

Read the Literature feature in your textbook.

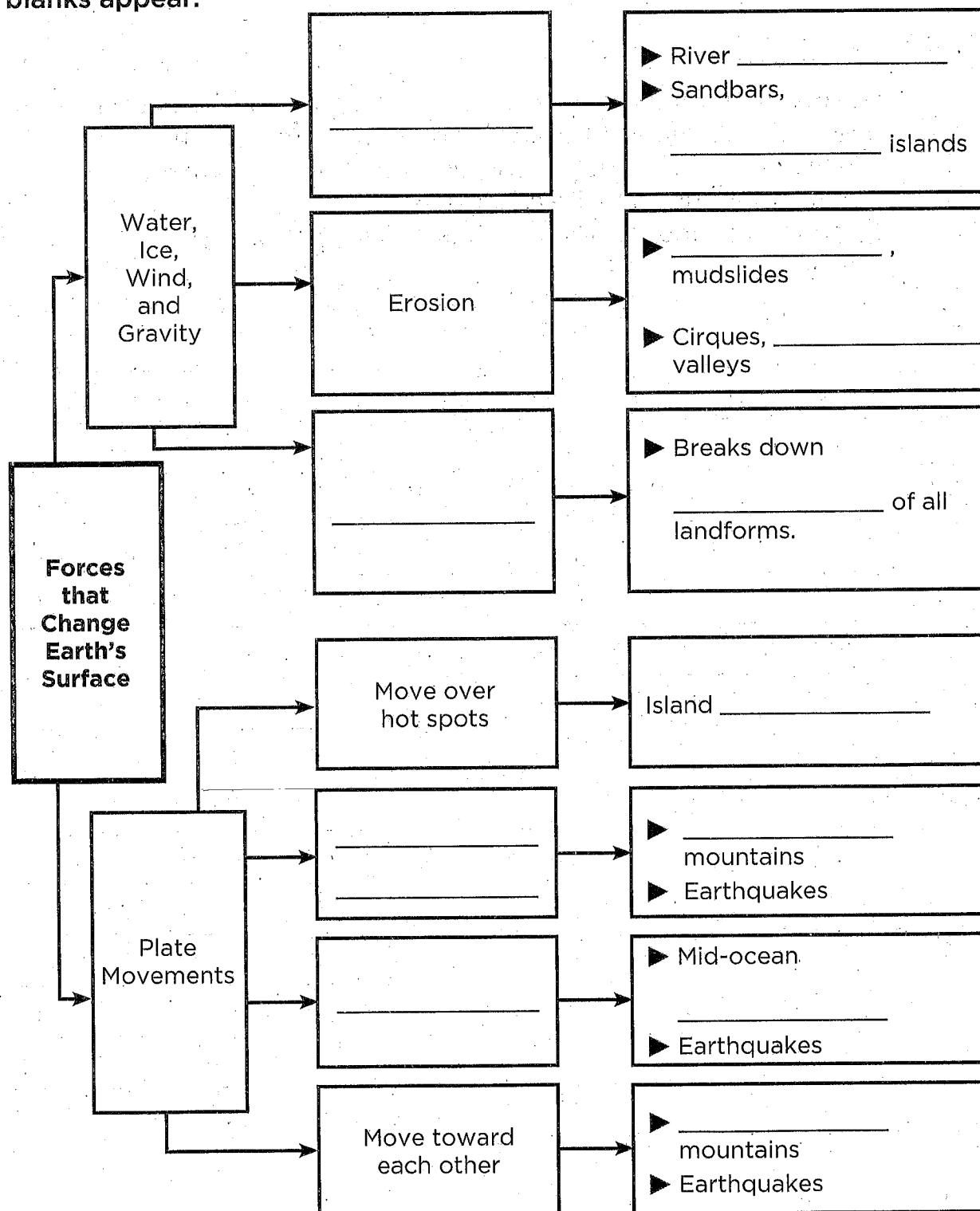


Response to Literature This article describes the formation and use of diamonds. Research additional information about the history of industrial diamonds, how they are formed, and how they are used. Write a report about industrial diamonds. Include facts and details from this article and from your research.

This image shows a single sheet of white paper with horizontal ruling lines. The lines are evenly spaced and run across the width of the page. There is no handwriting or other markings on the paper.

Our Dynamic Earth

Complete the concept map by filling in answers where blanks appear.



Earth's Landforms

Use your textbook to help you fill in the blanks.

What are landforms?

1. A physical feature on Earth's surface is a(n) _____.
2. The highest of Earth's physical features are _____.
3. A low area between mountains or hills is a(n) _____.
4. Wide, flat areas of land are called _____.
5. A large, flat area higher than the land around it is a(n) _____.
6. Earth's largest bodies of water are its saltwater _____.
7. Natural streams of flowing water that empty into lakes, oceans, or other bodies of water are _____.
8. A body of water with land all around it is a(n) _____.

What are the features of the ocean floor?

9. A(n) _____ is a large underwater area between continents.
10. Shallow waters cover the _____, the gently sloping part of the ocean floor along the coast.
11. The sharp drop from the continental shelf to the continental rise is the _____.

12. A wide, flat area covering about 40 percent of the ocean floor is the _____.
13. The deepest areas of the ocean floor are _____.

How are Earth's features mapped?

14. Measurements taken by a(n) _____ are used to make maps.
15. Elevations are shown with shading on a(n) _____ map.
16. Lines are used to show elevation and steepness of slopes on a(n) _____ map.

What are Earth's layers?

17. The layer of air around Earth is the _____.
18. Earth's waters make up Earth's _____.
19. Earth is made of three main layers: the crust, the _____, and the core.
20. The part of Earth that is home for living things is the _____.

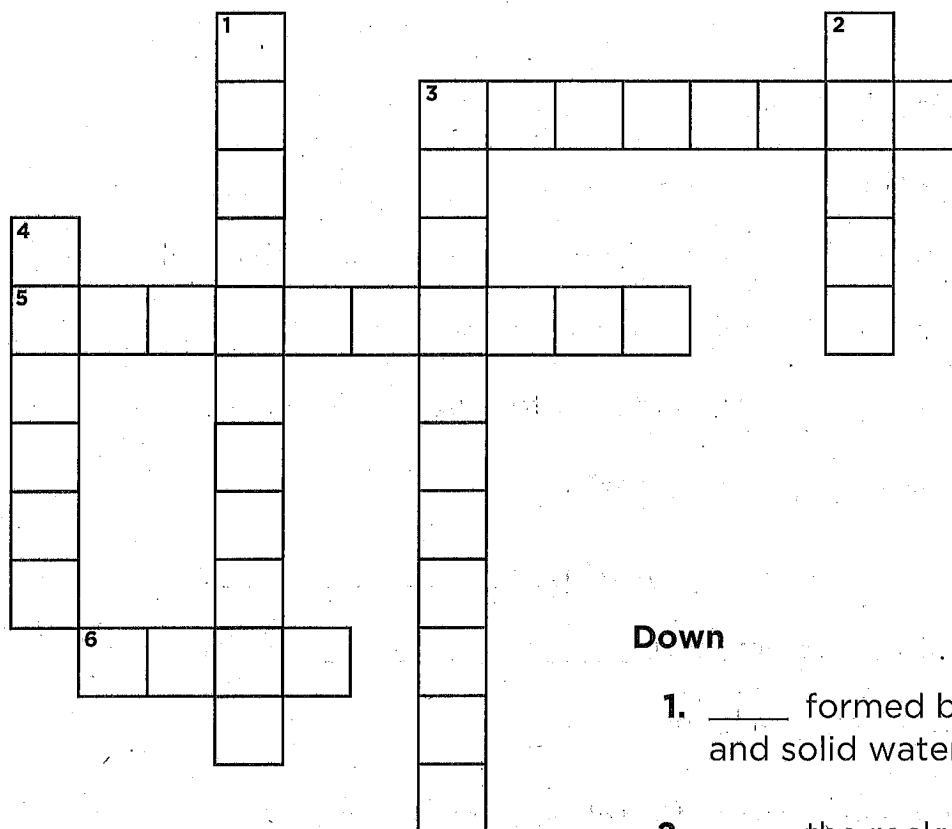
Critical Thinking

21. Compare the mantle and core of the Earth.

Earth's Landforms

Match the correct word with its description, and fill in the crossword puzzle.

atmosphere	crust	landform	mantle
core	hydrosphere	lithosphere	



Across

3. _____ a physical feature on Earth's surface
5. _____ the layer of air that surrounds Earth
6. _____ the central part of Earth

Down

1. _____ formed by Earth's liquid and solid water
2. _____ the rocky upper layer of Earth that contains continents and ocean basins
3. _____ the crust and the top of the upper mantle form it
4. _____ the layer of Earth's interior below the crust

Earth's Landforms

Fill in the blanks.

crust

inner core

oceans

elevation

landforms

outer core

hydrosphere

mantle

surveyor

The physical features of Earth are part of Earth's surface. Earth's surface has many types of _____, from high mountains to deep valleys. There are also physical features under Earth's largest bodies of water, the _____. These undersea features look like the mountains, valleys, and cliffs on land.

Landforms are measured by a(n) _____. One important measurement is _____, or the height of land above sea level.

Earth has several layers. Earth's waters are its _____. The planet itself is divided into the surface _____, the _____ beneath it, and the core at the center. The crust and mantle are rock. Earth's core is made of metal. The _____ is liquid, and the _____ is solid. The core makes up the central part of Earth.

Plate Tectonics

Use your textbook to help you fill in the blanks.

Is Earth's crust moving?

1. Geologist Alfred Wegener formulated the theory of _____.
2. Wegener's theory stated that Earth's _____ were once joined in one landmass, but gradually pulled apart and drifted.
3. Wegener's showed that the age and composition rocks in the _____ on South America's east coast matched of those on Africa's west coast.
4. Scientists also discovered evidence in _____ that Africa and South America were once joined.

How does the movement of Earth's crust affect the ocean?

5. Scientists developed the _____ model to explain how the continents have moved over millions of years.
6. Earth's lithosphere is made of huge pieces of solid rock called _____.
7. These solid pieces of rock rest on the hot, soft, slippery rock of Earth's _____.
8. Melted rock called _____ rises up through the crack where plates move apart under the ocean.
9. As the ocean floor spreads at the plate boundary, the _____ resting on the plates also move apart.

10. The hot rock cools at the surface forming the mid-ocean ridge and the _____ along its top.

How does the movement of Earth's plates affect the land?

11. When plates push toward each other, a force called _____ results.
12. Because of this force, the ground at the edges of plates is pushed upward to form _____ mountains.
13. A mountain range in Asia, the _____, began to form in this way millions of years ago.
14. In places where one plate rubs past another, a twisting or tearing force called _____ results.
15. This force can cause blocks of crust to break apart along deep cracks in Earth's crust called _____.
16. When rock on one side of a fault moves down and rock on the other side moves up, a _____ mountain is formed.
17. A California mountain range, the _____, is this type of landform.

Critical Thinking

18. Compare how two types of mountains are formed.

Plate Tectonics

Use the terms in the box below to fill in the blanks.

continental drift	mid-ocean ridge
fault-block mountains	plate tectonics
folded mountains	rift valley
geologist	

1. As hardened magma builds up on both sides of a plate boundary, a(n) _____ forms at the center of a mid-ocean ridge.
2. The force of compression can form _____ at the point where two plates push together.
3. The theory that states that the continents were once one landmass and that they drifted to their present positions over many years is called _____.
4. A highland in the middle of the oceans that runs parallel to the continents is called a(n) _____.
5. A scientist who studies Earth's structure and history is called a(n) _____.
6. Shear forces at a fault can form _____.
7. The scientific theory that states Earth's crust is made of moving plates is called _____.

Plate Tectonics

Fill in the blanks.

compression	continents	fossils	shear
continental drift	folded	plate tectonics	

The continents were not always where they are today. About 100 years ago, Alfred Wegener developed the theory of _____. The theory states that Earth's _____ were once one landmass. The landmass broke up millions of years ago, and the continents drifted to the positions we know today. Wegener supported his theory with evidence from rocks and _____. Later, scientists developed the theory of _____.

When plates push together, they produce the force of _____. This force can push the ground at the boundary upward, forming _____ mountains. When plates slide past each other, they create _____. This force can make huge blocks of crust break apart along faults. Over millions of years, the blocks can shift upward to form fault-block mountains.

Pangea and Other Supercontinents



Write About It

What evidence do scientists have that Rodinia and Pannotia existed? Research this evidence and select a main idea. Write an expository essay with details to support your main idea.

Getting Ideas

Do some research to find out whether Rodinia and Pannotia actually existed. Use the chart below. In the boxes on the top, write details that you find. In the box on the bottom, summarize this information.

↓	↓	↓

Planning and Organizing

Here are two sentences that Mai wrote. Write Yes if the sentence supports the idea that Rodinia and Pannotia actually existed. Write No if it does not.

1. There are common rock types and structural features along the coastlines of continents today. _____
2. Figuring out how supercontinents formed and broke apart is a lot like detective work. _____

Drafting

Write a sentence to begin your essay. This sentence should tell your main idea about Rodinia and Pannotia.

Review the evidence you found and your summary. Now write the first draft of your essay. Use a separate piece of paper. Include facts and details that back up your main idea. Draw a conclusion at the end.

Revising and Proofreading

Help Mai revise her writing. Use the word *but* to combine each pair of sentences. Put a comma before this word. Write the new sentence on the lines.

1. Pangea was a supercontinent. It was not the earliest supercontinent.

2. Rodinia and Pannotia were both supercontinents. They were formed at different times.

Now revise and proofread your writing. Ask yourself:

- ▶ Did I clearly state my main idea?
- ▶ Did I include facts and details to back up my idea?
- ▶ Did I reach a sound conclusion at the end?
- ▶ Did I correct all mistakes?

Volcanoes

Use your textbook to help you fill in the blanks.

Where are volcanoes found?

1. Most of Earth's volcanoes are located at edges of _____.
2. A string of volcanoes at plate boundaries around the Pacific Ocean is known as the _____.
3. Volcanoes often erupt at places where one plate _____ the other.
4. The bottom edge of the diving plate melts in the heat of the _____.
5. The melted rock rises within the crust, forming a hot pool of _____.
6. The hot rock sometimes erupts through openings in Earth's surface as a(n) _____.
7. Magma that reaches Earth's surface is _____.

How do volcanoes build land?

8. When magma hardens inside Earth's crust, it can form vertical _____ and horizontal sills.
9. Magma pushed into a thick sill can form a(n) _____.
10. The largest underground magma formations are _____, which can form large hills.

11. A volcano that is _____ can erupt with lava, ash, gas, or rock.
12. When a volcano stays quiet for a time, it is _____.
13. A volcano that no longer erupts is _____, or dead.

How do volcanoes build islands?

14. The Hawaiian Islands formed over a stationary pool of magma below Earth's crust called a(n) _____.
15. When the mountains grew high enough to break the ocean's surface, they became volcanic _____.
16. As the plate moved away from the hot spot a new _____ formed.
17. Where two ocean plates meet and one is pushed under the other, an island _____ may form.
18. Magma from edge of the lower plate rises and builds volcanic islands along the plate _____.
19. An example of an island arc is the _____ in Alaska.

Critical Thinking

20. Why do volcanoes form when one plate dives under another?

Volcanoes

Match the correct letter with the description.

- | | |
|-------------------------------|--------------------------|
| a. cinder-cone volcano | f. island chain |
| b. composite volcano | g. lava |
| c. crater | h. shield volcano |
| d. hot spot | i. volcano |
| e. island arc | |

1. _____ magma that reaches Earth's surface
2. _____ a series of volcanic islands that form along a plate boundary
3. _____ a broad volcano with gently sloping sides formed from thin, fluid lava
4. _____ an opening in Earth's crust through which magma flows
5. _____ a stationary pool of magma below Earth's crust
6. _____ a large, cone-shaped volcano built from alternating layers of cinders and hardened lava
7. _____ a line of islands
8. _____ a cup-shaped depression that forms around a volcano's vent
9. _____ a cone-shaped volcano of cinders, with a narrow base and steep sides

Volcanoes

Fill in the blanks.

cinder-cone	lava	plates	volcano
composite	mantle	shield	

Openings on Earth's surface appear on the edges of the crust's plates. An opening in Earth's crust from which magma flows is a(n) _____. Most volcanoes form in places where _____ push toward each other, and one dives under the other. The lower edge of the diving plate melts in the _____, producing hot magma that rises in the crust. Magma that breaks through to Earth's surface is _____.

There are three types of volcanic mountains. A large, broad mountain composed of hardened lava is a(n) _____ volcano. A narrow, steep mountain formed from cinders is a(n) _____ volcano. A large, cone-shaped mountain formed by layers of ash and cinders sandwiched between layers of hardened lava is a(n) _____ volcano. Volcanoes are built up over time as more material is deposited.

Earthquakes

Use your textbook to help you fill in the blanks.

What is an earthquake?

1. Earthquakes happen when the layers of rock on both sides of a(n) _____ suddenly slip.
2. Waves of energy spread out from the _____, the place where the slipping began.
3. When they reach the surface, waves spread out from the _____ of the earthquake (the point directly above the focus).
4. Most earthquakes happen at faults that are near the boundaries of _____.

What waves do earthquakes make?

5. Scientists use a(n) _____ to detect and measure earthquake waves.
6. The fastest earthquake waves, _____ waves, pass through solids and liquids and move back and forth.
7. An earthquake's _____ waves travel slower than primary waves and move only through Earth's solid layers.
8. The slowest-moving waves, _____ waves, move across Earth's surface causing the most damage.

How is an earthquake's energy measured?

9. A measure of the amount of _____ that an earthquake releases is magnitude.
10. Scientists use the _____ Scale to measure earthquake magnitude.

11. Scientists use the _____ Scale to measure an earthquake's effects.
12. An underwater earthquake can produce a large wave called a(n) _____.
13. Underwater earthquakes with a magnitude of _____ or greater on the Richter scale are most likely to cause tsunamis.

How can people prepare?

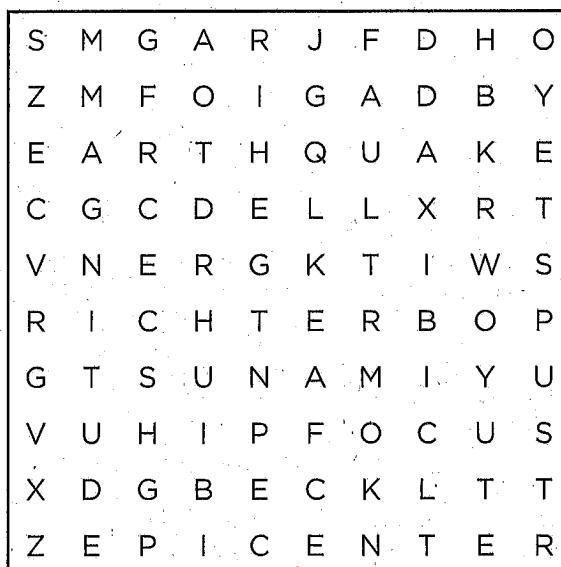
14. Layers of rubber and steel between a building and its foundation allow the building to _____, reducing the damage caused by up-and-down motions.
15. Before an earthquake, people should _____ objects to prevent them from falling and causing injury.
16. In their attempt to tell when earthquakes might happen, scientists look for possible warning signs such as changes in the angle of the _____.
17. Earthquakes are hard to _____, but the ability to do so would allow early warnings that could save lives.

Critical Thinking

18. Which scale do you think would better explain an earthquake to you, the Richter Scale or the Mercalli Scale? Why?

Earthquakes

Use the clues below to find the words hidden in the puzzle.



1. A sudden movement of Earth's crust is a(n) _____.
2. The point on the surface directly above an earthquake's focus is its _____.
3. A crack in Earth's crust is a(n) _____.
4. The place along a fault where the slipping that causes an earthquake begins is the earthquake's _____.
5. A measure of the energy that an earthquake releases is its _____.
6. A large ocean wave caused by an underwater earthquake is a(n) _____.
7. The scale that measures the magnitude of an earthquake is called the _____ Scale.

Earthquakes

Fill in the blanks.

earthquake

primary or P

energy

Richter

fault

secondary or S

Mercalli

The plates of the Earth are in motion. A sudden movement of Earth's crust is a(n) _____. Most earthquakes occur near plate boundaries, when layers of rock that usually adhere to each other suddenly slip at a(n) _____. The scale that measures the magnitude of an earthquake is called the _____ Scale. The scale that measures how severe an earthquake feels and the amount of damage the quake does to objects is called the _____ Scale.

The movement of plates during an earthquake sends out waves of _____ that shake the ground. When an earthquake occurs, _____ waves move back and forth very rapidly. An earthquake's _____ waves move up and down. The slowest waves are surface or L waves. They cause the most damage.

How Earthquakes Help Predict Volcanic Eruptions



Write About It

What are the differences between short-period and long-period earthquakes? Research these earthquakes. Write an explanatory essay with details that support your main idea.

Getting Ideas

Find out more about these types of earthquakes. Use the chart below to record information. Write the cause of each type of earthquake in the left-hand box. Write the type of earthquake in the right-hand box.

Cause	→	Effect
	→	
	→	
	→	

Planning and Organizing

Hector wants to write first about short-term earthquakes, then about long-term earthquakes, and finally about harmonic-tremor earthquakes. Here are three sentences he wrote. Help him organize them. Then write 1 by the sentence that should come first. Write 2 by the sentence that should come second. Write 3 by the sentence that should come last.

1. _____ Seismographs can detect the ongoing flow of magma in a harmonic-tremor earthquake.
2. _____ A short-term earthquake may be too small to be felt.
3. _____ When the gas builds up, you have a long-term earthquake.

Drafting

Write a sentence to begin your explanation. Tell your main idea about the types of earthquakes you have researched.

Now write your explanatory essay on a separate piece of paper. Tell how each type of earthquake occurs. Use time-order or spatial words to make your explanation clear.

Revising and Proofreading

Here is part of Hector's explanatory essay. Add a time-order word or a spatial-order word in each blank to make the meaning clearer.

_____ magma pushes its way _____
to the surface, the rocks begin to break. _____
long-term earthquakes begin. Finally, magma flows
_____ the surface and breaks through.

Now revise and proofread your writing. Ask yourself:

- ▶ Did I discuss each type of earthquake and explain the difference?
- ▶ Did I include clear details that are easy to follow?
- ▶ Did I include time-order words or spatial order words?
- ▶ Did I correct all mistakes?

Shaping Earth's Surface

Use your textbook to help you fill in the blanks.

What is weathering?

1. The process that breaks down rock into small pieces is called _____.
2. Impacts, temperature changes, and ice expanding in cracks break down rock in the process of _____.
3. When rock's composition is broken down and changed, _____ occurs.

What is erosion?

4. Pieces of weathered rock are moved from place to place by _____.
5. When rock and soil on a slope become loose, gravity can move them downhill in a _____.
6. A large mass of flowing ice, called a _____, can erode the rock and soil beneath it.

What is deposition?

7. The process of _____ picks up eroded material and leaves it in a different place.
8. The running water of _____ erodes rock and soil and washes it downstream.
9. Slow-moving rivers can flow in gentle loops called _____.

10. Waves wash away at the sides of a headland forming a(n) _____.
11. Waves can move sand along beaches or deposit it offshore to build strips of sand called _____.

How are shorelines changed?

12. During floods, rivers deposit sediment on _____ along their banks.
13. Deposits of sand along the shore can form _____ islands that protect the beaches behind them from storm waves.
14. Wind deposits sand along the shoreline in hills of sand called _____.

How can shorelines be protected?

15. People build walls called _____ along rivers to prevent floods.
16. To slow erosion _____ can be built in the water along the beach.
17. Fences and _____ protect dunes by preventing sand from blowing away.

Critical Thinking

18. How can people help stop erosion on a beach?

Shaping Earth's Surface

Who am I? What am I?

Choose a word from the word box below that answers each question.

- | | | |
|----------------------|----------------------|----------------------|
| a. acid rain | d. erosion | g. meander |
| b. delta | e. floodplain | h. sediment |
| c. deposition | f. glacier | i. weathering |

1. _____ I am a huge mass of ice. I erode the rock beneath me as I flow over it. Who am I?
2. _____ I am particles of rock. Moving water deposits me when it slows down. What am I?
3. _____ I wear away stone and metal surfaces when I fall from the sky. What am I?
4. _____ I am a flat area along a riverbank. Rivers deposit sediment on me when they flood. Who am I?
5. _____ I drop eroded sediment in a different place after I picked it up. What am I?
6. _____ I am a fan-shaped piece of land. I form from deposits at the mouths of rivers. Who am I?
7. _____ I break down rock into smaller pieces. What am I?
8. _____ I am a gentle loop in a slow-flowing river. What am I?
9. _____ I pick up and move pieces of weathered rock. What am I?

Shaping Earth's Surface

Fill in the blanks.

beaches	erosion	physical weathering
chemical weathering	glaciers	waves
deposition	landslides	weathering

Rocks are constantly being changed by the environment. Over long periods of time, the process of _____ breaks down rock. When _____ occurs, the rock simply breaks into smaller pieces. During _____, the rock weakens as the minerals in it are changed. After weathering, _____ removes the weathered rock. Gravity pulls loosened rock downhill in _____. Erosion and deposition shape shorelines. Ocean _____ and currents move sediment along shorelines. They erode sand from some _____ and deposit it on others.

As _____ move over the ground, they scoop out depressions and move the loose rock beneath them. Water, wind, and ice can drop eroded materials in a different place in a process called _____. This process also changes landforms.

Wrestling with the Big Muddy

Read the Reading in Science feature in your textbook.

Problem and Solution

Identify the main problem described in the reading. Then identify the solution to the problem and the steps taken to reach it. Write the information in the correct boxes in the graphic organizer below.

Problem
↓
Step to Solution
↓
Step to Solution
↓
Solution

Planning and Organizing

Read the “Write About It” questions carefully. Find the text within “Wrestling with the Big Muddy” that answers each question. Use the questions below to help organize your information.

List structures that now control the Missouri River.

a. _____

b. _____

List the problems the new structures cause.

a. _____

b. _____

Drafting Your Answers

Now, use the information above to help you write answers to the questions.

1. What did the government do to control the flow of the Missouri River?

2. What problems were caused by building dams along the river?

Our Dynamic Earth

Choose the letter of the best answer.

1. Which of these is a physical feature on Earth's surface?
 - a. tsunami
 - b. landform
 - c. mantle
 - d. hotspot
2. The crust and the top part of the mantle make up the
 - a. atmosphere.
 - b. hydrosphere.
 - c. asthenosphere.
 - d. lithosphere.
3. Earth's surface layer is the
 - a. mantle.
 - b. crust.
 - c. biosphere.
 - d. asthenosphere.
4. What layer of Earth's interior lies just below the crust?
 - a. mantle
 - b. inner core
 - c. lithosphere
 - d. outer core
5. The plate tectonics model states that Earth's crust is composed of
 - a. one solid piece of rock.
 - b. both liquid and frozen water.
 - c. several huge slabs of rock that fit together.
 - d. hot, melted rock.
6. What is a fault?
 - a. energy that an earthquake produces
 - b. the opening in a volcano
 - c. a large crack in Earth's crust
 - d. the boundary between two plates
7. Huge slabs of rock moving suddenly against each other in the Earth's crust create
 - a. earthquakes.
 - b. abyssal plains.
 - c. volcanos.
 - d. a trench stretch.

8. A volcano is
 - a. an opening in Earth's crust through which magma flows.
 - b. any mountain near a plate boundary.
 - c. a group of faults near a hot spot.
 - d. movement at a fault.
9. The low area between mountains is called a
 - a. plateau.
 - b. trench.
 - c. valley.
 - d. landform.
10. The wide, flat area of the ocean floor is known as the
 - a. mantle.
 - b. abyssal plain.
 - c. trench stretch.
 - d. aquatic plateau.
11. What is the term used for melted rock that reaches the Earth's surface?
 - a. lava
 - b. mantle
 - c. magma
 - d. boundary rock
12. A device used to detect and measure earthquake waves is called a
 - a. wavometer.
 - b. richtometer.
 - c. barometer.
 - d. seismometer.
13. A mass of large flowing ice that can erode rock is called a(n)
 - a. glacier.
 - b. landslide.
 - c. iceberg.
 - d. delta.
14. Underwater earthquakes of a great magnitude can create
 - a. continental divides.
 - b. trenches.
 - c. tsunamis.
 - d. aquatic drift.