How are rocks the same and how are they different?

Teaching and Learning Focus

It is important that your students begin to understand that rocks are made of minerals. Different rocks have different characteristics because of their minerals, the ways in which the rocks were formed, and the processes that acted on the rocks since they were formed. In this first investigation, your students will use their senses to investigate some of the physical properties of different types of rocks. They will then use their observations of the rocks to identify a particular rock from a collection.

Materials Needed

For each student:

- rock sample (from a collection of sedimentary, igneous and metamorphic rocks)
- magnifiers
- 5” X 8” card
- Colored pencils
- Copy Master 1 (for the assessment section)

For the whole group:

- Collection of rocks of different types, shapes and sizes (at least 20)
- Flipchart and marker to record students’ observations
- Large baggie to collect rock samples
- Extra index cards for the assessment (one per student)
- Wide-tipped nontoxic markers for the assessment (one per student)
- Tape for index cards

Safety

This investigation is considered generally safe to do with students. Please also review the investigation for your specific setting, materials, students, and conventional safety precautions.

Setting the Scene

To introduce students to rocks, ask students to gather around a collection of rock samples of different types, sizes and shapes of rocks (big chunks of granite, sandstone, limestone, marble, etc.) on a table. Ask students to volunteer what they notice about the rocks and write down their observations on the flipchart. If possible, give them the opportunity to handle the rock samples and describe their relative weights and textures. Let students know that they will be working with their own rocks and investigating how rocks are the same as or different from one another.

Presenting the Investigation Question

After the scene is set, introduce your students to the investigation question: “*How are rocks the same and how are they different?*” Tell your students that they will be investigating this question and at the end of their investigations they will be able to provide reliable answers.

Have your students brainstorm ideas about how this investigation question could be investigated.

1. Design an experiment that could be used to test the investigation question.
2. What materials would be needed?

3. What would you have to do?
4. What would be measured?
5. How long would the experiment take?

Assessing What Your Students Already Know

Here are some initial questions that your students can discuss, in pairs, groups and as a whole class:

- What are rocks made out of?
- Where do rocks come from?
- How are rocks the same and different?

Have your students report out their ideas and make a list of them. Start a list called “Questions we have about rocks.” This list will provide further insights into what your students know, and also what they would like to know. By the end of the investigation, some of these questions will probably be answered.

Exploring the Concept

1. If you have not already done so, divide your class into groups of about four students with each group sitting around its table or work area.
2. Before your students begin, tell them how much time they will have to complete their investigation. (*Group learning strategies often call for appointing a group time keeper who keeps the group on track.*)
3. Provide your students with the following tools for investigation:

    - Hand lenses (enough for everyone)
    - Rock sample (different one for each student)
    - 5” X 8” index card for each student
    - Colored pencils to share

4. Tell your students that they may use four of their senses to investigate their rocks. (*looking, feeling, smelling and listening – or: sight, touch. odor and sound*.)
5. Emphasize that it is NOT SAFE for your students to TASTE the rock. Let them know that they will need to wash their hands at the end of the investigation, after handling the rocks.
6. Tell your students that their job is to really study their rocks, using the hand lenses, and write down and draw their rock observations. Circulate while they work to monitor progress and answer questions.
7. When they finish, collect their rocks in your baggie. In a large open space, line the rocks up on the floor. This could be a hallway or space in your room. When you have finished, ask students to bring their record cards up to the row of rocks and find their own rocks. When they find their rocks, they should sit back down. *(You might find it useful to collect and spread out the rocks in two sub-groups to help younger children find their rocks more easily.)*
8. After students are back in their seats, ask them to share what characteristics of the rocks were most useful in finding their own rocks. *(unusual shapes and colors; presence of visible crystals)* What characteristics were *not* very useful? *(hardness of the rocks)*
9. In groups of four, ask students to compare their rocks. In what ways are the rocks the same? In what ways are they different? Ask students to record their observations.
10. When students are finished, hold a whole class discussion about how the rocks are the same and different. Make a list of these observations on a flipchart for later.

Applying Students' Understanding

- Copy Master 1 Word Document (38 KB)
- Copy Master 1 Adobe PDF (42 KB)

Give each group a copy of the Word Sunburst handout on Rocks and ask them to write one-word observations about their rocks. When they finish, give students another index card and a marker and ask each to write one observation from their Sunburst (using big printing) on the card. Make a whole class Sunburst out of flipchart paper, with the word ROCK in the center. Ask each student

to come up and tape a “rock word” to the rays of the Sunburst *(hard, shiny, gray, black, pointy, crystals, rough, sandy, sharp, etc.)* When everyone is finished, ask students what they now know about rocks that they didn’t know before. Also ask them what questions they now have about rocks that they hadn’t thought of before the investigation. Write these down for later.

Revisiting Investigation Question 1

Complete this investigation by asking your students to reflect on this question and how their answers may have changed as a result of this investigation. For example, most rocks are pretty hard and are solid, but they are different in color, texture, size, shape and shininess.

Digging Deeper

The following passage provides more detailed information related to this investigation that you may choose to explain to your students.

There are three main categories of rocks, which are defined by how the rocks are formed.

Sedimentary Rocks

Sedimentary rocks are formed from sediment, which is solid, loose pieces of rocks (in the form of sand, silt, clay, and gravel), or the remains of living things found at the surface of the Earth. Sediment is material that has been eroded and deposited by wind, running water, waves, and ice. Sediment can also form from material left behind by the evaporation of seawater, or the settling of the remains of animals and plants in oceans, lakes, and swamps. In certain conditions, and over a very long period of time, sediment can become compacted and cemented into sedimentary rock. Sedimentary rock is often found in layers. One way to tell if a rock sample is sedimentary is to see if it is made from grains.

Igneous Rocks

Rocks are mixtures of one or more minerals. Just like the apples, butter, flour, and sugar are the ingredients of apple pie, minerals like quartz, mica, and feldspar are the ingredients of an igneous (from the Latin word for fire) rock called granite. Igneous rocks come from melted rock material, or magma, that lies under Earth’s surface. Igneous rocks form when magma from inside the Earth moves toward the surface, or is forced above the Earth’s surface as lava and ash by a volcano. Here it cools and crystallizes into rock.

Metamorphic Rocks

Metamorphic rocks are rocks that have become changed by intense heat or pressure while forming. In the very hot and pressured conditions deep inside the Earth’s crust, both sedimentary and igneous rocks can be changed into metamorphic rock. In certain conditions these rocks cool and crystallize, usually into bands of crystals. Later they can become exposed on Earth’s surface. One way to tell if a rock sample is metamorphic is to see if the crystals within it are arranged in bands.

Rocks Unit Sections