

# Investigation One - Minerals vs. Rocks

## Standard III

Students will understand the basic properties of rocks, the processes involved in the formation of soil, and the needs of plants provided by soil.

## Objective 1

Identify basic properties of minerals and rocks.

## Intended Learning Outcomes

1. Use science process and thinking skills
4. Communicate effectively using science language and reasoning.

## Standard III

## Objective

1

## Background Information

Minerals are the building blocks from which rocks are made. Some minerals, such as gold and copper are made up almost entirely of one chemical element. Others are mixtures of elements. Rocks are nearly always made of mixtures of different minerals.

Geologists study the rocks on Earth. They make detailed observations of the rocks they discover to identify the various minerals found in the rocks they find. To do this they use different techniques to try to sort out all the minerals to identify them. They look at texture, appearance, shape, color, and smell to identify them.

## Preparation:

*(One week prior to this activity, make mock rocks and allow them to air dry.)*

- Mix one cup white flour, 1/2 cup salt, two tsp alum.
- In a separate bowl mix 1/2 cup water, five drops red food coloring, five drops blue color, three drops yellow food coloring.
- Add the water mixture to the flour mixture. Knead the mixture until it no longer sticks to the sides of the bowl.
- Add one cup coarse sand, 1/4 cup aquarium gravel (mixed colors). Knead until it is well mixed.
- Divide the mixture into 18 equal pieces about the size of a ping-pong ball.
- One by one place each ball into the palm of your hand. With your thumb make a small indentation in the centers. Place three or four pieces of sea shell or eggshell in the indentation. This represents fossils. Mold the dough around them.
- Smooth the surface of the ball and flatten the rock so that it is about one cm thick. Let them air dry for a week (do not bake).

## Materials

- Two bowls
- White flour
- Granulated salt
- Alum
- Water
- Red, blue, yellow food coloring
- Coarse sand
- Aquarium gravel (mixed colors)
- Egg shells or sea shell

## *Pre-Assessment/Invitation to Learn*

Explain that geologists study the rocks of Earth. Geologists must make detailed observations of the rocks they discover. Ask students what they might observe about rocks (texture, shape, color, smell, size, appearance). Tell the students these are the properties of rocks.

Show the students a mock rock. Tell them they are going to investigate this mock rock. (To mock means to imitate or copy.) This special rock imitates the properties of real rocks, but it is easier for young scientists with simple equipment to thoroughly investigate. They will be using some of the same observation techniques and skills that geologists use.

Geologists figure out what kind of rock they are examining. They do this by identifying the various ingredients in the rock. These ingredients are called minerals. The various minerals in the mock rock represent different minerals. The goal of the student is to use different techniques to try to sort out all the materials in order to identify them.

## **Instructional Procedure**

1. Distribute a mock rock to every pair of students. Have them investigate the rock, recording all the properties they observe on their record sheet.
2. Draw a mock rock on the grid. Strive for details and accuracy.
3. Examine the mock rock with the hand lens. Have students draw what they see.
4. Measure the rock. Find its diameter, circumference, depth or height, and weight. Record the measures on the log. (This does not, however describe the properties of rocks.)
5. Break the mock rock in half. Students should use a nail to separate all the different ingredients, sorting them into different piles. List the ingredients in the log. Include descriptions of color, shapes, and textures. (If the mock rock is very hard, place it in a plastic bag between padding and use a hammer to break it up. Be careful not to pulverize the shells).
6. Explain that rocks are made up of more than one ingredient, including different minerals. The colored gravel could represent different kinds of minerals. The shells were not observable without breaking the rocks open. They could represent fossils imbedded in sedimentary rock.
7. Ask students to describe the leftover material that is too small to be separated with a nail. Ask for ideas on how they might further separate these small pieces. Suggest that they could mix this material with water.
8. Give each pair of students a vial with a lid. Have them fill the vials 1/3 full of material. Water should be measured and added so the vial is about 3/4 full. (Have them measure precisely. The amount depends on the size vial or jar being used.)
9. Put the cap on and shake vigorously.
10. Set the vial down and immediately sketch what the cloudy, muddy mixture looks like before settling. (If it starts to settle before they finish drawing invite them to reshake the vials.)

### **Materials**

*For every student  
or pair of students:*

- Mock rocks (see list of ingredients in "Preparation" section)
- Paper plate
- Large nail
- Hand lens
- Crayons or colored pencils
- Piece of string
- Metric ruler
- 50-ml graduated cylinder
- Clear plastic plate
- Pipette or medicine dropper
- Vial with lid (or small bottles such as spice bottles)

*For class or one  
for each group:*

- Scale

11. Label the vials and set aside to settle overnight.
12. The next day have students carefully retrieve the vials and observe and draw what they see after settling.
13. Add to their list of ingredients [sand, silt (flour), and possibly a thin white mineral layer (alum)].
14. Ask students to look closely at the liquid in the vials. Ask if it looks as clear as it did when they added it the day before. Suggest that they might evaporate the water to see what, if any, materials are left behind.
15. Have the students use a pipette to withdraw some of the clear water. Pour just enough water into the evaporation dishes to barely cover the bottom. Set them aside to evaporate for a few days.
16. Give students samples of minerals such as iron pyrite, and rock such as granite, and a piece of conglomerate. Instruct the students to observe the differences between the mineral (all one material, color, and texture) and the rock (made of pieces of different kinds of minerals and other materials).

## Curriculum Extensions

### *Math-*

- Determine measurements using appropriate tools and formulas. (*Standard IV, Objective 2*)

### *Language Arts-*

- Help students build vocabulary and become more precise in their descriptions of the minerals and various components of rocks and the mock rocks. (*Standard VI, Objective 1*)
  1. Texture is gritty, rough, smooth, or powdery.
  2. Colors are not just a certain color but shades of color: grey-white, eggshell white, golden-yellow, or lemon yellow.
  3. Appearance can be speckled, banded, spotted, or streaked.
  4. Shapes include faces, edges, cubes, rectangular prisms, and other geometric terms.
- Check out some books about rocks and minerals. (*Standard VII, Objective 1, 2*)

### *Fine Arts-*

- Draw pictures of the different minerals the students are required to learn. In caption form, write the color, shape, appearance, and texture of each mineral. (*Standard II, Objective 2*)
- Draw pictures of the different rocks students are required learn. In caption form, write the minerals that make up each rock. (*Standard II, Objective 2*)

## Assessment Suggestion

- Write what the difference is between a rock and a mineral.
- Give students samples of pure minerals and rocks. Have them sort them into two groups and explain why they put the rock or mineral in the group that they did.

## Resources

### Websites:

- [www.surweb.org](http://www.surweb.org)
  1. SURWEB is an excellent, online resource. This site has over 180 image collections online, with over 38,000 images available for teacher and student projects.
  2. SURWEB allows people to create multimedia presentations in minutes using images, sound, and movies provided by SURWEB or other digital sources.
  3. There are Learning Segments, Media Shows, and Image Collections. Click on Image Collections and type in your topic such as crystals. Or, click on Media Shows, then Earth + Physical Science + Geology.
- [www.uen.org](http://www.uen.org)
  1. Pioneer is Utah's online library and has excellent videos on many topics. Each video is broken up into titled sections so you can go to the exact spot you want. Choose "Digital Curriculum." Select your preferred video player. Then choose "Search" and type in your topic.
  2. There are still photos of rocks, minerals, crystals, etc., on this website.

### Books:

- *Earth Materials* (FOSS, Lawrence Hall of Science)

### Agencies:

- The Mock rock activity is a modified version of "Mock Rocks" from the FOSS science module. Kits may be ordered through Delta Education at 1-800-258-1302.

## Homework & Family Connections

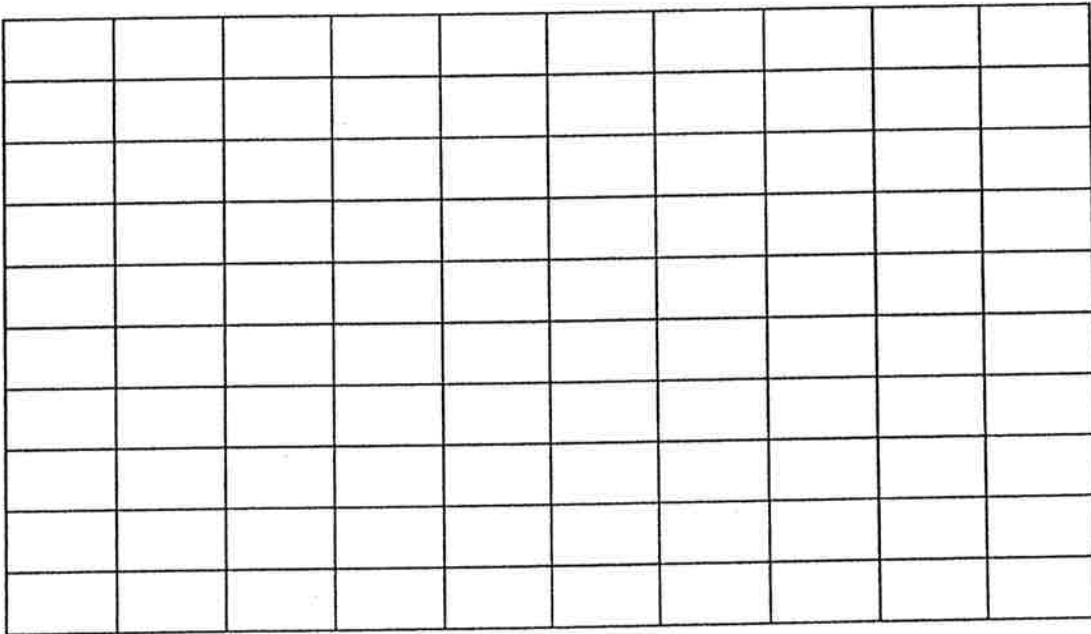
- Have students gather some rocks/minerals around their house.
  1. Have them tell their families what they have learned, telling them the difference between rocks and minerals.
  2. Have them point out the characteristics of minerals.
  3. Have them point out minerals they see in some rocks.

Name \_\_\_\_\_

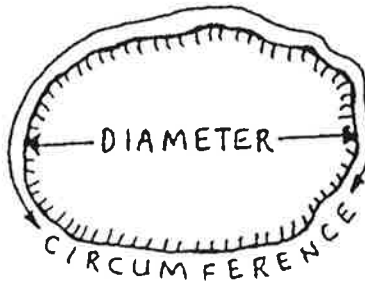
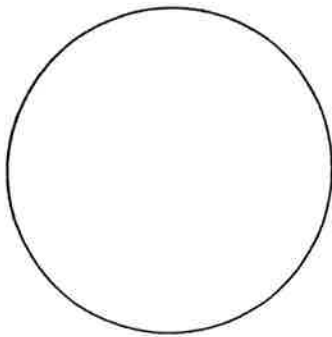
# Mock Rocks

Question: What is the difference between a rock and a mineral?

Trace and draw your mock rock.



Draw a magnified view of part of your rock.



## Mock Rock Measurements

Diameter \_\_\_\_\_ Depth \_\_\_\_\_

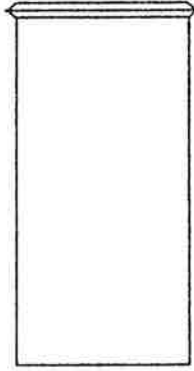
Circumference \_\_\_\_\_ Weight \_\_\_\_\_

Name \_\_\_\_\_

## Mock Rocks in Water



Before Shaking



After Shaking



After Settling

## Mock Rock Recipe

List the Mock Rock ingredients:

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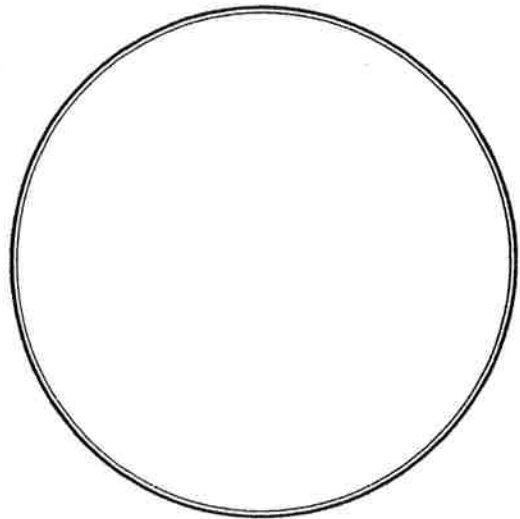
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What is a mineral? \_\_\_\_\_

\_\_\_\_\_

What is a rock? \_\_\_\_\_

\_\_\_\_\_

How is a mock rock like a real rock? \_\_\_\_\_

\_\_\_\_\_