

Identifying Rocks

Overview:

In this activity, students learn the characteristics of some common igneous, sedimentary, and metamorphic rocks. Students also learn to use a dichotomous key for identification purposes.

Objectives:

The student will:

- Identify ten common igneous, sedimentary, and metamorphic rocks; and
- Confirm the identity of these rocks by looking at rock descriptions.

Materials:

- Sets of ten rocks: pumice, basalt, obsidian, granite, sandstone, shale, limestone, slate, gneiss, and marble
- Hand lenses or magnifying tools
- Transparency: “Characteristics of Rocks”
- Student Information Sheet: “Identifying Rocks”
- Student Information Sheet: “Key to Rock Types”
- Student Worksheet: “Identifying Rocks”

Answers to Student Worksheet:

Data table answers will vary

1. Extrusive igneous rocks usually are fine-grained with few crystals, while intrusive igneous rocks have large crystals and are coarse-grained.
2. Sedimentary rocks are usually less compacted than layered metamorphic rocks, which have undergone tremendous amounts of pressure.

Identifying Rocks

Activity Preparation:

1. Prior to this activity, the rocks need to be labeled with numbers from 1-10. Each set of rocks should receive the same numerical order. For instance, if pumice is rock #2 in set 1, it should be rock #2 in all of the rock sets. Numbering can be accomplished by writing directly on the rock with a black permanent marker, or a small square of acrylic white paint can be applied first, and the number can be applied to the dried paint.
2. Several days ahead of time, ask students to bring in 3-4 rocks from their yard, the beach, or other outdoor location.

Activity Procedure:

1. Ask students to get out the rocks that they have collected. Have students examine the rocks closely and write down three characteristics about each rock that makes it different from the other rocks. Ask students if they think that the rocks are igneous, metamorphic, or sedimentary.
2. Explain that geologists use specific characteristics of rocks, such as color, crystal size, and the presence or absence of layers, to determine the identity of a rock.
3. Show the Transparency: “Characteristics of Rocks.” Explain the concepts of grain size and layering. Review how large grained vs. small grained igneous rocks are formed (small grained results from magma being extruded from Earth and cooled quickly, while large grains result from magma trapped in earth that cools slowly). Review that layered rocks are formed from sediment. Explain that metamorphic rocks can often appear layered because many metamorphic rocks were formed from sedimentary rocks.

Note: Limestone and marble will fizz when white vinegar is applied (unless the marble is dolomitic marble). Students may want to confirm the identity of these rocks with this vinegar test.

4. Distribute the Student Worksheet: “Identifying Rocks,” and the Student Information Sheet: “Key to Rock Types” and explain how to use the key. Students should start with step 1 in the key, determine if an individual rock fits the description, and follow the steps until identification is complete.
5. When students have completed the worksheet, pass out copies of the Student Information Sheet: “Identifying Rocks” so that students can check their work.

Extension Idea: Students could also identify the rocks that they collected. While the key in this activity is specific to this set of ten rocks, an online guide or a rock identification book could help identify additional rock types.

Identifying Rocks

Igneous Rocks

Basalt is an extrusive igneous rock, so it is rather fine-grained. Basalt is usually dark gray or black, with a fairly smooth surface. There are no visible layers.

Granite is an intrusive igneous rock. It is coarse-grained with large crystals. Granite can be white to light gray, with black specks. Granite is often pinkish in hue. The crystals are not arranged in layers.

Obsidian is an extrusive igneous rock that looks like black glass. It is very smooth, often with semi-circular rings in places where it is fractured. The color may be grayish or greenish at times.

Pumice is an extrusive igneous rock, so it is rather fine-grained with no crystals. It is not a smooth rock, however, as gas bubbles trapped within the rock during cooling give it many air pockets. Pumice is very light and is usually gray in color (but can be white or pink).

Sedimentary Rocks

Sandstone is a very common sedimentary rock. It is composed of layers that are brown, pinkish, white, or reddish in color. Sometimes sandstone is not well compacted, and often sand grains can be scraped from the rock.

Shale is a fine-grained sedimentary rock made from clay. It can be many different colors, but is usually black, gray, or brown.

Limestone is a sedimentary rock that is formed chemically from the mixing of calcite and sediment. It can have many different grain sizes, and is usually white or light colored. It often contains fossils. Because it contains calcium carbonate, limestone fizzes when vinegar is dropped on it. Acids like vinegar will dissolve it over time.

Metamorphic Rocks

Gneiss is a coarse-grained metamorphic rock. It has layers that look like bands running through it. Gneiss is formed when great pressure is applied to granite or schist.

Marble can vary in grain size. Crystals can usually be seen in marble. The color is usually light, often white, and often has streaks of other colors within it. Marble is formed when limestone is subjected to pressure. Like limestone, marble often fizzes when vinegar is applied.

Slate is a fine-grained, dark colored metamorphic rock, formed when shale is put under pressure. Slate is layered and easily splits into flat pieces.

Key to Rock Types

1. Is the rock composed of layers? (*A magnifying glass may be needed to determine whether the rock has layers or not.*)
YES..... go to 3 NO..... go to 2

2. Are there visible crystals in the rock?
YES..... go to 4 NO..... go to 5

3. Can sand be scraped off of the rock?
YES..... The rock is sandstone. NO..... go to 8

4. Is the rock mostly white, possibly with streaks of color?
YES..... The rock is marble. NO..... go to 10.

5. Does the rock look like black glass?
YES..... The rock is obsidian. NO..... go to 6

6. Is the rock very lightweight, with holes?
YES.....The rock is pumice. NO..... go to 7

7. Is the rock dark gray to black?
YES.....The rock is basalt. NO.....The rock is limestone.

8. Does the rock have visible crystals?
YES.....The rock is gneiss. NO..... go to 9

9. Does the rock easily split into thin, flat pieces?
YES.....The rock is slate. NO.....The rock is shale.

10. Is the rock very lightweight, with holes?
YES.....The rock is pumice. NOThe rock is granite.

Identifying Rocks

Background Information:

Rocks fall into three main categories: igneous, sedimentary, or metamorphic. Within these categories, rocks have distinct characteristics. Geologists use these characteristics to identify rocks. In this activity, you will identify ten mystery rocks based on their characteristics.

Materials:

- Magnifying tool or hand lens
- Set of ten rocks distributed by teacher
- Student Information Sheet: “Key to Rock Types”

Procedure:

1. Examine the set of ten rocks. Use the guidelines provided by the teacher and the Student Information Sheet: “Key to Rock Types” to identify each rock.
2. Each rock will have a number on it. Record the identity of the rock next to its number in the “Data” section below.
3. Read the descriptions of each rock type in the Student Information Sheet to confirm that each rock was identified correctly.
4. Answer the questions on the following page.

Data:

Rock Number	Name of Rock	Type <i>(igneous, sedimentary, or metamorphic)</i>

Name: _____

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Questions:

1. How are extrusive igneous rocks different from intrusive igneous rocks? (*Look at the Student Information Sheet: Identifying Rocks for help if necessary.*)

2. What is the difference between layered metamorphic rock and sedimentary rock?
