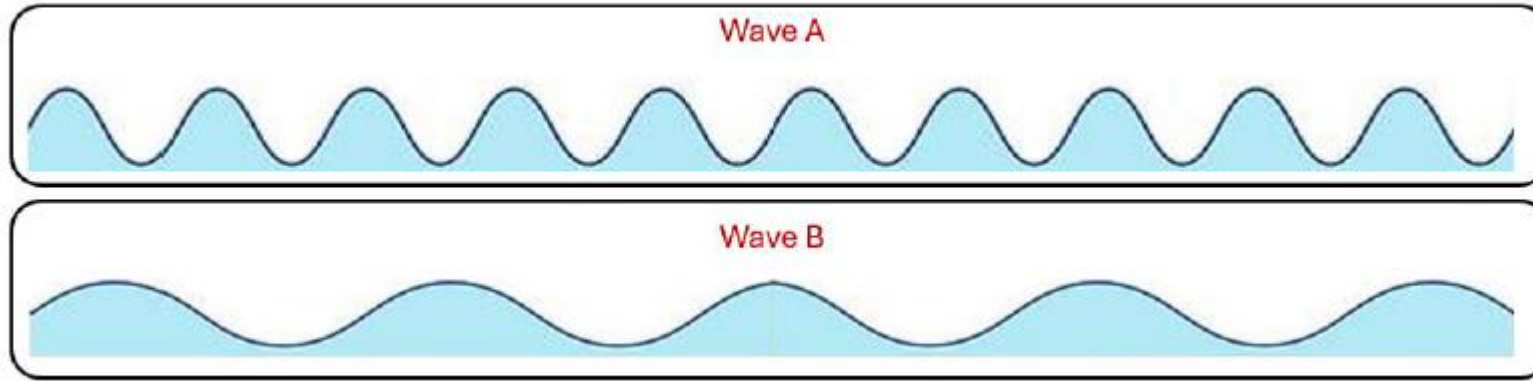
Long wavelength- Distance between waves is **more**



Short wavelength- Distance between waves is **less**

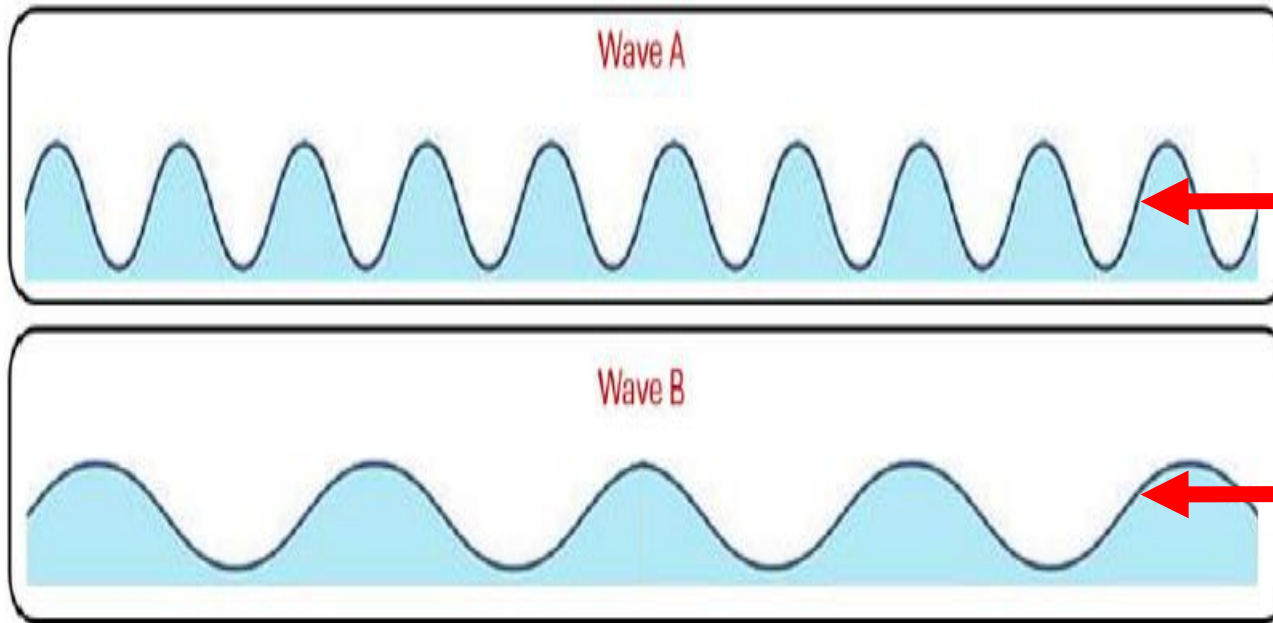


The two waves shown below travel with the same speed.



Which wave has higher frequency?

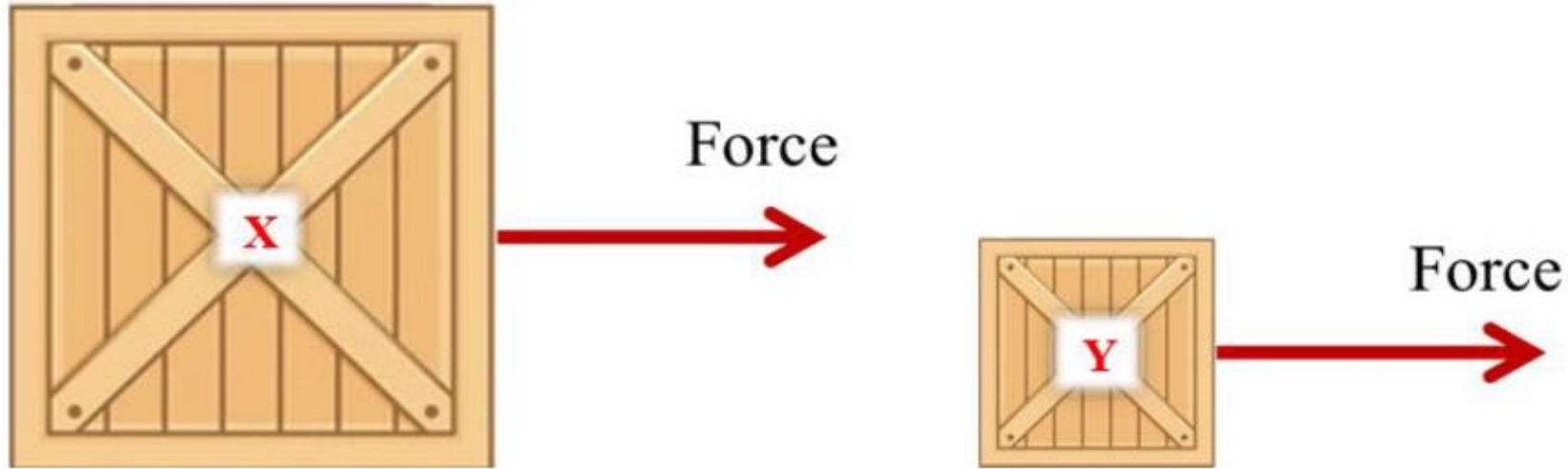
Which wave has lower frequency?



Higher frequency

Lower frequency

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

X has a lower acceleration. it is bigger and heavier

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

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

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

$$\text{Speed} = 360 \div 3 = 120$$

The car's speed is 120km/hour

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

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

Speed = Distance ÷ Time

Speed = 250 ÷ 2 = 125

The car's speed is 125km/hour