

## **Activity Guidelines for Identifying a Mystery Rock**

**Grade:** 6-12

**Purpose:** To help students use the skills of observation and deduction to identify a mystery rock.

**Supplies:**

- Several bags full of small pieces of pumice (2-3 cm in diameter), preferably pumice that has been oxidized.
- Pieces of red sandstone about the same size as the pumice.
- 2 or 3 sets of protective eye wear
- 2 or 3 geologic hammers
- A surface, such as a board, for breaking the rocks
- Magnifying glasses (enough so that every two students can share)
- Pieces of tile (enough so that every two students can share)
- beakers full of water (enough so that every two students can share)
- Pencils
- paper

Everyone has a different way of introducing this exercise, however, getting the students interested from the beginning is the most important task. For middle school students it may be fun to begin by saying that we found a bag full of these rocks in the back of one of the laboratories and that no one can know what they are. Therefore, we are going to enlist their help in determining what kind of rock we are dealing with. Another approach would be to say that the students are going to have a chance to be a true geologist for a day, ultimately determining where these rocks come from.

**Classroom Guidelines**

- 1) Begin by passing out the “mystery rocks” – one piece of sandstone and one piece of pumice (Depending on the class, one for each student or pair) and hand out one magnifying glass, a piece of tile, and a beaker for each pair of students. Do not tell the students what types of rocks they are studying. Instruct the students on how a geologist may use the tile to see the color of the scratch mark the rock makes, and the magnifying glass to look at the rock up close. Let the students make their own observations and instruct them to start sketching the rocks when they are ready. As they begin to draw the rocks ask them to be thinking about the aspects that make this rock interesting to them. Many students are intimidated by drawing in front of their friends, so let them know that it doesn’t have to be a work of art. Also, let them know that they can draw the samples as big as they want.
- 2) Once the students have made some observations, begin leading a discussion about the unusual characteristics of these rocks, both their similarities and their differences. The

three qualities that will most likely be mentioned are the density differences, the abundance of holes in the pumice, and the red color in both rocks.

- a. Ask the students why one rock floats and why the other sinks (hopefully someone will mention density differences or at least notice that one of the rocks has holes in it).
  - b. Depending upon the academic level of group that you are working with, a discussion about the reddish/rust-like color of the rocks may be useful. If you are working with an advanced group, it may be possible to have a discussion about oxidation, in turn leading to some guesses about the minerals/elements in the rock. Perhaps use rusting as an example.
  - c. Even though the holes in the pumice will most likely be addressed during the density discussion, try to get the students to make a guess about how the holes in the rock originated (don't give the answer just yet). Ask the students what would happen if the pumice were left in the water for a long period of time (after about 15 minutes, you may actually see the rock begin to sink). Have the students guess what percentage of the rock consists of holes. The answer is approximately 80% holes and 20% rock, but don't tell them this until you reach the SEM section of the activity.
  - d. Ask students to guess what types of environments the sandstone and the pumice formed in. If they were both deposited, was one deposited faster than another one? What types of materials are each of the rocks made of?
- 3) Have students make predictions about what the rocks look like on the inside. If time permits, ask them to draw a picture of what they think they will see. Tell the students to bring their rocks to the front of the room and have them break open their rocks (Be sure that each student wears a pair of goggles!) After each student has had a chance to examine the inside of their rock, ask if they are surprised about what they see. Compare the "bubbles" in the pumice to the bubbles in soda; this usually works well with all academic levels.

**National Science Education Standards addressed:**

Grades 5-8, Earth and Space Science, Content Standard D, Structure of the Earth System: Some changes in the solid earth can be described as the 'rock cycle'. Old rocks at the earth's surface weather, forming sediments that are buried, then compacted, heated, and often recrystallized into new rock.

Grades 9-12, Science as Inquiry, Content Standard A, Abilities Necessary to do Scientific Inquiry: Identify questions and concepts that guide scientific investigations.

**New Mexico Science Standards addressed:**

Grades 5-8, Earth and Space Science, Strand II, Standard III, Benchmark II: Describe the structure of the Earth and its atmosphere and explain how energy, matter, and forces shape

Earth's systems. Grade 6, #3: know that sedimentary, igneous, and metamorphic rocks contain evidence of the materials, temperatures, and forces that created them.

Grades 9-12, Earth and Space Science, Strand II, Standard III, Benchmark II: Examine the scientific theories of the origin, structure, energy, and evolution of Earth and its atmosphere, and their interconnections. Grade 9-12, #10: Describe the composition and structure of Earth's materials, including the major rock types (i.e., sedimentary, igneous, metamorphic) and their formation.