

Pacific Science Center Science On Wheels Program

MINERAL MADNESS Lesson Plan

Grades 3 - 8

Concepts:

1. Geologists use characteristics to identify and categorize minerals.
2. Humans use minerals in their every day lives.

Objectives: Students will be able to:

- Sort and classify minerals through observation, testing, and the use of a dichotomous key.
- Record discoveries as data.
- Make predictions about how minerals are used in everyday life and check predictions by matching with products. Match a variety of minerals with their everyday products through observation and testing.

(3-5)

GLE:

- 1.1.1 Understand how to use properties to sort natural and manufactured materials and objects.
- 1.1.5 Understand physical properties of Earth Materials including rocks, soil, water, and air.
- 2.1.1 Understand how to ask a question about objects, organisms, and events in the environment
- 2.1.2 Understand how to plan and conduct simple investigations following all safety rules.
- 2.1.3 Understand how to construct a reasonable explanation using evidence.
- 2.1.5 Understand how to report investigations and explanations of objects events, systems and processes.
- 3.2.2 Understand that people have invented tools for everyday life and for scientific investigations.

GLE Vocabulary 5th

Characteristic	Explain	Observation	Texture
Chart	Explanation	Observe	Tool
Classify	Hand lens	Organize	
Color	Hardness	Property	
Data	Identify	Question	
Describe	Invent	Scientist	
Diagram	Invention	Shape	
Earth	Magnetic	Size	
Electrical	Magnifying	Solid	
Electricity	glass	Sort	

(6-8)

GLE:

- 1.1.1 Understand how to use physical and chemical properties to sort and identify substances.
- 1.1.5 Understand how to classify rocks, air, soil, and water into groups based on their chemical and physical properties
- 2.1.2 Understand how to plan and conduct scientific investigations.
- 3.2.2 Analyze scientific inquiry and scientific design and understand how science supports technological development and vice versa.

8th Grade GLE Vocabulary:

circuit	cleavage of minerals	compare	compound
conduction	description	electron	element
igneous	luster of minerals	magnetism	metamorphic
rock cycle	sedimentary		

Activities**I. Invitation: People use minerals everyday.**

Challenge: Students share what they already know about minerals and discuss how people use minerals in everyday life.

- A. Introduce yourself to the students and explain that they will be geologists today. "What does a geologist study?" Encourage them to think back to the assembly if they have trouble getting started. Ask one or two students to summarize what the science of geology is about.
- B. "The geology that you will explore today is about minerals." Ask the students what they know about minerals. Write all answers on the board for later reference. Minerals are inorganic materials with definite chemical make-up, or composition.
- C. "One thing that I know about minerals is that people use them everyday." How do people use minerals? Record ideas.

II. Exploration: Students sort and classify minerals using observed physical characteristics.

Challenge: Describe and sort minerals using observed physical properties such as hardness, shape, weight, texture, color, etc.

- A. Explain that the students will be working as geologists in teams of two.
- B. Introduce the mineral kits. Show the students how to open the bag carefully. Explain that the fleece cloth should be spread on the desktop to protect both the desks and minerals. Tell them that they may take the mineral out of the small white bag (graphite).

Encourage them to pick up the minerals to examine them, using their flashscopes if desired. Give each partnership one kit. Allow one or two minutes for exploration. When they have finished call on a few students for some observations.

- C. Next, ask students to sort the minerals in a way that makes sense to both partners. Let them know that you will ask them to share with the class how they sorted the minerals. Give them some time (2-3 min) to sort. Ask a few groups to share their sorting strategies.

III. Exploration: Students record mineral descriptions on the worksheet.

Challenge: Students identify, describe, and record physical properties of the minerals.

- A. “Something else that geologists do is to keep track of what they learn about minerals by recording their discoveries as data.” Pass out the Chart worksheet or structured worksheet to each student and a Mineral Number Sheet to each partnership.
- B. Have the students match up each mineral sample with its corresponding picture on the Mineral Number Sheet. The students should put each mineral next to or on top of each mineral picture on the Mineral Number Sheet. The number corresponds to the sample number on the worksheets, so everything they do with Mineral 1 should be recorded in the number 1 space on the worksheet.
- C. **Grade 4-5:** Hold up the garnet. Solicit descriptions on color, shape and texture from the students. Model how to use the worksheet with the appropriate worksheet overhead using appropriate student responses for color, shape and texture. Allow several minutes for students to complete the portion of the worksheet above the streak box for the remaining minerals. Most students do not have a great deal of practice writing descriptions and may struggle. Ask a student to offer descriptions of the garnet, encouraging them to focus on color, texture, luster (shininess). The point is to be able to identify the mineral based on their descriptions, so the descriptions should be objective, discouraging words like, “pretty.” Instead, encourage them to describe the *features* they think make the mineral look pretty. The only area you want them to fill in now is the description section. They should not go on to the testing sections yet. **Grade 6-8:** Do the same for the mineral description portion of the worksheet.
- D. Ask the classroom teacher to help by assisting the students with their writing and keeping them on task.

IV. Exploration: Students perform simple tests on their minerals.

Challenge: Students make predictions then perform simple tests on the minerals using appropriate tools and equipment. They record their findings on a worksheet.

- A. **Streak Test:** “Now we will learn more about these minerals by investigating them further. Some of the minerals have special properties that make them easy to identify and very useful to people. We will try to find out now which of these minerals will leave a mark on your paper by performing a streak test. First I would like you and your partner to predict which mineral(s) will leave a mark on your paper.” Give them a few seconds to predict. When they have made their predictions ask them to find out which ones leave marks by rubbing each mineral in its own streak box on the worksheet. Tell the students to press their mineral lightly on their worksheet so they don’t tear their worksheet. Remind them to put each mineral back in its designated space on the Mineral Number Sheet. When they have finished ask the students to tell you their results. Most will conclude that the graphite is the only one to leave a mark. Explain to the students that geologists usually refer to the mineral’s color as a powder. This color is often more consistent than the surface color of the mineral and can be more helpful for identification. Also, minerals that have the same surface color may have different streak colors that can help to differentiate between them.
- B. **Conductivity Test:** “Some minerals can conduct electricity. What does it mean to conduct electricity? Minerals that allow electricity to pass through them conduct electricity.” Allow students to predict which mineral(s) will conduct electricity. Model how to use a hand generator. Tell them to turn the handle slowly so as not to damage the gears. “This hand generator can produce electricity and will help us learn if any of these minerals conduct electricity.” Get a student volunteer. Plug the wires into the generator, touch the two wire ends together and let the student turn the handle. “When you turn the handle, electricity is produced which flows through the wires, completing a circuit. If electricity is being conducted through the wire, or flowing, the handle will be harder to turn. Ask the volunteer, “When I detach the wires (do so), what happens?” The handle is very easy to turn. “Because there is no electricity traveling through the wires, the handle is easy to turn. Let’s test a mineral.” Use the volunteer to demonstrate how to place the ends of the wires on a mineral (not clipping them onto the mineral) and turn the generator handle. “If the handle is hard to turn, what does that mean? How will we know if a mineral is not a conductor of electricity?” Have grades 6-8 record their results on their worksheet. Hand out the generators. After testing ask the students to hold up the samples that conduct electricity. Most students will find that graphite and copper will conduct electricity.
- C. **Fluorescence Test:** “One very common way to classify minerals is by determining whether or not they fluoresce. What happens when something fluoresces? Objects that fluoresce appear to glow

because as a result of being exposed to energy from light. When some minerals are put under a special light called a UV light (show one), they will fluoresce, or glow.” Ask the students to predict which mineral(s) will glow. Show them how to test for fluorescence with the UV light (point the light end down toward their desktops and put a mineral under the light) or use the “UV Light Use” overhead. Insist on safe use by stressing that they should keep the light shining down and away from anyone’s eyes. Pass out the UV lights and ask the classroom teacher to help you monitor safe use. Turn out the classroom lights. Give them some time to use the UV lights and then ask for their conclusions. Most will find that the opal and fluorite fluoresce. Encourage grades 6-8 to record their findings on their worksheet.

- D. **Magnetism Test:** Some minerals are magnetic. Ask the students to predict which mineral(s) will be attracted to the magnet. Pass out one magnet to each partnership and allow them to test. Give them some time to use the magnets and then ask for their conclusions. Most will find that the magnetite is magnetic. Remind grades 6-8 to record their findings on their worksheet.

V. Exploration: Use a dichotomous key to identify the minerals.

Challenge: Students apply their data to a dichotomous key to determine the identity of their minerals.

- A. Hand out a “What Mineral Is It?” sheet (dichotomous key) to each pair of students. Explain that geologists use dichotomous keys to help them identify minerals. A dichotomous key is a series of paired (or two) choices which lead to the identification of an object, or mineral in this case. Model how to use the key by taking the garnet and placing it on “start here” on the “What Mineral Is It?” overhead or on a “What Mineral Is It?” sheet. Briefly explain that they will be deciding between two different paths for each characteristic, starting with color. When they determine the mineral name, encourage them to record it on their worksheet. Encourage grades 3-5 to use their testing tools if needed, as they did not record this data.

VI. Conclusion

- A. Refer back to the mineral list on the board you made earlier. Ask students if they would like to add or change anything on the list.
B. “Tell me one thing you could tell people about minerals now.”