

1: Amazing Metals

Based on the Nevada quarter reverse



OBJECTIVE

Students will participate in a guided investigation of metals, their properties, and their uses.

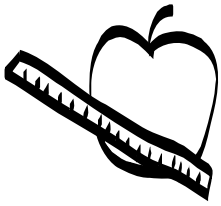


MATERIALS

- 1 overhead projector
- 1 overhead transparency (or photocopy) of the “Nevada Quarter Reverse” page
- 1 class map of the United States
- Locate copies of texts that give information about how minerals and metals are mined and used, such as:
 - *National Audubon Society—First Field Guide—Rocks and Minerals* by Edward Ricciuti and Margaret W. Carruthers
 - *Eyewitness Book—Rocks and Minerals* by Dr. R. F. Symes
 - *Exploring Science—Rocks, Gems, and Minerals* by Lisa Sitka
 - *Rocks and Minerals* by Neil Morris
- Chart paper
- Markers
- Highlighters (optional)
- “Marvelous Metals” worksheet
- “D” batteries
- Battery holders
- Light bulbs
- Light bulb sockets
- Insulated copper wires
- Wire stripper

PREPARATIONS

1. Make a copy of the “Marvelous Metals” worksheet (1 per student)
2. Locate and gather items made of metal, such as nickels, paper clips, aluminum foil, copper wire, iron elbow joints, and zinc connectors. Get enough items so that small groups each have five items to examine. Groups may all have the same items. Make sure that the items do not have sharp edges and are safe to handle. Label each item.
3. Before Session 2, create enough observation stations around the room so that the small groups can each examine five metal objects at each station.



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4. Make sure to include a simple circuit at each station, or have the students build the circuits. Here's how to build a simple circuit:
5. Gather materials (a "D" battery, a "D" battery holder, a light bulb, a light bulb holder, and two insulated copper wires) and a wire stripper.
6. Insert the battery into the battery holder and the light bulb into the socket.
7. Strip the insulator off both ends of the wires with the wire stripper.
8. Attach one end of each wire to the terminals on the light socket. Connect the other ends to the terminals on the battery holder.



GROUPINGS

- Whole group
- Small groups
- Pairs
- Individual work



CLASS TIME

Two 45- to 60-minute sessions



CONNECTIONS

Science



TERMS AND CONCEPTS

- Metal
- Luster
- Malleability
- Hardness
- Conductivity



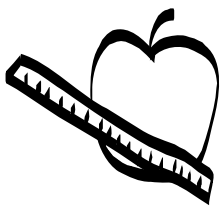
BACKGROUND KNOWLEDGE

Students should have a basic knowledge of electrical circuits.

STEPS

Session 1

1. Describe the 50 State Quarters® Program for background information, if necessary, using the example of your own state, if available. Locate Nevada on a classroom map. Note its position in relation to your school's location.

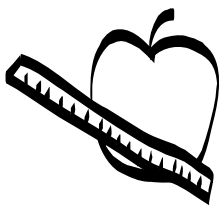


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2. Display the “Nevada Quarter Reverse” overhead transparency. Ask the students what they see in the image on the coin. Lead a class discussion regarding the images and explain the following to the students.
3. Nevada has the largest wild horse population of any state. These horses run free on public lands.
4. Part of the Sierra Nevada mountain range is located in Nevada.
5. Nevada became a state in 1864.
6. An area called “The Great Basin” covers much of Nevada. Although more mountainous than most deserts, the Great Basin is mostly desert.
7. Sagebrush, which is shown on the coin, is the state flower of Nevada and grows in the desert.
8. Nevada’s nickname is “The Silver State” because much of the silver found in the United States is found in Nevada. Explain that Nevada also produces gold, oil, and salt.
9. Ask the students what gold and silver have in common. The students may suggest that jewelry is made of gold and silver or that both are expensive. Guide the students to the conclusion that gold and silver are both metals.
10. Make a T-chart on chart paper with the columns labeled “Metals” and “Minerals.” Ask the students to name some other metals (besides gold and silver) with which they are familiar. List these metals under the “Metals” column on the T-chart. Guide the students to name common metals such as copper, aluminum, iron, nickel, zinc, and platinum. Write the metals on the chart.
11. Tell the students that they will read a text about minerals and metals. Introduce the selected text. Read the text or excerpts of the text aloud with the students.
12. As a class, summarize the main points of the text. Record key concepts and ideas on a piece of chart paper.
13. Have the students choose a mineral or metal mentioned in the text. On a piece of notebook paper or in their science journals, have the students write a summary explaining the properties of the metal, how it’s used, other names it may have, and facts about it. An illustration should also be included.
14. Have the students find a partner who wrote about a metal different from their own. Allow time for them to tell each other about the metal they chose.
15. Collect their writings.

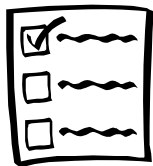
Session 2

1. Review the material from Session 1.



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2. Distribute the “Marvelous Metals” worksheets to the students. Tell the students that scientists use several terms to describe metals. Discuss the terms at the top of the worksheet. Review each of the terms and its meaning with the students. Tell the students that some metals have more of one property than another—for example, some are very hard, but not very bendable. Manufacturers choose different metals for different jobs depending on the needs of the job.
3. Using the items made of metal, have the students complete the “Marvelous Metals” worksheet in pairs. When the students are done, review the answers as a class.
4. Have the students get into small groups and assign the groups to each of the stations. Allow time for the groups to complete the activity.
5. Once the groups have completed the activity, have them compare their answers with those of other groups that have similar items.
6. Collect the “Marvelous Metals” worksheets.



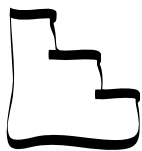
ASSESSMENT

Use the worksheets to assess the students’ achievement of the lesson objectives.



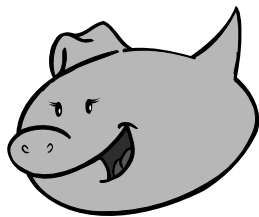
ENRICHMENT/EXTENSIONS

- Have students select one metal and research that metal, then report on where the metal is found, how it is mined, and its uses.
- Invite speakers who work with metals (jewelry maker, carpenter, electrician, computer technician) into the classroom to demonstrate how they use metals.



DIFFERENTIATED LEARNING OPTIONS

- Allow students to work in pairs to complete the worksheets.
- Allow students to dictate their written responses to a scribe.



CONNECTION TO WWW.USMINT.GOV/KIDS

Learn more about the metals used to make coins by looking at the October 2005 Coin of the Month Teacher Feature “Metals for Minting” found at www.usmint.gov/kids/index.cfm?fileContents=teachers/features/2005/10.cfm.



Name _____

Marvelous Metals

Directions: Based on your observations of the metal objects, choose an amount from each scale that rates the object's characteristics using the five terms scientists use to describe metals:

- Luster: Describes the metal's shininess.
- Malleability: Describes how bendable a metal is without breaking.
- Hardness: Describes how difficult the metal is to penetrate (go through).
- Conductivity: Describes how well the metal moves heat and electricity.
- Color: Describes the metal's color.

Item 1: _____

How lustrous is it?	Very	Somewhat	Not at all
How malleable?	Very	Somewhat	Not at all
How hard?	Very	Somewhat	Not at all
How conductive?	Very	Somewhat	Not at all

Describe the color: _____

Item 2: _____

How lustrous is it?	Very	Somewhat	Not at all
How malleable?	Very	Somewhat	Not at all
How hard?	Very	Somewhat	Not at all
How conductive?	Very	Somewhat	Not at all

Describe the color: _____

Item 3: _____

How lustrous is it?	Very	Somewhat	Not at all
How malleable?	Very	Somewhat	Not at all
How hard?	Very	Somewhat	Not at all
How conductive?	Very	Somewhat	Not at all

Describe the color: _____

Item 4: _____

How lustrous is it?	Very	Somewhat	Not at all
How malleable?	Very	Somewhat	Not at all
How hard?	Very	Somewhat	Not at all
How conductive?	Very	Somewhat	Not at all




Describe the color: _____

Item 5: _____

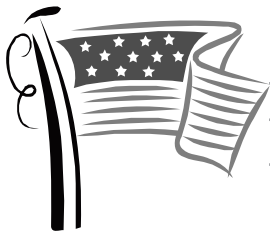
How lustrous is it?	Very	Somewhat	Not at all
How malleable?	Very	Somewhat	Not at all
How hard?	Very	Somewhat	Not at all
How conductive?	Very	Somewhat	Not at all

Describe the color: _____

For each use of metal pictured below, tell whether the use requires that the metal be lustrous, malleable, hard, conductive, or colorful. Explain why.

 ELECTRIC WIRE	 JEWELRY	 NAIL
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Think of an object that is made of metal. Write 5 sentences describing the properties of the object and how it is used.



Nevada Quarter Reverse

