

Lesson 4: Classifying Rocks: How can we identify them?

Topic:

Classifying Rocks

Grade level:

Sixth grade earth science

Instructional Objectives:

- Students will observe a variety of rocks and comment on their physical characteristics
- Students will identify classification schemes to identify common rock types
- Students will identify patterns of minerals found in rock types (e.g. What are common minerals found in sedimentary rocks as opposed to igneous rocks)
- Students will conduct an experiment to classify rocks
- Students will collect their own rock examples for further exploration
- Students will communicate their ideas in a well-organized report

Science Concepts Addressed/Proposed PDE Academic Standards

- 3.1.7 Unifying Themes
 - Identify patterns as repeated processes or recurring elements in science and technology
 - Identify different forms of patterns and use them to group and classify specific objects
 - Identify repeating structure patterns
- 3.2.7 Inquiry and Design
 - Apply process knowledge to make and interpret observations
 - Communicate, use space/time relationships, define operationally, raise questions, formulate hypotheses, test and experiment
 - Identify and use the elements of scientific inquiry to solve problems
 - Communicate appropriate conclusions from experiment
- 3.5.7 Earth Sciences
 - Describe earth features and processes
 - Describe the processes involved in the creation of geologic features and that these processes seen today are similar to those in the past
 - Recognize earth resources and how they affect everyday life
 - Identify and locate significant resources in Pennsylvania
 - Explain the value and uses of different earth resources

Materials required:

Rock collection set with an assortment of sedimentary, igneous and metamorphic rocks, laptop or computer for the instructor, overhead projector, nails, pennies, fingernail, an acid solution (diluted hydrochloric acid), eye goggles, classification and identification chart, rock identification key

Engagement (motivator or anticipatory set):

A laptop computer and an overhead projector will be setup for display. I will begin the lesson by asking students what properties of rocks are important when identifying them. Many should respond with minerals found inside of the rocks and some should give reference to color and shape. Then, I will begin a discussion by entering <http://www.leo.lehigh.edu/envirosci/geology/rocks/rocks.html> on the computer. I will click on the link entitled "Classifying activity". On this page I will call on students individually to make observations of each rock found on the page (there are 6 images of different rocks). Once students have made observations, I will click on another link entitled, "Click here to view rock descriptions". During this part of the exercise I will ask students to see if they can make connections to the observations they made to the descriptions given for each rock. Some questions I will ask are: "Based on your observations can you match the appropriate image with the correct description?" "If not, what factors inhibit you do so?" "What were the easiest to classify and why?"

Lastly, the class and the instructor will compile a list of characteristics that are most important in identifying rock types.

Procedure:

1. Students will be told that they have been hired as full-time geologist. Part of their training requires that they identify rock samples collected by their employer using their classification schemes (hardness, shape, color, minerals found, acid test and luster).
2. Students will be broken up in groups of three (materials person, data organizer and lab technician). A description of roles will be given on a handout.
3. Rocks will be set up at lab stations for the groups to work on. They will have 3 minutes at each station and must rotate in numerical order (e.g. If a group is a station 3 they move to station 4). However, they will have time to revisit any stations after a complete cycle is made.
4. Students will use various tools to identify the rock at their respective station. A rock key will be given to each group that has descriptions of the rocks. However, they must write their own observations and results of the tests that they use, not the descriptions given on the rock key.
5. After each group has completed the lab exercise, they must record any patterns among the rocks that they observed. Students will be given 5 unknown rocks that they must identify as sedimentary, igneous or metamorphic. They do not have to identify the rock name, but extra credit will be given to those who have done so.

Key Discussion Questions:

- How can we classify sedimentary, igneous and metamorphic rocks?
- Are there any patterns among similar rock types? If so, what are they?
- Explain what physical characteristics are difficult to observe from an image on the Internet.
- Explain what physical characteristics are easily observable
- What tests worked best in your lab experiment?
- What test were difficult to use and least helpful in identifying your rocks?

Closure

To end the lesson, the students will be responsible for handing in their lab sheets and results and answers to questions given. As a homework assignment, the students will read a passage from *The Pebble in my Pocket: A History of Our Earth* by Meredith Hooper, Chris Coady and Christopher Coady. They will write a two-sentence summary of what they believe the excerpt means and will be used for discussion in our next lesson. The excerpt reads as followed:

“The pebble in my pocket is round and smooth and brown. I found it on the ground. My pebble has been on top of mountains and under the sea. It has been buried in ice and buried in rock. It has been covered in drying sand and tropical forest. It has been flung and dropped, frozen, soaked and baked, squeezed and squashed. It has been stood on and sheltered under and used. It has traveled huge distances over immense periods of time.”

This will tie into our lesson on the Rock Cycle and how sedimentary, igneous, and metamorphic rocks are related.

Assessment

Students will be assessed by a rubric for their laboratory work in class. It will focus on their observations made, inferences about patterns, communication skills in their group, data collection and conclusions. Their two-sentence summary will count towards their language arts and science homework grade. It will be equivalent to a journal entry.

Extension activities:

Students will be encouraged to bring in any rocks and minerals for display on our activity center.

Rubric for Lesson 4—Classifying Rocks

Outstanding—Students completed task above and beyond expectation. Great examples and well-thought out explanations. Student demonstrated understanding at an advanced level.

Good—Student completed task and met expectation. Good example used and explanations were satisfactory. Student demonstrated understanding at a proficient level.

Fair—Student completed some parts of the task and was below expectation. Some evidence of examples are used, but explanations lacked depth and clarity. Student demonstrated understanding at a basic level.

Unsatisfactory—Student didn't complete tasks or minimally. Little to no examples used and explanations were minimal or none was given. Answers lack clarity and student demonstrated understanding at a limited level.

RUBRIC FOR LAB REPORT ON IDENTIFYING AND CLASSIFYING ROCKS

Criteria	Outstanding	Good	Fair	Unsatisfactory
Observation Skills Used	18-20	15-17	12-14	0-11
Classification Skills Used	18-20	15-17	12-14	0-11
Identifications of Rocks	9-10	7-8	5-6	0-4
Collecting and Analyzing Data—Discussi on Questions	27-30	24-26	20-23	0-19
Communication Skills	18-20	15-17	12-14	0-11
Final Score	90-100	75-89	65-74	0-64

RUBRIC FOR TWO-SENTENCE SUMMARY ON THE PEBBLE IN MY POCKET

Criteria	Outstanding	Good	Fair	Unsatisfactory
Summary Provided	18-20	15-17	12-14	0-11

Name: _____

Date: _____

Lab Report on Identifying Rocks

Welcome to the R.O.C. Inc, a geologist firm located in Freemansburg, Pennsylvania. You have just been hired as a full-time field geologist. Your objective is to identify the rock specimens collected by our group of interns. You must observe, classify, and identify our specimens according to:

- Shape
- grain size
- luster
- color
- minerals found within
- acid test
- hardness,

Each station has a different rock. You must use these tests mentioned above and your rock key to guide you in identifying them. Record your notes in the spaces provided and work efficiently. You have 5 minutes at each station!!

GOOD LUCK

SPECIAL NOTES

Acid test---To perform an acid test take an eyedropper and add two drops of the hydrochloric acid to the rock. If the rock begins to fizz, then record “yes” on your data sheet. If the rock doesn’t fizz, record “no” on your data sheet.

Hardness—Begin hardness test with your fingernail. If your fingernail scratches the rock then record that on your data sheet. Proceed with a penny if the fingernail doesn’t scratch the rock. Repeat for nail if the penny doesn’t scratch the rock.

Discussion Questions

1. What tests were most successful in identifying your rocks? Explain.

2. What tests were least successful in identifying your rocks? Explain.

3. Identify which rocks were composed of living organisms and explain?