6-1 What are erosion and deposition?

Objectives ▸ Define erosion and list five agents of erosion. ▸ Define deposition.

TechTerms

- **deposition** (dep-uh-ZISH-un): process by which material carried by erosion is dropped in new places
- **erosion** (eh-ROH-zhun): process by which weathered material is moved from one place to another

Erosion The rocks that make up the earth's crust are broken down by weathering. Weathering, however, is not the only force that acts upon the earth's surface. After rocks are broken down, they may be moved from one place to another. The process by which weathered material is moved from one place to another is called **erosion** (eh-ROH-zhun).

Define: What is erosion?

Agents of Erosion During erosion, parts of the earth's surface are worn away. Have you ever seen the Grand Canyon? The Grand Canyon is a gash in the earth more than 2 km deep. At the bottom of the Grand Canyon is the Colorado River. As the river flows, it carries away small pieces of weathered rock. Over millions of years, enough rocks have been carried away to carve out the Grand Canyon.

Running water, glaciers, wind, waves, and gravity are the five agents of erosion. How do these agents of erosion wear away the earth's surface? Running water and glaciers can carry away large amounts of rocks and soil. Waves can move sand onto and off a beach. Wind can carry sand, dirt, and dust. Gravity can cause soil and rocks to move down a slope.

List: Name five agents of erosion.

Deposition Materials moved by erosion are dropped in new places. The process by which weathered materials carried by agents of erosion are dropped in new places is called **deposition** (dep-uh-ZISH-un). Deposition builds landforms on the earth's surface.

Define: What is deposition?

Name _____ Class _____ Date _____

6–1 What are erosion and deposition?

Lesson Review

Part A *Complete the following. Write your answers in the spaces provided.*

1. What is erosion? _____
2. List five agents of erosion. _____
3. What is deposition? _____
4. Use the phrases "building up" and "breaking down" to explain how deposition differs from weathering. _____

Part B *Classify each of the following as an example of erosion or deposition. In the space provided, write "E" for erosion or "D" for deposition.*

_____ 1. Pieces of broken shell are found along the shoreline after the tide goes out.

_____ 2. During a heavy rain, gullies form in a muddy hillside.

_____ 3. Soil from an open field is blown into piles along a stone wall.

_____ 4. During a storm, sand is washed out from under a beachfront home.

_____ 5. Rocks at the top of a hillside begin to tumble down the hill.

Skill Challenge

Skill: *building vocabulary*

Use a dictionary to find the meanings of the terms "erode" and "deposit." Write a definition for each term. Then, write a sentence that correctly uses each term <u>without</u> relating the term to earth science.

erode: _____

deposit: _____

6–2 How does gravity cause erosion?

Objective ▸ Name and describe examples of erosion caused by gravity.

TechTerms

- **mass movement:** downhill movement of weathered materials caused by gravity
- **talus:** pile of rocks and rock particles that collects at the base of a slope

Gravity Gravity is a force. On the earth, the force of gravity pulls all things toward the earth's center. This downward pull of gravity can cause materials to move from areas of higher elevation to areas of lower elevation.

Gravity is the only agent of erosion that is not in motion. However, gravity can cause motion. For example, the force of gravity can cause rocks and glaciers to move down mountain slopes. Gravity also causes rivers to flow toward the oceans.

Infer: Why is gravity an agent of erosion?

Mass Movement The downhill movement of weathered materials caused by gravity is called **mass movement.** Mass movement can occur quickly or slowly. Materials moved by gravity come to rest in piles, called **talus** at the base of the slope. The talus can be carried away by running water and other agents of erosion.

Define: What is mass movement?

Landslides and Mudflows The sudden movement of rocks down a hill is called a landslide. Rocks on a hill can be loosened by earthquakes, volcanic eruptions, and heavy rains. The force of gravity then pulls the loosened rocks down the slope of the hill. The moving rocks of a landslide cause great damage to anything in their path.

A mudflow is the rapid movement of mud down a hillside. Mudflows usually happen in dry, mountain regions after a heavy rainfall. Like landslides, mudflows can damage property. In the United States, mudflows often happen in the hillside communities of southern California.

Infer: What kind of damage might be caused by a mudflow?

Earthflow and Creep Earthflow and creep are slow mass movements. An earthflow is the slow movement of soil and plantlife down a hillside. Earthflows usually occur after a heavy rain. Creep takes place when animals, water, or periods of freezing and thawing cause soil and rock particles to move. As the soil and rock begin to move, gravity slowly pulls the materials downhill. Tilted trees and telephone poles usually indicate that creep is happening.

Identify: Name two examples of slow mass movement.

Name _____ Class _____ Date _____

6–2 How does gravity cause erosion?

Lesson Review

Complete the following. Write your answers in the spaces provided.

1. What is mass movement? _____
2. Name two examples of slow mass movement. _____
3. Name two examples of rapid mass movement. _____
4. What is gravity? _____
5. What is talus? _____
6. How is a mudflow different from a landslide? _____
7. How does gravity differ from all other agents of erosion? _____
8. How can gravity cause motion? _____

Skill Challenge

Skills: *applying concepts, diagraming*

The map shows some of the main rivers in the United States. Beside each river, draw an arrow to show the direction in which the river flows. Then, answer the questions.

1. In which direction do rivers flow? _____
2. What force determines the direction in which a river will flow? _____

6-3 How does wind cause erosion?

Objective ▸ Describe the kinds of wind erosion and deposition.

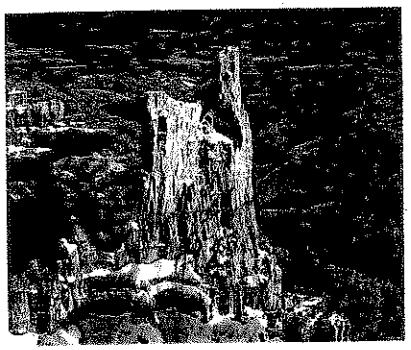
TechTerms

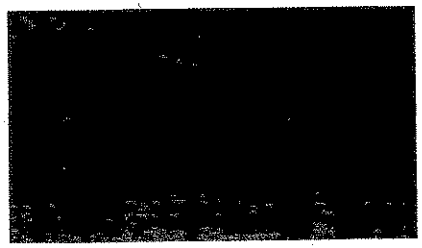
- **abrasion** (uh-BRAY-zhun): wearing away of rock by particles carried by wind and water
- **deflation** (dih-FLAY-shun): removal of loose material from the earth's surface
- **loess** (LESS): deposits of wind-blown dust

Deflation Energy is the ability to do work. Work is done when an object is moved. Wind has energy. Wind can move a sailboat across a lake. Wind also can move loose materials such as sand and dust particles. The removal of loose materials from the earth's surface by the wind is called **deflation** (dih-FLAY-shun). Deflation most often occurs in deserts, plowed fields, and on beaches.

Describe: Why is wind an agent of erosion?

Abrasion Sand particles carried by the wind can wear away rocks. Have you ever rubbed sandpaper against a piece of wood? The sand on the sandpaper wears away the surface of the wood. The same thing happens when sand and rock particles are blown over exposed rock or soil. Sand particles carried by the wind are bounced along close to the ground. As the sand particles hit rocks and exposed soil, some of the surface of the rock and soil are worn away. The process by which rock and soil are worn away by particles carried by wind and water is called **abrasion** (uh-BRAY-zhun).





Define: What is abrasion?

Sand Dunes Fast-moving wind can carry more sand than slow-moving wind. When a rock or other barrier blocks the wind, the wind slows down. As the wind slows down, it drops the sand it is carrying. The sand is dropped and builds up. A mound called a sand dune is formed. Sand dunes are common in deserts and on beaches.

A sand dune has two sides. The side facing the wind is the windward side. The windward side has a gentle slope. Sand is blown up the windward side and over the top, or crest, to the other side. The side away from the wind is called the slipface. The slipface has a steep slope.

Infer: The north side of a sand dune has a gentle slope. From which way is the wind blowing?

Loess Wind carries dust higher and farther than it carries sand. Thick deposits of wind-blown dust may build up many kilometers away from the source of the dust. This wind-blown dust is called **loess** (LESS). The photograph at the top of the page shows a loess deposit. Loess deposits are found in parts of the Mississippi River valley, Washington State, and Oregon.

Define: What is loess?

Name _____ Class _____ Date _____

6–3 How does wind cause erosion?

Lesson Review

Part A *Label the windward side, the crest and the slipface of the sand dune. Then draw an arrow to show the direction that the wind is blowing.*

Part B *Write true if the statement is true. If the statement is false, change the underlined term to make the statement true. Write your answers in the spaces provided.*

_____ 1. The removal of loose materials from the earth's surface by the wind is called abrasion.

_____ 2. Energy is the ability to do work.

_____ 3. Wind-blown dust is called talus.

_____ 4. The process by which rock and soil are worn away by particles carried by the wind is called deflation.

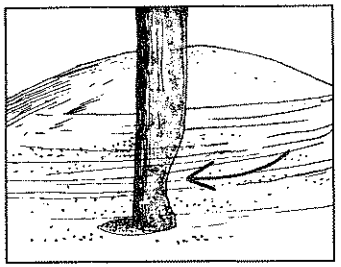
_____ 5. The windward side of a sand dune has a gentle slope.

_____ 6. Sand dunes are formed by deposition.

Skill Challenge

Skills: *applying concepts, interpreting a diagram*

Use the diagram to answer the questions.



1. What process wore away the pole in the diagram? _____
2. Why can wind carry dust higher and farther than it can carry sand? _____
3. Was the pole more likely worn away by dust or sand? _____
4. Why is the pole worn away close to the ground? _____
5. Suggest two things that could have been done to prevent this pole from being worn away. _____

6-4 How does running water cause erosion?

Objective ▸ Describe how running water causes erosion.

TechTerms

- **runoff:** rainwater that flows into streams and rivers
- **tributary** (TRIB-yoo-ter-ee): small stream that flows into the main stream of a river

Running Water Running water changes more of the earth's surface than any other agent of erosion. Rivers, streams, and runoff are forms of running water. Runoff is rainwater that flows over the earth's surface. Runoff empties into streams and rivers.

List: What are three forms of running water?

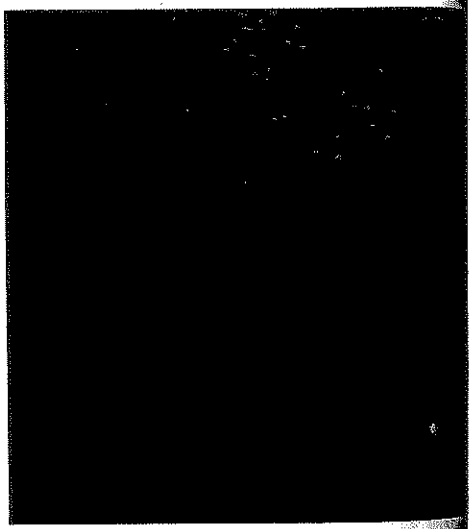
Runoff and Erosion As runoff flows over the earth's surface, the running water carries away soil particles. The faster the water moves, the more soil the water can carry away. Have you ever seen gullies in a hillside? Gullies are formed by erosion caused by runoff.

The amount of rainfall, plant growth, and shape of the land affect the amount of runoff in an area. During heavy rains, there is a lot of runoff. The roots of plants take in some water and hold soil particles in place. For this reason, areas with a lot of plant growth have less runoff than areas with little plant growth. Areas with steep slopes have the most runoff. The greater the amount of runoff, the more erosion there will be.

Predict: Would erosion be greater on a hillside or on flat land? Explain.

River System A river system is made up of a main stream and all the streams that flow into the main stream. The streams that flow into the main stream of a river system are called **tributaries** (TRIB-yoo-ter-ees), or branches. The Mississippi River is the main stream of a large river system. The Mississippi River has many tributaries. Two tributaries are almost as large as the Mississippi River. These tributaries are the Ohio and Missouri rivers. Runoff from the surrounding land feeds the many tributaries of a river system.

Identify: Name three rivers that are part of the Mississippi river system.



Formation of a River A river system usually begins to form in mountains or in hills. The place where a river starts is its source. When water cannot soak into the ground, runoff flows down the slope of the hill or mountain. The running water erodes the soil and cuts gullies into the slope. A small channel forms. Channels are the paths that streams follow. The small stream may join other small streams to form a larger stream. Larger streams may flow together to form the tributaries of the main stream, or river, of a river system.

Explain: How do channels form?

Name _____ Class _____ Date _____

6–4 How does running water cause erosion?

Lesson Review

Part A *Place a check mark beside each form of running water.*

_____ 1. a river	_____ 3. rain	_____ 5. runoff
_____ 2. waves	_____ 4. a stream	_____ 6. water from a faucet

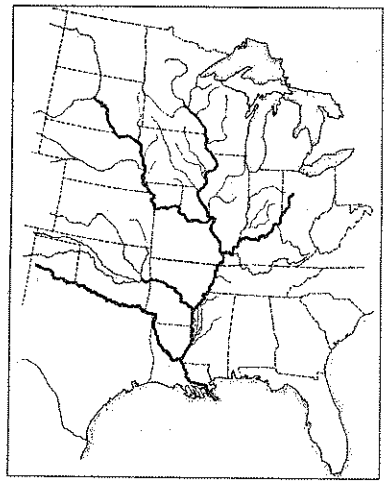
Part B *Complete the following. Write your answers in the spaces provided.*

1. What is runoff? _____
2. What is a tributary? _____
3. Which can carry more soil, a fast-moving river or a slow-moving river? _____
4. Which will erode faster, a hill with a gentle slope or a hill with a steep slope? _____
5. Which will erode faster, a hillside with many plants or a hillside with few plants? Explain. _____

Skill Challenge

Skills: *labeling, map reading, analyzing*

Use the map of the Mississippi River System to complete the following.



1. Label the mouth of the Mississippi River on the map. _____
2. Name three tributaries of the Mississippi River system. _____
3. What is the main stream of the Mississippi River system? _____
4. Through how many states does the Mississippi River flow? _____
5. Name three states through which the Mississippi River flows. _____