Changing Earth's Surface (pp. 266–269)

This section explains how sediment is carried away and deposited elsewhere to wear down and build up Earth's surface. The section also describes ways that gravity moves sediment downhill.

Use Target Reading Skills

As you read, fill in the graphic organizer below to compare and contrast types of mass movement.

<table>
<thead>
<tr>
<th>Type of Mass Movement</th>
<th>Characteristics</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Erosion</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deposition</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Wearing Down and Building Up (pp. 266–267)

1. What is erosion?

2. List the forces that cause erosion.
   a. __________________________ b. __________________________
   c. __________________________ d. __________________________
   e. __________________________

3. The material moved by erosion is called __________________________.

4. Where does deposition occur?

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Erosion and Deposition - Guided Reading and Study

Changing Earth's Surface (continued)

Mass Movement (pp. 267–269)

5. Circle the letter of each sentence that is true about gravity.
   a. It pulls things toward Earth’s center.
   b. It causes landslides.
   c. It causes mass movement.
   d. It is a force of erosion.

6. Is the following sentence true or false? The most destructive kind of mass movement is creep. ______________________

7. Is the following sentence true or false? Mudflows and slump are especially likely in soils high in clay. ______________________

8. Complete the concept map.

\[\text{Mass movement} \quad \text{includes} \quad \begin{array}{c}
   \text{Landslides} \\
   \text{a.} \\
   \text{b.} \\
   \text{c.} \\
\end{array}\]

9. Write a sentence that explains the relationship among the concepts shown.

   ______________________

   ______________________

Match the type of mass movement with its description.

<table>
<thead>
<tr>
<th>Mass Movement</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>9. landslide</td>
<td>a. Rock and soil suddenly slip down a slope in one large mass.</td>
</tr>
<tr>
<td>10. mudflow</td>
<td>b. Rock and soil slide quickly down a steep slope.</td>
</tr>
<tr>
<td>11. slump</td>
<td>c. Rock and soil move very slowly downhill.</td>
</tr>
<tr>
<td>12. creep</td>
<td>d. A mixture of water, rock, and soil moves rapidly downhill.</td>
</tr>
</tbody>
</table>

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Erosion and Deposition  •  Guided Reading and Study

Water Erosion (pp. 272–281)

This section describes how moving water erodes and deposits sediment to create landforms such as valleys and deltas.

Use Target Reading Skills

Look at the figure The Course of a River in your textbook, and write in the graphic organizer below two questions you have about the visuals. As you read about rivers, write the answers to your questions.

The Course of a River

Q. What features does a river produce by erosion?

A.

Q.

A.

Runoff and Erosion (pp. 273–274)

1. Moving water is the major agent of ____________________.

2. Water that moves over Earth’s surface when it rains is called ____________________.

3. Other than how people use the land, list four factors that determine the amount of runoff in an area.
   a. ____________________   b. ____________________
   c. ____________________   d. ____________________

4. Is the following sentence true or false? More runoff generally means ________ erosion.

   ____________________
5. Fill in the first column of the table with the correct form of moving water.

<table>
<thead>
<tr>
<th>Form</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Water moving in a tiny groove in soil after a rainstorm</td>
</tr>
<tr>
<td>b.</td>
<td>Water moving in a channel after a rainstorm</td>
</tr>
<tr>
<td>c.</td>
<td>Water continually flowing down a slope through its own channel</td>
</tr>
<tr>
<td>d.</td>
<td>Water flowing downhill in a large channel</td>
</tr>
</tbody>
</table>

e. Which form of moving water causes the greatest changes in the shape of the land? Explain.

6. A stream that flows into a larger stream is called a(n) ________.

7. The area of land from which a river and its tributaries collect water is the ________.

**Erosion by Rivers** (pp. 275–276)

8. How do V-shaped valleys form?

9. When does a river develop meanders?

10. A meander that has been cut off from a river is called a(n) ________.
Erosion and Deposition  

11. Identify and label each of the following landforms in the illustration: waterfall, oxbow lake, meander, flood plain, and V-shaped valley.

Deposits by Rivers (pp. 276–279)

12. List two landforms created from deposits by rivers.
   a. ________________________  b. ________________________

13. What is an alluvial fan?
   ________________________________________________________
   ________________________________________________________

14. Sediments deposited where a river flows into an ocean or lake form a(n) ________________________.

15. What makes a river valley fertile?
   ________________________________________________________
   ________________________________________________________
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**Water Erosion (continued)**

**Groundwater Erosion** (pp. 280–281)

16. Underground water is called ____________________.

17. Is the following sentence true or false? Unlike moving surface water, groundwater does not cause erosion. ____________________

18. How does groundwater cause chemical weathering of limestone?

19. Complete the compare/contrast table.

<table>
<thead>
<tr>
<th>Groundwater Deposits in Limestone Caves</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of Deposit</strong></td>
</tr>
<tr>
<td>a.</td>
</tr>
<tr>
<td>b.</td>
</tr>
</tbody>
</table>

e. How are the deposits similar? ____________________

f. How are the deposits different? ____________________

20. Is the following sentence true or false? An area where sinkholes are common is said to have karst topography. ____________________

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The Force of Moving Water (pp. 286–290)

This section explains why moving water has energy and how it erodes and carries sediment. The section also identifies the factors that determine how much sediment a river can erode and carry.

Use Target Reading Skills

The first column in the chart lists key terms in this section. As you read the section, write a definition of the key term in your own words in the second column.

<table>
<thead>
<tr>
<th>Key Term</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Energy</td>
<td></td>
</tr>
<tr>
<td>Potential energy</td>
<td></td>
</tr>
<tr>
<td>Kinetic energy</td>
<td></td>
</tr>
<tr>
<td>Abrasion</td>
<td></td>
</tr>
<tr>
<td>Load</td>
<td></td>
</tr>
<tr>
<td>Friction</td>
<td></td>
</tr>
<tr>
<td>Turbulence</td>
<td></td>
</tr>
</tbody>
</table>

Work and Energy (p. 286)

1. The ability to do work or cause change is _________________.

2. Energy that is stored for later use is called ________________ energy.

3. Is the following statement true or false? Kinetic energy is the energy an object has due to its motion. ________________

How Water Erodes (p. 287)

4. In what ways can sediment enter a river?

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The Force of Moving Water (continued)

5. The wearing away of rock by a grinding action is called

   ____________________________

6. Is the following sentence true or false? Sediment in a river abrades the streambed and is abraded by the streambed in return

   ____________________________

7. The amount of sediment that a river carries is its

   ____________________________

8. Circle the letter of each sentence that is true about a river's sediment.
   a. Gravity and the force of the water cause sediment to move downstream.
   b. Most small sediment moves by rolling and sliding along the bottom.
   c. Most large sediment moves by bouncing.
   d. Some sediment is dissolved by the water and carried in solution.

Erosion and Sediment Load (pp. 288–290)

9. Complete the concept map.

   A river's power to erode

   depends on

   a. ____________________________
   b. ____________________________
   c. ____________________________

   d. Write a sentence that describes a river with very little power to erode. Use the terms you wrote for a, b, and c.

   ____________________________

   ____________________________

10. Is the following sentence true or false? When a river slows down and deposits its sediment load, smaller particles of sediment are deposited first.

   ____________________________
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11. Circle the letter of each factor that increases the speed of a river.
   a. Steep slope
   b. Low volume
   c. Deep streambed
   d. Boulders in streambed

12. Circle the letter of each factor that decreases the speed of a river.
   a. Gentle slope
   b. High volume
   c. Shallow streambed
   d. Boulders in streambed

**Match the term with its definition.**

- **13. flow**
  - a. Movement of water every which way instead of downstream

- **14. friction**
  - b. Force that opposes the motion of one surface across another

- **15. turbulence**
  - c. Volume of water that moves past a point on a river in a given time

16. Is the following sentence true or false? Where a river flows in a straight line, the water flows faster along the river's sides than near its center.

17. Label the drawing to show where the river erodes sediment and where it deposits sediment as it flows around the curve.
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**Glaciers** (pp. 291–295)

This section describes huge ice masses, called glaciers. The section also describes the ice ages, a time when glaciers covered much of Earth. In addition, the section explains how glaciers form and move and how they cause erosion and deposition.

**Use Target Reading Skills**

Complete the first column in the chart by previewing the red headings and asking a what, how, or where question for each. As you read the section, complete the second column with the answers.

<table>
<thead>
<tr>
<th>Glaciers</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Question</td>
<td>Answer</td>
</tr>
<tr>
<td>What kinds of glaciers are there?</td>
<td></td>
</tr>
</tbody>
</table>

**How Glaciers Form and Move** (pp. 292–293)

1. Any large mass of ice that moves slowly over land is a(n) ____________________.

2. Circle the letter of each sentence that is true about continental glaciers.
   a. They are larger than valley glaciers.
   b. They spread out over wide areas.
   c. They are found only in Antarctica.
   d. They cover 2 percent of Earth’s land.

3. What are ice ages?

   ______________________________________________________

   ______________________________________________________

4. Is the following sentence true or false? The most recent ice age ended about 10,000 years ago. __________________

5. Is the following sentence true or false? All of North America was covered by a continental glacier in the last ice age. __________________

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6. Circle the letter of each sentence that is true about valley glaciers.
   a. They are generally long, narrow glaciers.
   b. They are found on many high mountains.
   c. They are larger than continental glaciers.
   d. They usually move down valleys.

7. Where can glaciers form?

8. When does gravity begin to pull a glacier downhill?

9. Complete the table to show how the different types of glaciers move:

<table>
<thead>
<tr>
<th>How Glaciers Move</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type of Glacier</td>
</tr>
<tr>
<td>a.</td>
</tr>
<tr>
<td>b.</td>
</tr>
</tbody>
</table>
   c. Relate the movement of continental glaciers to why they cover Antarctica and most of Greenland.

10. How Glaciers Shape the Land (pp. 293–295)

10. List two processes by which glaciers erode the land.
   a. ____________________________  b. ____________________________

11. Is the following sentence true or false? Plucking can move only small stones. ____________________________
Glaciers (continued)

12. Describe abrasion and how it affects bedrock.

13. When does a glacier deposit the sediment it is carrying?

Match each type of glacial landform with its description.

<table>
<thead>
<tr>
<th>Type of Landform</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>14. till</td>
<td>a. Small depression formed by a chunk of ice when it melts</td>
</tr>
<tr>
<td>15. moraine</td>
<td>b. Mixture of sediments a glacier deposits on the surface</td>
</tr>
<tr>
<td>16. terminal moraine</td>
<td>c. Ridge formed at the edge of a glacier</td>
</tr>
<tr>
<td>17. drumlin</td>
<td>d. Long mound of till that is smoothed in the direction of the glacier's flow</td>
</tr>
<tr>
<td>18. kettle</td>
<td>e. Ridge at the farthest point reached by a glacier</td>
</tr>
<tr>
<td>19. cirque</td>
<td>f. Sharp ridge separating two cirques</td>
</tr>
<tr>
<td>20. arête</td>
<td>g. Bowl-shaped hollow eroded by a glacier</td>
</tr>
<tr>
<td>21. fiord</td>
<td>h. Sea-filled valley cut by a glacier in a coastal region</td>
</tr>
</tbody>
</table>

22. Explain the difference between glacial erosion and glacial deposition.
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Waves (pp. 296–300)

This section explains how waves form. The section also describes the erosion and deposition that waves cause.

Use Target Reading Skills

As you read about waves, complete the graphic organizer by filling in the details:

Main Idea
Waves cause erosion by impact and . . .

Detail
a.

Detail
b.

Detail
c.

How Waves Form (p. 296)

1. Circle the letter of each sentence that is true about the energy in waves.
   a. It comes from wind.
   b. It moves water particles up and down.
   c. It moves water particles forward.
   d. It moves across the water.

2. What part of the water is affected by a wave in deep water?
Waves (continued)

3. Circle the letter of each sentence that is true about a wave approaching land.
   a. It begins to drag on the bottom.
   b. It encounters more friction.
   c. It speeds up.
   d. It moves the water toward the land.

Erosion by Waves (pp. 297–298)

4. Is the following sentence true or false? Waves are the major force of erosion along coasts.

5. List two ways that waves erode land.
   a. ______________________   b. ______________________

6. Part of the shore that sticks out into the ocean because it is made of harder rock is called a(n) ______________________.

7. List three landforms created by wave erosion.
   a. ______________________   b. ______________________
   c. ______________________

Deposits by Waves (pp. 299–300)

8. An area of wave-washed sediment along a coast is a(n) ______________________.

9. The process in which beach sediment is moved down the beach with the current is called ______________________.

10. How does a spit form?
Wind (pp. 301–303)

This section describes how wind causes erosion. The section also describes the types of deposits that are caused by wind.

Use Target Reading Skills

As you read about wind erosion, fill in the flowchart to show the sequence of events.

Wind Erosion

Wind picks up smallest particles of sediment.

a.

b.

c.

Introduction (p. 301)

1. A deposit of wind-blown sand is a(n) _____________________.

How Wind Causes Erosion (pp. 301–302)

2. Is the following sentence true or false? Wind is the strongest agent of erosion. _____________________

3. Why is wind effective in causing erosion in deserts?

______________________________
Erosion and Deposition - Guided Reading and Study

Wind (continued)

4. Circle the letter of each sentence that is true about deflation.
   a. It is the main way wind causes erosion.
   b. It usually has a great effect on the land.
   c. It can create blowouts.
   d. It can create desert pavement.

5. Circle the letter of each sentence that is true about abrasion by wind-carried sand.
   a. It can polish rock.
   b. It causes little erosion.
   c. It causes most desert landforms.
   d. It causes most erosion.

Wind Deposition (p. 303)

6. Is the following sentence true or false? All the sediment picked up by wind eventually falls to the ground. __________________________

7. When does wind-carried sediment fall to the ground?

8. List two types of deposits formed by wind erosion and deposition.
   a. __________________________
   b. __________________________

9. Complete the Venn diagram by adding the following phrases: have finer sediments, have coarser sediments, result from wind erosion.

\[\text{Sand Dunes} \cap \text{Loess Deposits}\]

\[\text{a.} \quad \text{b.} \quad \text{c.}\]

d. Which type of sediment can be found far from its source? Explain.

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Erosion and Deposition  •  Key Terms

**Key Terms**

*Use the clues to help you unscramble the key terms. Then put the numbered letters in the right order to spell out the answer to the riddle.*

**Clues**

1. It's how sediment moves.
2. It's how sediment settles.
3. It's a small particle that moves.
4. It's how much sediment a river carries.
5. It's the force that opposes motion of one surface across another.
6. It's how rocks are polished.
7. It can be found where a river enters a lake.
8. It sticks out into the ocean.
9. It's formed by a chunk of ice.
10. It sticks out in the water like a finger.
11. It's a ridge at the edge of a glacier.
12. It's a deposit of clay and silt.
13. It's how most wind erosion occurs.
14. It flows into a larger stream.
15. It's a kind of lake created by a river.
16. It's the ability to do work or cause change.

**Key Terms**

<table>
<thead>
<tr>
<th>Clue</th>
<th>Key Term</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>sorineo</td>
</tr>
<tr>
<td>2</td>
<td>oisontipde</td>
</tr>
<tr>
<td>3</td>
<td>ideemtns</td>
</tr>
<tr>
<td>4</td>
<td>adol</td>
</tr>
<tr>
<td>5</td>
<td>nfcotiri</td>
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<tr>
<td>6</td>
<td>barinoas</td>
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<tr>
<td>7</td>
<td>ldtae</td>
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<tr>
<td>8</td>
<td>aahlnded</td>
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<tr>
<td>9</td>
<td>teketl</td>
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<td>10</td>
<td>ipst</td>
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<tr>
<td>11</td>
<td>noamire</td>
</tr>
<tr>
<td>12</td>
<td>seols</td>
</tr>
<tr>
<td>13</td>
<td>otefdalni</td>
</tr>
<tr>
<td>14</td>
<td>tutyrabir</td>
</tr>
<tr>
<td>15</td>
<td>wxoob</td>
</tr>
<tr>
<td>16</td>
<td>ynreeg</td>
</tr>
</tbody>
</table>

**Riddle:** What shapes Earth's surface?

**Answer:**

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