

"Pet Rocks"

Governor's Institute for Physical Science 2003
Lesson Plan
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This lesson is in the Earth Science Unit after the study of the layers of soil and nonrenewable resources. It is before the students focus on the need for sharing resources and investigates if there will be enough.

Problem to be studied: Apply the nature of inquiry when classifying different physical properties of minerals. In science it is helpful to work with a team and share findings.

Standard Statement(s):

- 3.2.4 A. Identify and use the nature of scientific and technological knowledge.
Provide clear explanations that account for observations and results
- 3.2.4 C. Recognize and use the elements of scientific inquiry to solve problems.
Generate questions about objects, organisms and/or events that can be answered through scientific investigations.
Design an investigation
Conduct an experiment
State a conclusion that is consistent with the information.
- 3.5.4 B. Know types and uses of earth materials
Identify and sort each material according to a classification key
- 3.7.4 A. Explore the use of basic tools, simple materials and techniques to safely solve problems.
- 3.7.4 B. Select appropriate instruments to study materials.
Develop simple skills to measure, record, cut and fasten
Explain appropriate instrument selection for specific tasks.

Content Objective(s): The students will be able to:

Recognize that Earth's materials have different physical properties.
Describe and explain the observable physical properties of six different minerals.
Identify and sort minerals by the observable properties, including size, weight, shape, texture, color, etc.
Observe and record data on six different minerals on the following physical properties: hardness, softness, shininess, makes a streak and attracted to a magnet.

Process Objective(s): The students will be able to:

Apply the nature of scientific inquiry.
Employ simple equipment and tools to gather data about minerals.
Use data to construct a reasonable explanation of the different physical properties of the six minerals.
Communicate investigations and explanations.
Plan and conduct a simple investigation of six different minerals.
Use simple skills to measure, record, and observe minerals.

Assessment Strategies: (Evaluation)

Formative Evaluation: The students will be able to:

Record data as a group about the classifications of candy on the Candy Game checklist and about river rock on the River Rock Collection checklist.
Record predictions, observations, hypothesis and conclusions about the luster, weight, and scratch test results in the Science Notebook.
Demonstrate prior knowledge and what they want to learn on the KWL worksheet.
Generate questions when investigating the six minerals in the Journal Entry worksheet.

Summative Evaluation: The students will be able to:

Use a rubric to guide them in recording data for the Four Question Strategy cooperative learning lab work on the Four Question Strategy Worksheet to investigate other physical properties of the six minerals.

Suggested Grade Level:
Grades 4-5

Standard Category:
3.2 Inquiry & Design
3.5 Earth Science
3.7 Technological Devices

Materials:
Per groups of 4-5 students:
One Ziploc bag of an assortment of candy in wrappers
Approx. 10 River Rock
Six different types of minerals: (magnetite, hematite, feldspar, gypsum, calcite, and quartz)
1 Porcelain Tile
1 Magnet
2 Rulers
1/4 cup of vinegar
Graph paper
1 Scale in grams
Cooperative Learning worksheet

Per student:
Writing utensils
Science Journal
KWL sheet
Candy and Rock checklist
Four question Strategy worksheet
Journal Entry worksheet
Research form
Rocks and Minerals book

Instructional Strategies:
Inquiry Method
KWL
Four Question Strategy
Journaling
Research

Research, using the Rock and Minerals Book and the internet websites to find the common uses of the six minerals to record on the Fact Sheet and at least three additional minerals.
Create in writing a paragraph about the Pet Rock, create a name, physical properties and uses for society, using a writing checklist as a guide.

Procedures:

The following activities can be done on different time schedules. You may be able to do several activities in one class or may be able to do only one activity a day.

Engage:

Activity #1 Collections of Candy

Divide class into groups of four. Give each group a bag of candy. The candy needs to be different kinds with different wrappers. Tell the class that they as a group are going to decide how to group the candy. They will write down the way they have grouped the candy on the Candy Game worksheet. Give each group the opportunity to tell the way they have grouped their candy. Next, ask the groups to classify the candy a second time. Tell them it cannot be in the same way as they did before or the same as the other groups had done. It needs to be a new way of classifying. Again, have each group discuss how they grouped their candy. At the end collect the worksheet for points and each child can take a piece of candy. For homework ask the class to bring in collections of rocks if they them. It can be collections they bought or collections they did on their own.

Activity #2 Pet River Rock Have a pile of river rock for each group of students. Ask the students to do the same thing they did for the candy. They will write what they did on the Pet River Rock worksheet. Follow the same procedure as was done with the Candy Game. They will be required to make two groupings.

Next explain to the students that they will be picking out their own rock from the pile and that particular rock will be their Pet Rock. Each student will study the Pet Rock completely, write down in their journal at least three observations that they can tell about their rock. Make a drawing of their rock. Explain to the students that they will be putting their rock back into the pile in 10 minutes. The teacher will mix up the rocks and they will have to find their rock that they picked from the pile from the notes that they made in their journal on the Pet Rock Identification Sheet.

Discuss after they have found their rock what were some of the ways that you remembered or could identify your particular rock. What is a good way to tell the difference? Did the note taking and drawing help you? Wonder if you didn't make any notes would you have been able to find your rock?

Tell the students that their rock is now their Pet Rock and they must take care of it for the rest of the Science Labs.

Activity #3 Collections of Rocks Obtain a variety of collection of rocks from local library, museum, classroom collection and have on display.

Have the students share their collections in small groups three to four students. If no one in a group brought a collection have them use one of the collections that are on display. Have them share how the rocks are different and the different names.

After everyone has had a chance to share, solicit a few "hows" and "whats" from the group and record them on the chart paper. Discuss the way the rocks are organized in the collections. Ask the students if they have any theories about how the rocks were identified. KWL In their science notebooks have each student do the KWL journal entry worksheet. Have each student fill out the KW about minerals.

Explore:

Activity #4 Shininess Lab Prior to the activity, classify the six samples of minerals according to their shininess(luster). Place them in three groups: minerals that have a lot of shininess, a little amount of shininess and no shininess. Have students examine each mineral. Indicate that the minerals in each group have been classified in a certain way. It is up to them to try to find out how they have been classified. Student should be looking for any distinguishing features of the minerals that would put them in a certain order. They may come up with a variety of interesting responses when given this problem to solve.

Four-Question Strategy. Use large chart paper to write their responses. Write it on chart paper so you can refer later with the other activities.

1. What materials are available to study the six minerals?
2. What physical properties do minerals have?
3. How can I use different materials to observe the physical properties of minerals?
4. How can you measure or describe the minerals with the materials or observations?

Have the whole class consider the responses from the Four Question Strategy. Have them predict how they think the minerals were grouped. None of the groups may be close to determining how the minerals have been grouped. Do not let them know how the minerals were grouped.

Then provide them with an opportunity to develop a hypothesis of how the minerals in each group were formed. Give them the Hypothesis Worksheet to help them develop a hypothesis. After everyone in the group has written the hypothesis they will test their hypothesis and record the result in the manner that they decided to record their data. The students in their groups will be asked to record and graph their data on large chart paper so the entire class can see the data when there is the discussion.

After the discussion tell the students that the minerals were classified according to their shininess. At the end provide the Rock Chart for Shininess and have them fill out the chart as a whole class. Ask the students if they can tell by this information the names of the correct minerals. In the next activity tell them they will be able to tell the names of the minerals.

Explain:

Activity #5 Hardest to Softest Have students use the Journal Entry Record Sheet Questions: What is the hardest to softest mineral from A to F? Make a prediction in your journal. Have students perform scratch tests on the six minerals and arrange them in order of hardness. The scratch test is rubbing the two minerals against one another to see if one will scratch the other. The one, which ends up being scratched, is not as hard as the other. This test enables the minerals to be arranged in order of hardness. Allow enough time for the small groups to work through this process.

(Minerals are arranged in order of hardness on a scale of 1 to 10. for comparison, a fingernail has a hardness of about 2.5. so if a rock will scratch a fingernail it has to have a hardness which is greater than 2.5. Similarly, a copper penny has a hardness of about 3, while steel knife blades has a hardness of about 5.5. For reference, the Mohs' Scale of mineral hardness, which can be found in any geology textbook may be used for comparison.

Correctly identifying some of the less common minerals can be a challenging task. However, making correct identification is only of peripheral importance in this activity. Of more importance is that students recognize that problem solving can be systematized into small, incremental procedures, each of which is relatively simple, but then taken together are able to solve a much more complex problem which would be more difficult to solve otherwise.

Activity #6 Group Lab - Using the information gathered in the Four Question Strategy divide the class into groups of four, develop an hypothesis, create a new physical property to measure and observe and record data. Each group will present their new information to the class about the minerals. There will be a large chart in front of the room to record all the data on one large chart for the whole class to see and discuss.

Elaboration and Extension Activities:

- Research Each student will look up the six minerals in the rock and Minerals book. Find out what each mineral is used for and two other interesting facts. Record on the Rocks in my Pocket Worksheet. Give them the opportunity to look up on the internet, websites for any other interesting facts. Ask them to find at least three other interesting minerals and record the same facts.
- Pet Rock classification - The students will decorate their rock with paint or magic markers. They can create interesting physical properties to create a new mineral and give it a name. For Writing, the students will be asked to write a paragraph on what their particular mineral's physical properties are and what it would be used for by society. A writing rubric will be used for

evaluation. At the end, have the students group their pet rocks in some way just like they did for the candy and the rocks at the beginning of this lesson. .

Related Web Sites:

www.teachervision.com

www.eduplace.com

edtech.kennesaw.edu/web/3-5.htm

Sources consulted in developing this lesson:

Academic Standards for Science and Technology

Pennsylvania Department of Education

STC Meets the Standards, by National Academy of Sciences, 1999

Governor's Institute for Physical Science, CMU Summer 2003

Students and Research, by Cothron, Giese, and Rezba,

Discovery Works, Houghton Mifflin, Unit A-Earth Science

National Science Education Standards, National Academy Press, 1996