What Kind of Weathered Rock have You Found?

Strand Earth Patterns, Cycles, and Change
Topic Investigating the changing Earth
Primary SOL 5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include:
a) identification of rock types;
b) the rock cycle and how transformations between rocks occur;
f) weathering, erosion, and deposition.
Related SOL 5.1 The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which
a) items such as rocks, minerals, and organisms are identified using various classification keys;
b) estimates are made and accurate measurements of length, mass, volume, and temperature are made in metric units using proper tools;
c) estimates are made and accurate measurements of elapsed time are made using proper tools.
5.7 The student will investigate and understand how Earth's surface is constantly changing. Key concepts include
e) changes in Earth's crust due to plate tectonics.

Background Information

Rocks move and change over time due to heat and pressure within Earth and due to weathering, erosion, and deposition at the surface. These and other processes constantly change rock from one type to another. *Weathering* is the process by which rocks and other materials on Earth's surface are constantly being broken down both chemically and physically. *Erosion* is when broken down materials are moved by water and wind. *Deposition* is when sediment is deposited in new locations.

Topsoil is the upper soil surface and a natural product of subsoil and bedrock. *Subsoil* and *bedrock* are layers of soil under the topsoil that are formed over a long period of time by the action of water.

Materials

- Clear plastic containers
- Water
- Small spades or shovels
- Rock Classification key (see the Rocky Road lesson)
- Screens for filtering, or kitchen sieves
- Magnifying glasses
- Vinegar
- Eye droppers

Vocabulary

weathering, erosion, topsoil, sediment, deposition

Student/Teacher Actions (what students and teachers should be doing to facilitate learning)

Introduction

1. Begin by reviewing the definitions of *weathering*, *erosion,* and *deposition*. Explain to students that they will be identifying weathered rock that has been found in the soil around the school yard or around their home.
2. Hold a discussion about the layers of soil. Ask students in what layer they would find weathered rock? Discuss appropriate areas for collecting the soil containing weathered rock. Taking the sample from an area that has just been dug up and replaced during recent construction is not the best idea as the layers have been disturbed. The soil samples should come from a long-established area and should come from a variety of levels in the soil.

Procedure

1. Students will work in small groups for this activity. The groups collect their soil samples from an undisturbed area where they have permission to dig down below the topsoil and extract some soil. (Be certain that the owners of the land have given permission for this activity to occur.) Document the exact location of the area.
2. Have students use the screens for filtering, or a kitchen sieve to separate the rock from the soil by mixing or shaking the soil in water.
3. Have students use the magnifying glasses to observe the soil sediment left after straining and observe the presence of crystals and their sizes. They should be able to draw conclusions about the kind of soil in which this sediment was found (for example, if it is gritty, it is a sandy soil; if it is smooth, it may contain limestone).
4. Each group will use their rock classification key to identify the weathered rock found in their sample, using the vinegar and eye droppers to help identify the type of rock, according to the rock classification key.

Conclusions

1. Students are to write up their investigation, describing their finding at each step. They need to identify the exact location where they collected their soil sample, procedures that they followed to identify the type of rock, and the reasons for their decision.

Assessment

- **Questions**
  - What significance does the vinegar have in the experiment?
  - What would be the purpose of using a screen for filtering or a kitchen sieve in this experiment?
- **Journal/writing prompts**
  - How would soil from different areas of the area make a difference in the results?
  - Explain the difference between weathering and erosion.

- **Other**
    - Assess the procedure the students followed to complete their investigation, checking it for details and logical order.
    - Assess the final rock identifications and the students' reasons for their decisions. Ascertain whether those decisions logically follow from information provided in the rock classification key.

Extensions and Connections (for all students)

- Have the students graph the class results and draw inferences from the graph about the most common kinds of weathered rock in your community.
- Have students bring samples of soil from visits to other places, such as another part of Virginia or another state. Have them do the identification procedure with these samples. Then, have them place the identified weathered rock in clear plastic bags with identification tags and attach them to a Virginia or U.S. map, creating a display of where different kinds of weathered rock are found around the state or country. This could accompany a year-long unit on weathering and erosion.
- Have students document the depth from which the rock samples were removed. Students can use this information to make inferences about types of rocks at different levels in the soil.
- Students can get rocks from close to a water source and compare these rocks to the ones taken from the soil.

Strategies for Differentiation

- Provide students with an outline of the process they are to follow.
- Students can draw pictures with or without captions in lieu of writing up their investigation.
- Provide students with samples of the rock types in the classification key, and/or with samples properly classified originating in the area they are experimenting in.