

Weathering Rocks

4th Grade

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References:

- Lesson plan from CPS 4th grade Earth Science curriculum guide
- Adapted from a lesson prepared by Megan Knapp

Benchmarks:

(Benchmark B): Summarize the processes that shape the Earth's surface and describe evidence of those processes. ES-8: Identify and describe how freezing, thawing, and plant growth reshape the land surface by causing the weathering of rock.

Objectives:

Students should be able to describe natural events that can cause rocks to break apart, using the vocabulary: ice wedging, plant wedging, and abrasion. Students should be able to distinguish between erosion and weathering, and describe natural processes that will cause erosion, including water, wind, gravity.

Materials:

- Plaster of Paris
- Sand
- Dixie cups
- Green balloons
- Ice cube trays
- Sand
- Clay
- Glass pickle jar w/ lid

Preparation:

Rocks: Put a spoonful of sand and a spoonful of plaster of paris in a Dixie cup. Add water as per directions. Allow the cup to set, usually about 20 minutes. When the plaster is stiff but not hard, push on the bottom of the cup to create cracks. In a larger cup, prepare another rock, this time placing a green balloon in the mixture, slightly inflated. Make sure the end to blow up the balloon is out and free of plaster. Do not put plaster in the balloon. Add more mixture on top. The balloon is your "plant", with the buried part being the roots, and the exposed part the stem.

Glaciers: Place a small amount of sand in the bottom of a small baking pan. Fill with water and freeze.

Initial Demonstration:

Give the students a rock and ask them how we could change its shape or make it smaller. Students may suggest things like beating it with a hammer. Inform students that when rocks break up in nature, it is called **weathering**. Ask them how the weather (or nature) can break a rock up. Rocks can break by being hit by something, or hitting something else (**abrasion**), as when they fall or other rocks tumble on to them. Give the students the paper cups with the “rocks” in it. Students should observe the rocks and the cracks in them.

Target Observations:

- Some rocks are hard, others break and chip easily.
- The plaster rocks have cracks in them.

Target Model:

- Squeezing or hitting rocks can cause them to crack.
- Weathering is caused by rocks tumbling around or by the Earth squeezing them.

Procedure:

Ask students: *If this rock were to break, where would it break?* Students will probably guess along the cracks. Ask, *How could we help the crack along so that the rock does break.* Students may suggest “bending” the rock or sticking something in the hole. Point out that animals move rocks around or step on them which might help them break up. Introduce the word **wedge** as something that gets stuck in a crack and pries it open. Ask, *What kinds of things might get stuck in a crack in nature?* Students may suggest a variety of things. Remind them that if a big rock is to be broken, the wedge must be very strong. If students suggest plants, ask them if plants are strong. They may say that trees are.

Take out the plaster with the green balloon. Tell them that the balloon is a plant. *What part of the plant is in the rock?* (the roots). Ask, *What happens when the plant gets plenty of water and sunshine?* (It grows) Blow up the balloon and watch the “rock” break apart. This is called “plant wedging” or “root wedging” because the plant is serving as the wedge.

Ask students, *What will happen if it rains on a rock with cracks in it?* Students should say that the water will get in the cracks. Ask them if the water is strong enough to break the rock apart. They will probably say no. *What if it freezes, what happens to water if it freezes?* (Students may or may not know that water expands when it freezes). Fill a glass pickle jar to the very top and cap it off. Place the jar inside a bucket or wrap a towel around it to prevent the glass from breaking into pieces in the freezer. Put it in the freezer over night. Introduce the word **“Ice wedging.”** (Ice is serving as the wedge). Students should find that both plants and ice can cause a rock to break up.

Target Revised Model:

- Weathering is caused by rocks tumbling around, by the Earth squeezing them, or by a “wedge” getting into the cracks, such as ice or plants.

Procedure:

Put a pile of sand on one end of a tray. Point out that sand is just tiny rocks, so these rocks have already been weathered. Ask the students how you can move the sand without touching it. Students may suggest the following, each of which is a form of erosion: Tilting the tray (gravity); blowing on the sand (wind); pouring water on the sand (rivers or runoff); pushing it with another object, such as a pencil (movement by animals).

Give students a piece of flat clay and a block of ice with sand on the bottom. Instruct the students to rub the sand part of the ice across the clay. Ask them what natural thing the ice might represent. (Glaciers) If students are not familiar with glaciers, fill them in with details. Glaciers are huge blocks of ice, sometimes called rivers of ice because they can be as large as or larger than rivers. They move slowly down hill, a few inches to a few feet a day. As they move, the dirt and sand underneath them are pushed along. Some of this dirt or sand piles up in front of the glacier as it moves. This is called a moraine. The northern part of Ohio was carved out by glaciers, and the last one left a moraine across the middle of the state, called the Powell Moraine. Ask student what would happen if they left the ice on the clay all day. Of course the ice would melt. The great lakes, such as Lake Erie, were created by glaciers and when the last ice age ended and the Earth began to warm again, much of the remaining ice melted and ended up in these lakes!

Target Revised Model:

- Weathering causes rocks to break up.
- Erosion causes the pieces to be moved away.
- The pieces are later deposited elsewhere (this is called deposition).
- These processes happen naturally. However, some things that humans do can cause the processes to speed up. For example, exposed soil is more susceptible to erosion than soil covered by plants. Also, mining causes rocks to be broken up.

Summary:

The Earth’s surface is constantly changing. Some processes that cause these changes are weathering (breaks things up) and erosion (moves things from one place to another). Both these processes are natural, but can be sped up by humans, such as when plants are removed, and topsoil erodes away.

A review worksheet is attached.

This Rocks!

Name _____ Room _____ Date _____

Fill in the blanks below with the words “Erosion” and “Weathering”.

_____ is when rocks break apart.

_____ is when pieces of rocks get moved away.

Look at the vocabulary below. Use the letter “E” if it describes Erosion, or the letter “W” if it describes weathering.

_____ 1. Ice wedging

_____ 2. Rivers washing away sand on their banks

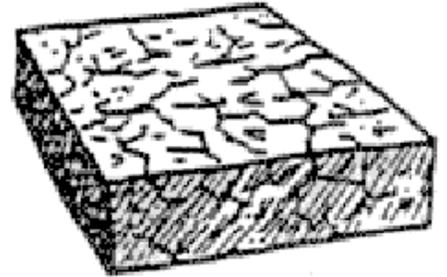
_____ 3. Abrasion

_____ 4. Gravity

_____ 5. Wind blowing dust away

_____ 6. Plant wedging

_____ 7. Animals moving rocks as they walk around.



What type of weathering is most likely to happen in the winter?

What type of weathering is most likely to happen in the spring and summer when plants are growing?