

1: Rock On!

Based on the California quarter reverse



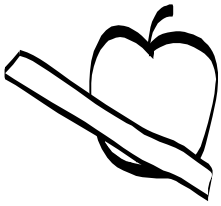
OBJECTIVE

Students will investigate and identify common rock types. Key concepts include igneous, sedimentary, and metamorphic rocks.



MATERIALS

- Chalkboard/chalk
- “Connect the Concepts” page
- “Yosemite” page
- “John Muir” page
- “50 State Quarters® Program” page
- “California” page
- “Where in the World” page
- “Rocks Rock!” chart
- “Name That Rock” page
- Highlighters
- Tape
- Chart paper/markers
- 1 overhead projector (optional)
- “California Quarter Reverse” page
- 1 class map of the United States
- Pictures of Yosemite National Park, available on Web sites such as:
 - www.uh.edu/~doan2580/catrip.htm
 - en.wikipedia.org/wiki/John_Muir
 - www.yosemitefun.com/tarheel/images/pictures_of_yosemite.htm
 - www.yosemite.org/vryos/index.htm
- Paper bags
- Assorted igneous rocks, such as:
 - basalt
 - pumice
 - obsidian
 - granite



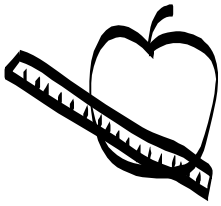
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- Assorted metamorphic rocks, such as:
 - slate
 - marble
 - schist
 - gneiss
- Assorted sedimentary rocks, such as:
 - limestone
 - sandstone
 - halite
 - conglomerate
- Hand lenses
- A copy of an age-appropriate text relating to rocks and rock formation, such as:
 - *Let's Go Rock Collecting* by Roma Gans
 - *The Pebble in My Pocket* by Meredith Hooper and Christopher Coady
 - *How to Dig a Hole to the Other Side of the World* by Faith McNulty
 - *Earthsteps: A Rock's Journey Through Time* by Diane Nelson Spickert and Marianne D. Wallace
- Bulletin board
- Sentence strips
- Markers
- Index cards
- Small plastic bags



PREPARATIONS

- Make copies of the following:
 - “Connect the Concepts” page (1 per student)
 - “Yosemite” page (1 per student in corresponding group)
 - “John Muir” page (1 per student in corresponding group)
 - “50 State Quarters® Program” page (1 per student in corresponding group)
 - “California” page (1 per student in corresponding group)
 - “Where in the World” page (1 per student)
 - “Rocks Rock!” chart (1 per student)
 - “Name That Rock” page (1 per student)



Rock On!

- Make an overhead transparency of each of the following:
 - “California Quarter Reverse” page
 - “Where in the World?” page
 - “Rocks Rock!” chart
 - “Name That Rock” page
- Assemble pictures of Yosemite National Park (see examples under “Materials”).
- Create rock bags. Include an assortment of each type of rock in each paper bag (see examples under “Materials”). The bags should be identical (1 per group).
- Locate an age-appropriate text relating to rocks and rock identification (see examples under “Materials”).



GROUPINGS

- Whole group
- Small group
- Individual work



CLASS TIME

Five 45- to 60-minute sessions



CONNECTIONS

- Science
- Social Studies
- Language Arts
- Art



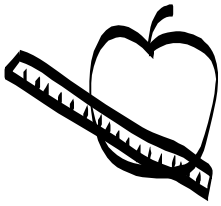
TERMS AND CONCEPTS

- Quarter
- Reverse (back)
- Igneous
- Sedimentary
- Metamorphic
- Yosemite
- John Muir
- 50 State Quarters® Program
- California
- Classification



BACKGROUND KNOWLEDGE

Students should have a basic knowledge of minerals and the rock cycle.



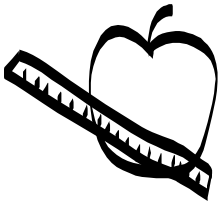
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STEPS

Session 1

1. Write the following terms on the board: “Yosemite Valley,” “John Muir,” “50 State Quarters® Program,” “California.”
2. As a warm-up, have students in pairs write predictions about how these four items are connected. As a class, have students share their predictions.
3. Distribute a “Connect the Concepts!” page to each student.
4. Arrange the class into four groups.
5. Assign each group one of the boxes on the “Connect the Concepts!” page. Then, distribute to each student his or her corresponding informational reading and a highlighter. For example, each student in the “California” group will receive the “California” reading.
6. Direct the groups to read their informational handouts and highlight the three or four most important points in the reading. Direct the students to record this information in the box on the “Connect the Concepts!” page.
7. Allow an appropriate amount of time for the groups to complete the activity.
8. Tape four pieces of chart paper to the board and label them “Yosemite Valley,” “John Muir,” “50 State Quarters Program,” and “California” respectively. Direct the groups to come up and write the three or four most important points from their readings in the corresponding box. Direct the students to copy down all the information on their individual charts.
9. Lead a class discussion on the connections that can be made between the four topics. If necessary, explain that the United States Mint has released its California quarter as part of the 50 State Quarters Program. Describe the 50 State Quarters Program for background information, if necessary, using the example of your own state, if available. Then display the transparency or photocopy of the California quarter reverse. Point out that both John Muir and the Yosemite Valley are represented on this coin.
10. Ask the students if they have ever visited California or the Yosemite Valley. If so, have them describe what it looks like and pinpoint the locations on the class map.
11. Display pictures of the Yosemite National Park that showcase the mountains and rock formations. Explain that the Yosemite Valley is part of Yosemite National Park. Ask the students to find similarities in the pictures. Guide the students to realize that all of the pictures include images of mountainous and/or rocky terrain.
12. Explain to the students that they will be learning more about rocks and rock types in the coming days.



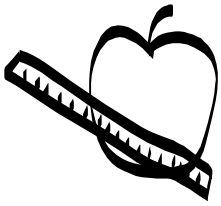
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Session 2

1. Review the four terms on the chart papers from the previous session. Review with the students how these four concepts are related.
2. Remind the students that today they will be investigating the different types of rocks found in Yosemite Valley and in other places around the world. Have the students meet in their groups from the previous session.
3. Distribute to each group a bag of assorted rocks and hand lenses. Direct the groups to carefully inspect each of the rocks in their bags with the hand lenses. Direct the students to look for similarities and differences among the rocks. Discuss these comparisons as a class.
4. Introduce the selected text. As a group, preview the illustrations and make predictions about what is happening in different parts of the text.
5. Read the text aloud, asking the students to pay close attention to the characteristics of the three different types of rocks.
6. Review with students the three types of rocks.
7. On a bulletin board, create three columns labeled “IGNEOUS” (column 1), “SEDIMENTARY” (column 2), and “METAMORPHIC” (column 3).
8. Review the characteristics of each type of rock as presented in the text.
9. Distribute six sentence strips, tape, and a marker to each group. Have the groups generate two words or phrases to describe what each group of rocks looks like. Model this process by writing “layered” on a sentence strip and placing it under the “SEDIMENTARY” column. Write “glassy” on another sentence strip and place it under the “IGNEOUS” column. Finally, write “grains of minerals” on a sentence strip and place it under the “METAMORPHIC” column.
10. Allow each group to explain its words and phrases to the rest of the class and add them under the appropriate columns on the bulletin board. Explain to the students that they will be further exploring these rocks and their characteristics in the next session.

Session 3

1. Review the bulletin board from the previous session.
2. Direct the students to meet in their groups from the previous session. Distribute one copy of the “Where in the World?” page to each student and a bag of assorted rocks to each group.
3. Display the “Where in the World?” overhead transparency. Direct the students to classify the rocks into the three categories listed on the overhead, using the bulletin board as a guide if necessary.
4. Allow an appropriate amount of time for group work.



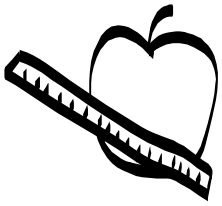
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5. Show the students the correct classification of the rocks in their group bags. Direct the groups to reclassify their rocks as necessary to reflect the correct classifications.
6. Review with the students that rocks coming from inside the earth are formed by magma and are called “igneous” rocks. Those that are formed by layers of sediments like clay and sand are called “sedimentary” rocks. Metamorphic rocks are those that were once igneous or sedimentary but were changed by pressure or heat over a long period of time.
7. Direct the students to find and bring in a rock sample for the next session.

Note: For the next session, record the student descriptions of each rock type (from the bulletin board) on the “Rocks Rock!” chart. Make an overhead transparency and copies of this chart for use in the next session.

Sessions 4 and 5

1. Direct the students to get out the rocks they brought in from home.
2. Briefly review the characteristics of each type of rock from the bulletin board and the “Where in the World?” page.
3. Display an overhead transparency of the “Rocks Rock!” chart and distribute one copy of this page to each student. Explain to the students that this is a copy of the bulletin board that they created in the previous session.
4. Distribute an index card and assign a number to each student. Direct the students to write their names on one side of the index card and their assigned numbers on the other side.
5. Direct the students to use the “Rocks Rock” chart to record the correct classification of his or her rock.
6. Direct the students to write and complete the following sentence on their index cards under their names: “I think my rock is a(n) _____ rock because _____.”
7. Distribute one “Name That Rock” page to each student and display an overhead transparency of the same page. Direct the students to place their index cards on the desk with the numbered side facing up. Then, have students place their rocks on top of the cards.
8. Explain to the students that they will inspect five rocks from around the classroom, recording their impressions and classifications on their handouts. Model this process for the students by inspecting one rock. Record this rock’s assigned number in the corresponding column on the overhead transparency of the chart. Next, make a few verbal observations about the rock and record these in the “Characteristics” column on the overhead transparency. Remind the students that they can use the bulletin board for help with this part of the activity. Finally, identify the classification of the rock specimen aloud and circle the correct initial (“I” for igneous, “M” for metamorphic, “S” for sedimentary) in the “Classification” column on the overhead transparency.



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9. Explain that each rock should only have one student inspecting it at a time. Encourage students to choose rocks that are different in appearance in order to get a variety of observations.
10. Allow an appropriate amount of time for student work.
11. Direct the students to return to their desks.
12. As a class, review each rock. Have student volunteers share their classification of each rock. Allow for student discussion and clarify student questions.
13. Direct the students to grade their own “Rocks Rock” charts as you record the correct answers on the overhead transparency.
14. Place the rock specimens in small plastic bags and pin them to the appropriate column of the bulletin board.



ENRICHMENT/EXTENSIONS

- Have students create a “rock song.” Challenge them to rewrite the lyrics to a popular song, being sure to include information about igneous, sedimentary, and metamorphic rocks.
- Have students draw pictures of the rocks and place them on the bulletin board next to each description.



DIFFERENTIATED LEARNING OPTION

- Allow students to use the rock identification books for additional support as they circulate throughout the room.
- Include digital pictures of each type of rock on the bulletin board so students can visually compare rocks.
- Create a note-card-sized copy of the bulletin board for students to carry with them through the activity in Sessions 4 and 5.



CONNECTION TO WWW.USMINT.GOV/KIDS

Did you know that New Hampshire chose a rock formation for the design of its quarter? Learn all about it on the New Hampshire quarter page! Be sure to include a study on what has happened to this rock formation since the debut of the coin. Students will discover that a rock slide destroyed the “Old Man of the Mountain.” This could lead to a discussion or exploration of the changes in rock formations over time. (www.usmint.gov/kids/index.cfm?FileContents=/kids/coinnews/50sq/2000/nh.cfm)



NAME _____

Connect the Concepts

Directions: Record the most important points from your group reading in the corresponding box below. As other groups share their information with the class, record it in the appropriate boxes.

- _____
- _____
- _____
- _____
- _____
- _____

YOSEMITE VALLEY

- _____
- _____
- _____
- _____
- _____
- _____

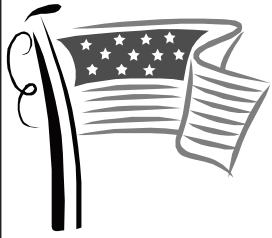
CALIFORNIA

- _____
- _____
- _____
- _____
- _____
- _____

50 STATE QUARTERS® PROGRAM

- _____
- _____
- _____
- _____
- _____
- _____

JOHN MUIR



California

The explorers who discovered the California peninsula thought at first that it was a large island. They named it after an imaginary island in a Spanish book popular at that time. Today, the peninsula is known as lower California (or the Spanish "Baja California") and the state as upper California ("Alta California").

Upper California was first owned by Spain, then Mexico after it became independent from Spain. California won its independence from Mexico in 1847 and then became part of the United States (but not yet a state). After only one year of independence, California became a target of a gold rush. The population soon began to explode. California became a state in 1850.

Without telegraph or railroads, the news about finding gold could travel across the Pacific Ocean in only three months, while it took five to seven months for news to reach the eastern United States. For this reason, many of California's first immigrants were from China.

The state's many kinds of terrain include high mountains, fertile valleys, arid deserts, and many miles of sandy coastline. California's highest point, at 14,495 feet above sea level, is Mount Whitney; its lowest is Death Valley, at 282 feet below sea level—and the two points are only about 50 miles apart! The state's frequent earthquakes show that the powerful forces that shaped this wonderful land are still at work.



Yosemite Valley

The Yosemite Valley, named after the Yosemite Indians who used to live there, is now part of Yosemite National Park. The scenery of this 747,956-acre park in the Sierra Nevada mountains is simply spectacular. Set aside as a national park in 1890, the park has a grand collection of natural features such as Tuolumne Meadows. This large, beautiful meadow is surrounded by mountain peaks.

Yosemite Valley has many high cliffs and some of the highest waterfalls in the world. Hetch Hetchy Valley is considered a twin of Yosemite Valley, but was made into a reservoir despite efforts to keep it in its natural state.

The Mariposa Grove contains hundreds of giant sequoias (redwood trees). These trees are the world's largest living things, thousands of years old. Glacier Point has an amazing view of Yosemite Valley and the high country during summer and fall.

The park is also home to dozens of kinds of amphibians, reptiles, fish, mammals, and birds, including many endangered species like the California bighorn sheep and the southern bald eagle. Visitors are always welcome without needing to make reservations first—the park is always open.



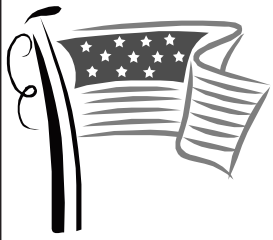
John Muir

John Muir has inspired many people around the world with his writings on the beauty of wilderness and the need to keep it safe for future generations.

This writer and nature lover was born in Scotland in 1838. He moved to Wisconsin with his family when he was 11 years old. He worked on his family's farm throughout his youth and also did some inventing.

When Muir was 30, he traveled to California, where he settled and explored the high country of the Sierra Nevada mountains. Later in his life, he traveled all over the world and encouraged people in different countries to take care of their own wilderness areas.

The California Historical Society voted Muir the greatest Californian in the state's history. He helped to found the Sierra Club in 1892 and served as its president for the rest of his life. Every year, April 21 (his birthday) is John Muir Day in California. Several places in the United States and Scotland are named after him, and Yosemite is now a National Park largely because John Muir worked to make it one.



50 State Quarters® Program

You may be used to seeing different designs on the back of the quarter dollar coin. But did you know that, before the 50 State Quarters® Program began, the coin had not changed since 1932? Except for the bicentennial design in 1975 and '76, the same eagle design was used for more than 65 years!

The first designs from the 50 State Quarters Program began showing up on the reverse (back) of this coin in 1999. Over the following 10 years, each of the nation's fifty states is being honored with its own design. The order in which the states joined the Union is the same order in which the fifty designs are being released. The familiar portrait of George Washington always remains on the obverse (front).

Through this program, the United States Mint introduces the American people to the special history, geography, and heritage of each of the states. A new quarter is released into general circulation about every 10 weeks, for a total of five new quarter designs each year. Each of these designs is minted for a period of 10 weeks, never to be minted again after that.



Where in the World?

Directions: See if you can classify your rocks into these categories.

CATEGORY #1

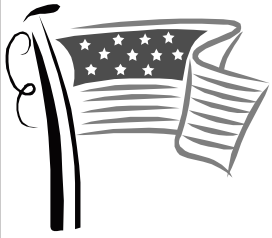
These rocks appear to have come from deep within the Earth, where it is very hot. These rocks may have gotten to the surface through a volcano. These rocks can look glassy and usually do not have large mineral or crystal chunks.

CATEGORY #2

These rocks formed on the top of the Earth by layers of clay, sand, and silt. These layers may be parallel, straight, crooked, or clumped. Some of these rocks will have small grains of minerals like quartz. Many of these rocks are used as building materials.

CATEGORY #3

These rocks used to be in one of the above categories, but have been changed by pressure and/or heat over time. You will be able to see in them mineral grains that were flattened by high heat and pressure. These grains may be in alternating or irregular patterns.

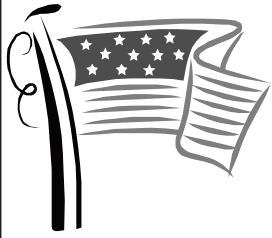


NAME _____

Rocks Rock!

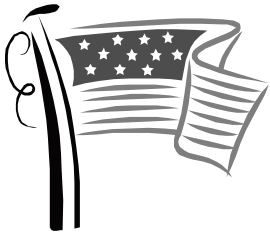
IGNEOUS	SEDIMENTARY	METAMORPHIC	UNKNOWN

NAME _____



Name That Rock

ROCK #	CHARACTERISTICS	CLASSIFICATION
		I S M
		I S M
		I S M
		I S M
		I S M
		I S M
		I S M
		I S M



California Quarter Reverse

