

ROCK CYCLE ROULETTE

POINT OF INQUIRY

How can two rocks that have the same minerals in them look very different?

CONCEPT

Knowledge of early geologic processes is important in understanding how mineral resources are formed.

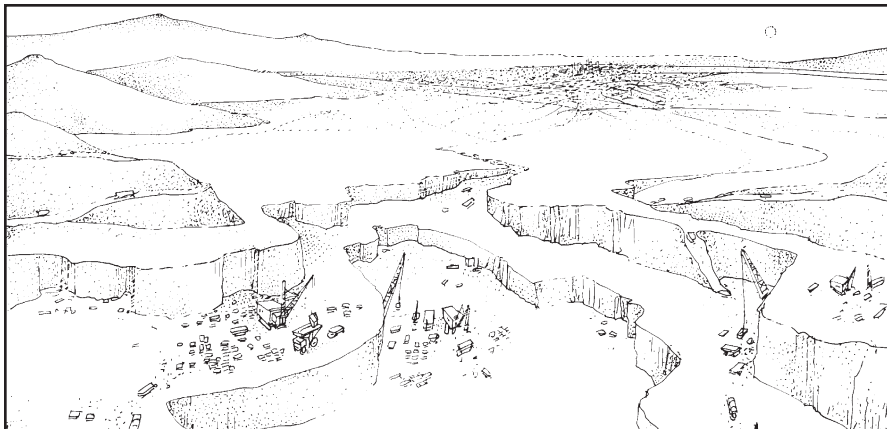
LEARNING OUTCOME
The students will role play rocks moving through the rock cycle.

CURRICULUM FOCUS:
Science, Language Arts, Math

SKILLS/PROCESSES:
record, diagram, discuss, compare, write

KEY VOCABULARY:
igneous, sedimentary, metamorphic, rock cycle

MATERIALS:
Eleven dice made from cardstock



Background

The three major types of rocks are igneous, sedimentary, and metamorphic. Igneous rocks are formed from rock that has melted, sedimentary rocks are formed from rock that has been broken into pieces and cemented together again, and metamorphic rocks are formed from rocks that have been changed by heat and pressure under the Earth's surface. Over long periods of time, one rock may be igneous, be worn down by a stream and the broken pieces turned to sand, the sand buried and cemented into a sedimentary rock, which is subjected to intense pressure turning it into a metamorphic rock. The metamorphic rock can be buried and compressed so much that it eventually melts and recrystallizes into a brand new igneous rock. This natural rock recycling is called the rock cycle.

Preparation

This activity involves the use of six sided cubes set around the room at 11 stations. The cubes (dice) can be made of construction paper or card stock. The sides of the cubes should be labeled as shown on the chart found at the end of this activity. Each die or cube corresponds to a station (11 total). You may want to place rock samples of the three major types at the appropriate stations.

Tape signs around the room in a circular pattern and move desks so that the students can easily circulate from station to station. You may want to draw or project a station map on the board.

Learning Activity

Ask the students the following questions to assess their knowledge of the subject, and to stimulate their interest in the activity:

How can one type of rock change into another type of rock?

How long does it take for rocks to change forms?

FOR YOUR INFORMATION

Schist is a metamorphic rock that forms from basalt, shale or slate. Schist may contain small gemstones such as garnets.

1. Instruct students to create a map or chart that includes all eleven stations. Explain that they will be following the path of a rock as it travels through the rock cycle. Each station represents one event in the cycle. Throughout the activity students are to record each stop they make in order on their map. Students should also make marks if they remain at the same station for numerous rolls. Each roll of the die represents 200,000 years of geologic time.
2. Students continue to move from station to station for 10-15 minutes. Students do not stop when they have visited each station. Some students might only visit a few stations during the allotted time.
3. After students have completed the activity, hold a class discussion about their experiences.

Check For Understanding

Students should write the life story of the elements that they followed through the cycle. Possible criteria for the write up are listed below.

The story must cover 2 million years or at least 5 station changes.

Must be written from the viewpoint of a mineral in the rocks.

Specific geologic and geographic locations must be identified for each stage. For example if melting is occurring, the rock might be experiencing subduction along the coast of Washington.

All locations must be geographically connected so that a rock might actually travel through the steps described in the region identified.

A specific type of rock such as sandstone or basalt must be identified for each stage as a rock.

Discuss student results with the following discussion questions.

1. Where did you spend most of your time?
2. What might be some reasons that some people went to every station while others only went to four or five?
3. Why did everyone follow a different path?
4. How does the water cycle influence the rock cycle?
5. In what kinds of environments do sedimentary rocks form? Igneous? Metamorphic?

To Know and Do More

Have students create a rock cycle poster using specific rocks rather than just igneous, sedimentary, and metamorphic. For example, they could replace igneous with granite, sedimentary with sandstone, and metamorphic with quartzite, which all contain the mineral quartz.

Instructions for Making Station Labels and Dies for Each Station

Station Label	Number of Die Sides to Mark With Given Phrase	Phrase to Write on Number of Sides Indicated for This Station's Die
Station 1: Compaction and Cementation	3	Go to Sedimentary Rock
	3	Keep Compacting and Cementing at this station
Station 2: High Temperature and Pressure	3	Go to Metamorphic Rock
	3	Stay under High Temperature and Pressure at this station
Station 3: Sediment	2	Go to Compaction and Cementation
	4	Continue as a pile of Sediment at this station
Station 4: Igneous Rock	2	Go to Weathering and Erosion
	2	Go to High Temperature and Pressure
	2	Go to Melting
Station 5: Exposure at the Surface	4	Go to Weathering and Erosion
	2	Continue Exposure at the Surface at this station
Station 6: Metamorphic Rock	2	Go to Melting
	2	Go to Exposure at the Surface
	2	Go to High Temperature and Pressure
Station 7: Sedimentary Rock	2	Go to High Temperature and Pressure
	2	Go to Melting
	2	Go to Weathering and Erosion
Station 8: Melting	3	Go to Magma
	3	Continue Melting at this station
Station 9: Cooling and Hardening	3	Go to Igneous Rock
	3	Continue Cooling and Hardening at this station
Station 10: Magma	2	Go to Cooling and Hardening
	4	Continue as Magma at this station
Station 11: Weathering and Erosion	3	Go to Sediment
	3	Continue Weathering and Eroding at this station

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Roll Number	Years of Geologic Time	Station Visited
Roll 1	200,000	
Roll 2	200,000	
Roll 3	200,000	
Roll 4	200,000	
Roll 5	200,000	
Roll 6	200,000	
Roll 7	200,000	
Roll 8	200,000	
Roll 9	200,000	
Roll 10	200,000	
Roll 11	200,000	
Roll 12	200,000	
Roll 13	200,000	
Roll 14	200,000	
Roll 15	200,000	
Roll 16	200,000	
Roll 17	200,000	
Roll 18	200,000	