

Open Earth Systems for Maryland Teachers

Erosion and Weathering Part 2

Grade 4

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Objective:

Students will understand 4 types of weather processes: wind, running water, plant growth, and freezing water.

Next Generation Science Standards

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. [Clarification Statement: Examples of variables to test could include angle of slope in the downhill movement of water, amount of vegetation, speed of wind, relative rate of deposition, cycles of freezing and thawing of water, cycles of heating and cooling, and volume of water flow.] [Assessment Boundary: Assessment is limited to a single form of weathering or erosion.]

Maryland Voluntary State Standard

4.A.2 Recognize and explain how physical weathering and erosion can cause changes to the Earth's surface

a. Investigate and describe how weathering wears down Earth's surface.

- Water
- Ice
- Wind

b. Cite evidence to show that erosion shapes and reshapes the Earth's surface as it moves from one location to another.

- Water
- Ice
- Wind

Common Core State Standards Connections:

ELA/Literacy -

RI.4.7 Interpret information presented visually, orally, or quantitatively (e.g., in charts, graphs, diagrams, time lines, animations, or interactive elements on Web pages) and explain how the information contributes to an understanding of the text in which it appears. (4-ESS2-2)

W.4.8 Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources. (4-ESS1-1), (4-ESS2-1)

Materials:

Access to the Internet

Worksheets for each student (from www.uen.org)

- [Student Log: Weathering](#) (pdf)
- [What is Weathering?](#) (pdf)

Activity 1 Materials

- 16 oz. paper cups
- Colored Chalk
- Salt

Activity 2 Materials

- Plastic bottle with lid
- Small pieces of sandstone (about 3 pieces per bottle)
- Water

Activity 3 Materials

- 16 oz. paper cups
- Bean seeds
- Plaster of Paris
- Paper towels

Activity 4 Materials

- Small plastic bags
- Clay (the soil kind)
- Water

Engage:

Show students power point slides of different things that have been eroded (from <http://www.slideshare.net/MMoiraWhitehouse/weathering-erosion-and-depositioneasier>) Note: transcript available on the web page. Have students guess how each item was eroded.

Explore: (activities from www.uen.org)

Activity 1 - Wind as an agent of weathering

1. Give groups of students a cup half-filled with salt and a colored piece of chalk. Have them take turns stirring the colored chalk through the salt.
2. Two things will happen: the salt will be colored and the chalk piece will wear away. Relate this to wind blowing sand on rocks and wearing them away like the formations seen in the slide show. (Instead of wind blowing sand against Arches, tell them the chalk represents Arches and they are moving Arches through the sand.)

Activity 2 - Running water as an agent of weathering

1. Compare river rocks with sharp-edged rocks. Rub two pieces of sandstone together and notice the pile of sand that collects.
2. Fill the plastic bottle 3/4 full of water.
3. Drop in three or four small pieces of sandstone.
4. Make sure the top is screwed on tightly. Have students observe the clean, clear water, and the shape of the rocks.
5. Shake bottle vigorously for three minutes.
6. Examine water. Take stones out. Observe the weathering (rounded edges).

Activity 3 - Plant growth as an agent of weathering

1. Explain that Plaster of Paris hardens and will represent rocks in this demonstration. Mix the Plaster of Paris quite well and pour into a disposable 16 oz. cup. "Plant" several bean seeds in the wet mix so that some are covered and are just below the surface and the others are resting on the surface (about half submerged).
2. Assign a student to keep a wet folded paper towel on top of the cup. It must be moistened every day. (Soaking the seeds ahead of time will hasten their growth.)
3. Ask students to predict what will happen to the seeds. Record predictions and subsequent observations in their science log.
4. Over the course of two to three weeks you will see the seeds sprout. As they do, small fragments or flakes of the Plaster of Paris will break away. These flakes represent rock flakes broken away from large rocks as plants take root and grow on them.

Activity 4 - Freezing water as an agent of weathering

1. Wet a chunk of clay about the size of a grapefruit. Roll it into a ball.
2. Place the ball in a plastic bag and put it in the freezer. Leave it overnight.
3. Next day, removed the clay from the freezer. Its surface should be slightly cracked and broken. Ask students to record their observations.
4. Wet the clay again, taking care not to close up the cracks that have been formed. Put it back into the freezer for another night.

On the following day, take it out and have students observe what has happened to the cracks. Measure the cracks. You could repeat this process several more times, watching the cracks widen. Discuss how this relates to the breaking down of rocks on a larger scale. Compare this to autumn rains filling cracks in the rocks (and sidewalks) then freezing during the winter.

Explain:

Have students walk around the block and record evidence of weathering. Look closely around the playground equipment, parking lot, and sidewalk.

Record your observations and explanations in your science log.

Evaluation:

Students will demonstrate their understanding of the differences between weathering and erosion. Students will use their knowledge from the previous class on erosion and today's class on weathering to complete the Weathering and Erosion Worksheet. After completing the evaluation students will share their answers and have a group discussion about the difference between erosion and weathering.

Weathering and Erosion

Name: _____

Vocabulary:

Weathering - the **breaking** of rock or other materials on Earth's surface.

Erosion - the **moving** of rock, sand, sediment or other materials on Earth's surface.

Sediment - Bits of rock, sand, soil, shells and other materials.

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Directions:

Use the words "**Weathering**" or "**Erosion**" to complete the blanks below.

Hint: Underline the verb in each sentence. If the verb is "**breaking**" or a synonym for "breaking", then it's an example of "Weathering".

If the verb is "**moving**" or a synonym of "moving", then it's an example of "Erosion".

1. _____ Water runs down a river breaking off pieces of rock along the bank of the river.
2. _____ A fast moving river carries rock and sediment to the bottom of the river.
3. _____ Many beaches in Florida are losing their sand due to ocean carrying the sand out to sea.
4. _____ A wave crashes into a sea cliff causing it to break off and fall into the ocean.
5. _____ Wind blows and moves topsoil off a farmer's field.