

Weathering and Erosion

4th Grade

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References:

- Columbus Public Schools SLC Guide

Benchmarks:

SLC 15: Identify evidence and show example of changes in Earth's surface.

Objectives:

Students will observe and identify the effects of weathering and geological activities in their environments as well as in the reports of events such as storms, floods, earthquakes, or volcanoes.

Materials:

- Tub of loose, unconsolidated dirt
- Rough rocks
- Tub of sod
- Pitcher of water
- Smooth rock

Initial Demonstration:

Take the students on a walk around the school grounds, pointing out evidence of erosion and weathering. [e.g. buckled sidewalks, rivulets, worn bricks/concrete on the building, potholes]

If there is not time for this or if the weather is inappropriate, pass out rocks that are smoothed due to weathering/erosion and rocks that are rough and unweathered.

Target Observations:

- Some parts of the building and surrounding earth have changed over time. Rocks do not all start out smooth, sidewalks buckle, foundations shift, concrete and bricks get worn down.

Target Model:

- Rocks and buildings and roads and sidewalks are changed by the natural processes of weathering and erosion.

Procedure:

1. Blow on the tub of loose dirt. Observe that wind makes soil move.
2. Blow on the turf. Observe/infer that the plants/grass seem to hold the soil in place.
3. Incline the tub of loose dirt and pour water on it. Observe that the water carries away the soil.
4. Incline the tub of turf and pour water on it. Observe/infer that the plants/grass seem to hold the soil in place.
5. Pick up a fragile clump of wet soil. Hold one end of it and wait for the other end to fall. Ask the students what force caused the clump of dirt to break.

Wind and water and gravity can all make soil move. These are the three agents of erosion. Which is the process by which bits of earth [typically soil and rock, but also bits of buildings] are transported from one place to another. But why does this happen? Gravity is easy to figure out, it provides a force to pull down on overhanging bits of earth. But what about wind and water?

Target Observations:

- Wind can move dirt, rocks, etc.
- Water can move dirt, rocks, etc.
- Gravity can cause dirt to break apart too.
- Plants have roots that can help keep soil from moving.

Target Revised Model:

- Wind, water, and gravity can all lead to erosion, which is the movement of soil, dirt, rocks, etc.- all the things that make up the Earth.

Procedure:

1. Pass out rocks and sandpaper. Have the students rub the rocks and wear off bits of rock with the sandpaper.
2. Take some soil from the loose soil pile and drop it into the pitcher of water. Have the students observe that some of the soil is suspended and some sinks. Swirl the water and have them observe that the faster the water moves the more material it can hold. Explain that the same is true for wind.

The particles held in suspension by wind and water will rub against objects. What do you think will happen? The particles will act like the sandpaper and wear away the surface of the objects.

Discuss with the class the difference between transporting and wearing off small pieces and breaking off larger bits of earth/buildings. Ask the students to examine the rocks again. Have them observe that they are not solid, but have pores and cracks. Ask

what would happen if they got wet? [water goes in pores/cracks]. Now ask what happens if the temperature drops below freezing [water turns to ice and expands]. What might happen to the rock/brick/etc? [it might break in half]. Make a similar argument for plant roots. For both discussions it might be helpful to draw pictures on the board.

Target Observations:

- Rocks can be broken up by little rocks.
- Rocks can be split up by water seeping into cracks and pores and freezing.

Target Revised Model:

- Particles in suspension in wind and water can act as sandpaper and wear down bits of earth. The worn off particles are then carried in a similar manner to a new location.
- Weathering is the breaking up of large bits of earth into smaller bits due to the effects of plant-wedging, ice-wedging, and water and wind and gravity.

Summary:

Students have seen the effects of erosion and weathering firsthand. They understand that weathering is the breaking up of rocks, dirt, etc., while erosion is the movement of these things from one place to another due to water, wind, gravity, etc. Oftentimes, weathering and erosion take place very slowly, over a period of years.