



# Why Does the Earth's Surface Change?

- OBJECTIVES:**
1. Identify and define several different types of erosion.
  2. Compare and contrast the effects of various types of erosion.
  3. Discuss how engineers work to prevent erosion.

## OVERVIEW:

This lesson will look at five types of weathering and simulate the effect of each type on our surrounding Earth. Students rotate through stations and model each type of erosion on rocks, soils, and minerals. Students record their observations and discuss the effects of erosion on the earth.

## STANDARDS ADDRESSED:

**NGSS 4-ESS2-1:** Make observations and/or measurements to provide evidence of the effects of weathering or the rate of erosion by water, ice, wind, or vegetation.

**NGSS 4-ESS3-2:** Generate and compare multiple solutions to reduce the impacts of natural Earth processes on humans.

## MATERIALS:

- Goggles (to be worn at all times)
- Stopwatch (8 minute rotations)
- Paper towels (for clean up)

### Station #1: Chemical Erosion Station:

- Tray
- Rock samples
- Vinegar
- Droppers
- Magnifying glass

### Station #2: Water Erosion Station:

- Tub
- Moist soil
- 10-15 coins (different sizes)
- Watering can
- Water
- Ruler

### Station #3: Wind Erosion Station:

- Shallow, large, plastic container (under-bed-storage size)
- Handheld electric fan
- Play sand

### Station #4: Glacier Erosion Station:

- Ice cubes
- Modeling clay
- Tray
- Sand (assorted grain size)

### Station #5: Temperature Erosion Station:

- Heat source
- Glass beakers
- Ice
- Water
- Tongs
- Glass marbles

**ACTIVITY STEPS:**

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**Pre-Activity Assessment:**

Class discussion questions:

- a. Do you know what erosion and weathering is?
- b. What are some examples of erosion that can be found in nature?

Pre-Activity for Teacher:

- a. Set up stations.

**Stations for Students:**

Use the vocabulary words to record your observations in academic language. Restore everything at your station to the original set up before moving to the next station.

1. Chemical Erosion Station: One at a time, place each rock sample in the tray, then gently add drops of vinegar over it to simulate rain (precipitation). Using a magnifying glass, observe the reaction (if any) taking place. Why do you think this reaction occurred?
2. Water Erosion Station: Pile the soil to simulate a mountain about 10 cm across at the top. Press your coins into the surface at different angles to simulate trees and structures. Create a rainstorm by pouring water from the watering can directly over the pile of soil. Record your observations. Why do you think this occurred?
3. Wind Erosion Station: Form a pile of sand to simulate a sand dune in the large container, preferably outdoors. Use the fan to blow directly at the pile of sand to move it from one end of the container to the other end. Record your observations. Why do you think this occurred?
4. Glacier Erosion Station: Make a ball of clay and flatten it on the tray. Press an ice cube into the clay and let it stand for a few minutes. Record your observations of the surface of the clay under the ice cube. Now place some sand on top of the clay and repeat. What does the bottom of the ice cube look like? Move the ice cube back and forth on the clay. Record your observations. Why do you think this occurred?
5. Temperature Erosion Station (this station is best done as a class demo by the teacher): Place the beaker with the marble over the Bunsen burner (on a very low flame) for 1-2 minute. Then place it in the beaker of water and quickly move it to the beaker of ice. Record the change in appearance of the marble. Why do you think this occurred?

**ASSESSMENT:**

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1. Assessment during activity: One-on-one conferring to evaluate comprehension of science concepts and skills. Review observations and responses submitted by students.
2. Ask students to draw examples of each type of erosion and describe the process taking place and its effect on the environment and the surface of the earth.
3. Students will research and present the role of engineers in protecting the environment, landmark structures, and people from the effects of erosion and weathering.
4. Lesson summary assessment: Show students a slideshow of pictures of different natural and manmade things that have been affected by erosion and have them identify the type of erosion that caused it.
5. Students will research the effect erosion has on their community. Identify possible solutions for reducing these effects and the role of engineers.

**EXTENSION (OPTIONAL):**

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Students will create flashcards with pictures of: acid rain, deposition, erosion, geology, glacier, limestone, scouring, sediment, and weathing.