

Learning Objectives

- 1) Know that landforms are the shape of the land on the surface of the earth. Mountains, hills, plateaus, basins, and valleys are examples of landforms.
- 2) Realize that landforms are constantly changing. Some of these changes occur because of actions below the surface of the earth. For example, magma can erupt through the crust to the earth's surface; these eruptions can build mountains. In addition, earthquakes can cause drastic changes to the landscape. Other changes to landforms are the result of forces that originate on the earth's surface; they are **weathering** and **erosion**.
- 3) Define weathering and know about the forces that cause it. Weathering is a long process in which large rocks are broken down into smaller pieces. For example a boulder might be broken down into smaller rocks, and those smaller rocks may be broken down again into sand or soil. The agents of weathering include:
 - a) **Water:** Water, in all its forms, is the most powerful agent of weathering. The freezing and flowing action of water can causes physical changes to landforms. Water can get into cracks in rocks. If the temperatures are cool enough, the water will freeze into ice. As ice forms, it expands, which creates a force so great that it can split rocks apart. The flowing action of rocks can wear the surface of rocks away. Rocks on the bottom of a stream are relatively smooth because of the water flow. Water can "team up" with other chemicals or act on its own and cause a chemical change in the substances that make up landforms. For example, plants tend to grow near rivers, streams and other bodies of water; these plants produce vinegar, a weak acid. When the vinegar and water mix, and the solution is carried over rocks, it can dissolve some of the minerals. Furthermore, some minerals do not need acid to dissolve; the polarity of water alone can dissolve them.
 - b) **Plants:** Plants can grow in the cracks of a rock. As their roots and stems increase in size, they can pry the rock apart.
 - c) **Wind:** The wind can act like a sandblaster to the surface of many landforms. As the wind blows, it picks up sand and other particles. These particles collide with the surface of landforms, causing them to wear down.
 - d) **Temperature changes:** A rock is made of many different minerals, each with their own physical properties. As the temperature increases, the individual minerals **expand at different rates**. As the temperatures decreases, the mineral

- contract at different rates.** The different expansion and contraction rates within the rock may cause it to break down.
- 4) Define erosion and know about the forces that cause it. Erosion is the movement of weathered rocks and soil; pieces of the earth's crust are picked up and carried away. The agents of erosion include:
 - a) **Gravity:** Gravity can act quickly or over a long period of time to cause erosion. A rock or group of rocks on the side of a mountain or hill can fall and end up somewhere else; this is called a rockslide. Soil, water, and gravity can be a destructive combination when they produce a mudslide. Gravity can influence landforms in ways that are not so immediate. For example, creep is a form of erosion, where soil is pulled down hill over a long period of time.
 - b) **Ice:** Moving ice can cause erosion. The weight of a glacier causes it to flow down hill and scrape over the land, bringing large amount of rocks and soil with it. Eventually, the rocks and soil will be deposited somewhere else. Many landforms including Cape Cod, Long Island, and the Yosemite Valley were created by flowing glaciers thousands of years ago,
 - c) **Wind:** Wind can carry sand and soil great distance and, in the process, change the shape of the land. For example, wind may pick up particles of sand, deposit them when it slow down, and form a sand dune. Over time, the wind may pick up the sand again and deposit it to form another sand dune. In addition, during drought, the wind can pick up the fertile topsoil needed to grow crops destroying many farms.
 - d) **Water:** Flowing water is the agent of erosion that causes the most change to the landscape. Water flowing in a creek or river can carry large amounts of silt many miles.
 - e) **Human activity:** As they move and build on the earth's surface, people cause a great deal of erosion. People tunnel through mountains to build roads, and they dig into the earth as they mine for resources. People also help to control erosion. They terrace the sides of mountains and hills and build retaining walls around them to keep soil from being washed away by water and gravity.
 - 5) Explain deposition. Deposition occurs when eroded materials are "dropped off". Deposition builds up the surface of the earth. For example, the Mississippi river carries silt to its mouth in the Gulf of Mexico. There it deposits the silt forming a delta.
 - 6) Realize that erosion/weathering and deposition are processes that work together to break landforms down and then build them back up.

Suggested Activity

Before and after picture: Give each student a piece of white paper (larger than 8 1/2 X 11) and some coloring utensils. Ask the students to fold the paper in half (not lengthwise if the paper is not square). Ask each student to choose an example from the video of weathering, erosion, and/or deposition. Then have him draw a picture on one side of the paper showing what the landform may have looked like before the change occurred and draw a picture on the other side of the paper showing what the landform looks like after the change. In addition each student should write a sentence or two explaining how weathering, erosion, and/or deposition changed the landform.

Vocabulary

Chemical Change — An occurrence where compounds are formed or broken down

Crust — The outer layer of the earth

Delta — A triangle-shaped, low, flat area at a river's mouth built up by sediment

Glacier — A large body of moving ice

Gravity — The force that pulls everything on earth to the center of the earth

Sediment — Material that is deposited after erosion

Silt — Very fine particles of earth usually found floating in rivers and other bodies of water

