



Share with Your Students

What Is a Property?

1. Make copies of Student Resource 1.1, *Vocabulary*, and distribute to students. Discuss the definitions of terms as they come up throughout the section.
2. Start by reviewing the definition of mineral. Explain that a mineral is made of just one kind of substance. Ask: **Can you think of any examples of minerals?** (*Students may mention rock salt or gemstones.*) If a student mentions rocks, explain that rocks are made of more than one mineral, and they will learn more about rocks in the next section.
3. Explain that scientists identify minerals by properties such as color and hardness. Briefly review the definitions of properties on the *Vocabulary* page. Tell students that in this section they will learn how to test minerals for these properties, and how to use those properties to identify the minerals.

Name _____ Date _____

Vocabulary STUDENT RESOURCE 1.1
INFORMATION SHEET

cleavage the way a mineral breaks along flat surfaces
Some minerals have obvious cleavage. They break along flat surfaces in predictable ways. For example, mica always peels into thin, flat sheets. Halite (rock salt) always breaks into cubes.

color a property that can help identify a mineral
Color is often the first thing you notice in a mineral. However, some minerals can have more than one color, and more than one mineral can have the same color. So color should not be the only property used to identify a mineral.

hardness how hard or soft a mineral is compared to other minerals and materials
Hardness is tested by scratching one mineral against another mineral, or against another substance. If the mineral scratches the other substance, it is harder than that substance. If it is scratched by the other substance, it is softer.

luster how the surface of a mineral reflects light
Some minerals have a metallic luster. This means a mineral reflects light the way a metal does. A mineral with glassy luster reflects light the way glass does. Other words that describe luster are dull, earthy, pearly, greasy, and waxy.

mineral a solid substance that occurs in nature, was not formed by anything alive, is made of only one kind of material, and has a crystal structure
A mineral has atoms of certain elements that every sample of that mineral shares. Those elements are arranged in a certain pattern, forming a crystal structure. The crystal structure is there even if the mineral does not form a crystal shape that you can see.

property a characteristic, such as hardness or luster, that helps tell one mineral from another
A property is part of the description of a mineral. Several properties are used to identify a mineral. Color, hardness, streak, luster, and cleavage are all mineral properties.

streak the color of the powder of a mineral
Streak is a better way to identify a mineral than color. That is because a mineral that comes in different colors will always have the same color streak. Also, two minerals that are the same color can be recognized if they have different streaks. To test for streak, rub a mineral against an unglazed tile.

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Student Resource 1.1 (p. 13)

Investigate 1

Testing the Hardness of Minerals

Name _____ Date _____

Mohs Hardness Scale STUDENT RESOURCE 1.2
INFORMATION SHEET

Number	Description	Example Mineral
1	rubs off on fingers	talc
2	can be scratched by fingernail	gypsum
3	can be scratched by a copper penny	calcite
4	can be scratched by a steel nail	fluorite
5	can be scratched by a steel nail	apatite
6	scratches glass	feldspar
7	scratches steel or glass	quartz
8	scratches quartz	topaz
9	scratches topaz	corundum
10	scratches all materials	diamond

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Student Resource 1.2 (p. 14)

30 minutes **Pairs**

Objectives

- Students observe the hardness of minerals by scratching them with other substances.
- Students record data on a chart.


Materials
For each pair

1 calcite sample	1 mica sample, white
1 feldspar sample, pink	1 nail, steel
1 feldspar sample, white	1 *penny, copper
1 galena sample	1 pyrite sample
1 hematite sample	1 quartz sample
1 magnifier	1 sulfur sample
1 mica sample, black	1 tray, plastic

Testing the Hardness of Minerals (continued)

Name _____ Date _____

Testing the Hardness of Minerals

STUDENT RESOURCE 1.3
ACTIVITY SHEET 

Write the name of each kind of mineral and describe it. Remember that you have two samples each of feldspar and mica. Minerals may be listed in any order.

Test each mineral with each object.

Write an X in the box for any mineral that is scratched by the object.

Mineral Name and Description	Fingernail scratches mineral	Penny scratches mineral	Nail scratches mineral	Glass is scratched by mineral	Number on Mohs Scale
mica: thin flaky layers, silvery or black	X				1 or 2
sulfur: bright yellow and bumpy		X			3
calcite: white, clear, slanted rectangle shape		X			3
galena: like a metal cube		X			3
hematite: silvery with some layers			X		4 or 5
quartz: white and shiny				X	7
feldspar: pink or white fine grains				X	6
pyrite: goldish; tiny little cubes				X	6 or higher

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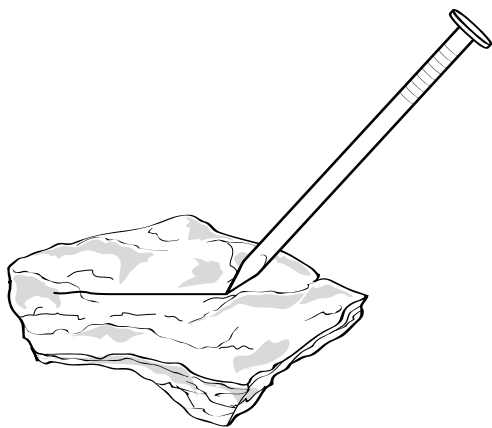
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Student Resource 1.3 (p. 15)



Teaching Tip

Step 2: Do not test the minerals with a diamond, as the diamond may crack on a flaw.



▲ Scratch each mineral only once with each item.

Materials (continued)

For the teacher

1 jar, glass

Student Resources

- 1.2 Mohs Hardness Scale
- 1.3 Testing the Hardness of Minerals

Inquiry Focus

- Record Data

In Advance

For each student pair, place all materials except the magnifier on a tray. Hand out the magnifiers separately, in their plastic bags, to avoid scratching.

1. Explain Mohs Hardness Scale.

Copy and distribute Student Resource 1.3, *Testing the Hardness of Minerals*, to each student. For each student pair, make one copy of Student Resource 1.2, *Mohs Hardness Scale*. Call attention to the *Mohs Hardness Scale*. Explain that minerals with higher numbers can scratch minerals with lower numbers. Ask: **How could you use the chart to identify the hardness of a mineral?** (*Scratch the mineral with items listed on the chart, then compare results to chart.*)

2. Help students to identify minerals.

Pass out trays of minerals. Start by asking students if they can identify any of the minerals, then identify the rest of the minerals for the class. As each mineral is identified, hold it up, name it, and have students write its name and a brief description on the Resource page. When there are two samples of the same mineral (mica and feldspar), only fill in one box on the Resource page.

3. Students apply the fingernail test.

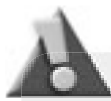
Have students remove the two mica samples, white and black, from the tray. Tell students to scratch each with a fingernail. Point out that a scratch mark will not rub off. Tell them to record their findings on the answer sheet, then look up mica's number on the Mohs scale. Collect white and black mica samples so students do not break them and have students continue to test the other minerals with their fingernails. Remind students to test each mineral only once, so the samples are not destroyed.

Testing the Hardness of Minerals (continued)



Teaching Tip

Step 4: Pennies minted in the U.S. prior to 1983 are pure copper and have a hardness of 3. Pennies minted since that time are zinc with a thin copper coating, and have a hardness between 2 and 3. Older pennies are needed for the clearest results.



Safety

Step 6: It is suggested that the teacher demonstrate this step to avoid the danger of students breaking glass.

4. Students apply the penny test.

Ask students to try scratching the remaining minerals with a penny, look up each mineral's hardness on the scale, and record results. Remind them to put any scratched minerals back in the tray.

5. Students apply the nail test.

Ask students to try scratching the remaining minerals with a nail. Have them record the results and put any scratched minerals back in the tray. Tell students that minerals not scratched by a nail are the hardest.

6. Demonstrate the glass test.

Turn the glass jar upside down on your desk. Ask: **Which mineral is hardest?** (*quartz*) Scratch the bottom of the jar with each of the remaining minerals. Show students that scratches will not rub off. Have them record results.



Assessment

Ask: **Which two minerals are the softest?** (*mica and sulfur*) **Which are the hardest?** (*feldspar, quartz, and pyrite*)

Investigate 2

Observing Color, Luster, and Cleavage



30 minutes



Pairs

Objectives

- Students observe properties of minerals.
- Students compare the color, luster, and cleavage of mineral samples.

Materials

For each pair

1	calcite sample	1	mica sample, white
1	feldspar sample, pink	1	pyrite sample
1	feldspar sample, white	1	quartz sample
1	galena sample	1	sulfur sample
1	hematite sample	1	tray, plastic
1	magnifier		
1	mica sample, black		

Inquiry Focus

- Compare