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ROCK IDENTIFICATION - ACTIVITY 3 (LP3)

Science Standards of Learning 5.8, 5.1, 4.8, 4.1, 3.1

Guiding Question

How can the features and characteristics of rocks be used to identify them?

Rationale

In this investigation students further use their observation skills and perform simple tests on a set of common Virginia rock samples. Students are expected to gain a basic fluency with rock identification using some prior knowledge of rock terms, charts with background information, and workstations that provide additional clues. Being able to recognize a few basic rocks is an important skill concurrent with learning about the rock cycle, geological change, and Earth history as it relates to Virginia. Skills embedded within Science SOL 3.1, 4.1, and 5.1 are further reinforced.

Objectives

It is expected that students should be able to:

- Make precise observations of visible rock characteristics.
- Apply basic rock identification techniques to describe common Virginia rocks.
- Chart qualitative information accurately in a given format
- Compare and contrast observations of actual rock samples to a chart of rock characteristics and properties.
- Deduce basic rock identification based on observed and tested properties and charted information.

Key Concepts

The concepts developed in this activity include the following

- The overall size of the particles that make up a rock determines its texture.
- If the particles are too small to be seen with the naked eye, the rock is said to have a very fine texture.
- Color in the same rock type can vary from sample to sample. Color can be a deceptive characteristic for identifying rocks. Overall rock color depends on the rock's mineral composition and texture.

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- Some rocks are made of both large and small particles.
- Rocks vary in density (specific gravity) depending on the mineral composition and any air space which may occur within the sample (volcanic tuffs).
- Rocks are generally composed either of 1) grains that are cemented together or, 2) interlocking crystals.
- Crystalline rocks frequently have a shiny appearance, even when their constituent particles are very small, or where specific minerals have a well developed cleavage (feldspars).
- Rocks can be identified reliably by looking at several characteristics at once.
- Some rocks have banding or layers. This is a result of their formation.
- In crystalline rocks, segregation of minerals in parallel bands is called foliation. Layering in sedimentary rocks is common, though not always observable in small samples.
- A few common rocks make up a large percentage of those found at the Earth's surface.
- Quartz (conchoidal fracture or cleavage), feldspar (white/red-pink with very flat cleavage or fracture), and the dark (biotite) and light (muscovite) colored micas are important rock forming minerals.

Procedure: Description and Directions

As in the previous activities, students will work in groups of two or three, moving in a "round-robin" fashion among the stations set up around the room. The teacher needs to prepare the activity by placing the samples on the appropriate cards prior to the rock lab. Notice the rock numbers correspond to the stations in this activity.

- Students will be asked to make observations about the rocks on the station cards. (The teacher will need to continue to reinforce certain procedures to the class before the students begin the activity. These include: 1) "hefting" the rock in the palm of your hand to determine relative density; 2) moving the rock in the light to note the presence of reflections, usually an indicator of crystals and/or cleavage; and 3) using a magnifying glass.
- There are several ways this lab can be instructionally sequenced, and the teacher should determine how the activity may be used best with her/his students. It is assumed that students will have participated in *The Luck Stone Rock Activities 1 and 2* (LP1, LP2) and have had some type of additional instruction to introduce and reinforce the basic mineral and rock concepts employed in this lab. Understanding of some terminology is critical to interpreting *the Rock Description Charts* as well as the *Student Recording Sheet*.
 - Students will need to be familiar with some minerals including quartz and the feldspars.
 - Students should have observed limestone or calcite "fizzing" in vinegar/weak acid. (Teacher demonstration only.)

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- Students should be familiar with some basic vocabulary as used in the activity. Samples from the *Luck Stone Rock* or other good hand samples should be used to develop this understanding.
 - The same samples are used in Activities 1 and 2, so student should already be somewhat familiar with the rocks and the format of the lab.
 - The teacher may decide to give or use the names of the rocks at a point after Activity 1 (LP1). Students should be somewhat familiar with the rock names as they begin Activity 3 (LP3).
- Pass out the student recording sheets. Each student, regardless of the group size or teaming, should be responsible for keeping a data sheet.

Two ways to proceed-

- Either pass out the *Rock Description Charts A, B, and C* before students begin to visit stations or,
- Wait until students have completed their “round-robin” information gathering at each station to pass out the description charts.
- The teacher may consider filling in some of the information on the *Student Recording Sheet* prior to duplication of the sheets and distribution.
- Have students use the information they have obtained and recorded on the chart to identify each sample. You may want to allow students to revisit stations after the initial cycle.

Procedure: Class Debriefing /Follow-up

- A basic way to debrief is to have student oral responses for each station. One or more students can provide a description of the features and characteristics that were noted and the reasoning for the particulate identification of the sample. Move systematically around through each station.
- Another way is to use a chart (projected or drawn) with different groups of students recording their observations and identifications for all to review. Alert your students not to be too concerned when responses display variation.
- Debrief by looking at answers and discussing the disagreements. Focus on why students have chosen certain identifications. Proceed through each sample and provide additional background information as appropriate. Use the images on the *The Luck Stone Rock* CD-ROM as well as the actual rock samples to conduct this part of the debriefing.

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- Given a subset of the rock samples, students should be able to make observations about those samples, communicate descriptions in an organized format, and make reasonable identifications using the *Rock Description Charts* or similar information.
- With some experience using real samples, students should be able to identify a few major rocks including granite, sandstone, and slate.
- Given a subset of the rock samples, students should be able to identify whether some of the more obvious samples are igneous, metamorphic, or sedimentary.

Vocabulary

- Calcite
- Foliation
- Fossil
- Igneous
- Metamorphic
- Mineral
- Quartz
- Sedimentary