

WEATHERING ROCKS

Ages:
3rd to 6th grade

Duration:
20 minutes

Materials:
For each team of three to four students:

- 1 margarine container, filled three-fourths full with sand and water and frozen
- Access to a sink with flowing water (can be done with pitchers of water)
- Either a sink or a large bowl
- 2 pieces of dry, brittle bread
- 1 (2"x2") piece of coarse sandpaper

OVERVIEW —

The students will model how wind and water can weather and break down rocks.

OBJECTIVE —

The students will:

- Observe the features resulting from water as it weathers a “sandstone rock”
- Observe the features resulting from “wind” as it weathers a “rock”
- Compare the forces of water and wind on rocks over time

BEFORE YOU START: Prepare the frozen blocks of sand: Fill the margarine tubs about three-fourths full with sand; add water to cover the sand and freeze lightly.

ACTIVITY —

1. Invite the students to share their thoughts about different ways soil can form.

- What helps to break down rock on Earth? *Flowing water, the expansion of freezing water, wind and wind-carried particles, plant roots widening cracks in rocks.*

2. Place the student into groups. Provide each group with the frozen block of water and sand and ask them to imagine that this is a rock — a sandstone!

Have the groups place their "rock" in the dishpan under the faucet and turn the water on at a slow to medium stream. Alternatively, place the “rock” in a large bowl and use water poured from a pitcher or bottle.

3. Bring the students back together to discuss what they found.

- What happens to the rock? *The water wears it away.*
- What does this tell us about how water contributes to the breakdown of rocks?

4. Now invite the groups to explore how wind can break down rocks. Provide each group with a piece of dry, brittle bread and ask them to imagine it is a rock.

- What happens when their hand — acting like the wind — brushes across the bread? *Small crumbs may fall from it.*
- What happens when they rub a piece of sandpaper across the surface? *Many more crumbs break away from the surface!*

5. Bring the students back together to discuss what they observed.

- What process does this represent? *Sometimes the wind is strong enough to carry particles of rock. These particles act like the sandpaper when they are blown against rock surfaces.*
- What does this tell us about how wind contributes to the breakdown of rocks?

BACKGROUND —

Weathering is the chemical and physical alteration of rock and minerals when exposed to air, moisture, and organic matter.

Chemical weathering - minerals in a rock are chemically altered or dissolved

Physical weathering - solid rock fragmented by mechanical breaking

When comparing planets:

- Soil: the unconsolidated (loose) top layer of material on Earth's surface that is made of minerals and, usually, organic matter in which plants grow.
- Regolith: a general term for the layer of loose rock material that forms the surface of a planet — including Earth! — and covers the rock. Soil is a type of regolith. Other types of regolith include volcanic ash, materials deposited by a glacier or river, sand dunes, the red rocky surface materials of Mars, and the layer of material on the lunar surface.
- Dirt: a term used by small children and gardeners to describe soil; a term used by scientists when they are unimpressed with the qualities of the regolith they are investigating or when they are more interested in the layers of rock beneath the regolith. May also refer to information, often of a negative connotation (e.g., "I have the dirt on you").

What Controls the Rate of Weathering?

- Parent Material (minerals and structure)
- Climate (rainfall and temperature)
- Biology
- Slope
- Presence / Absence of Soil
- Exposure Time

TIES TO STANDARDS —

Correlations to National Science Standards

Grades K–4

Earth and Space Science – Content Standard D

Properties of Earth Materials

- Earth materials are solid rocks and soils, water, and gases of the atmosphere. The varied materials have different physical and chemical properties.

Grades 5–8

Earth and Space Science – Content Standard D

Properties of Earth Materials

- Soil consists of weathered rocks and decomposed organic material from dead plants, animals, and bacteria. Soils are often found in layers, with each having a different chemical composition and texture

Texas Essential Knowledge Standards (Science)

Grade 3

(7) A Earth and space. The student knows that Earth consists of natural resources and its surface is constantly changing. The student is expected to: explore and record how soils are formed by weathering of rock and the decomposition of plant and animal remains;

Grade 4

(7) Earth and space. The students know that Earth consists of useful resources and its surface is constantly changing. The student is expected to:

- (A) examine properties of soils, including color and texture, capacity to retain water, and ability to support the growth of plants;
- (B) observe and identify slow changes to Earth's surface caused by weathering, erosion, and deposition from water, wind, and ice