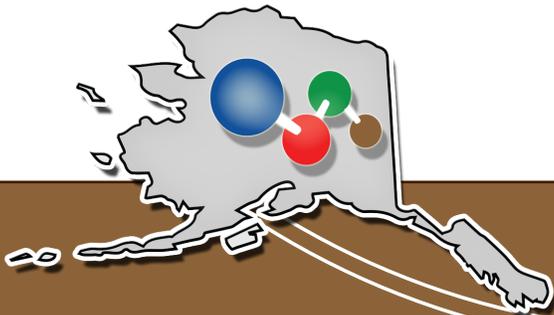




# Minerals





# Girl Scouts of Alaska Alaska Resource Education Minerals Patch

**Level:** Brownie

**Requirements:**

Complete item 1, or 2, or 3, and at least 2 other activities.

**Level:** Junior, Cadette, or Senior

**Requirements:**

Complete item 1, or 2, or 3, plus activity number 5, and at least 2 other activities.

## 1. JellyBelly Geology

## 2. Mine a Cookie

## 3. The Rock Game

## 4. Speaking Science

Define the following terms related to minerals or mining:

- Rock
- Mineral
- Luster
- Hardness
- Exploration
- Operation
- Reclamation

## 5. Look Up

Find and record information for the following:

- A proposed/exploration mining project (i.e. Donlin Creek, Pebble, Niblack, Livengood)
- An operating mine (i.e. Red Dog, Fort Knox, Pogo, Greens Creek, Kensington, Usibelli)

- Name the project
- Locate the project (Within Alaska)
- List the mineral(s) in the deposit/mine
- Identify the type of mine (or what is proposed)

## 6. Compare and Contrast

What are differences between a rock and a mineral? What are the similarities? List as many of both as you can.

## 7. Identify

List 3 items you use in your everyday life. Research what minerals are used to make those items and list at least 3. Determine which of those minerals are mined here in Alaska.



For lessons,  
more information,  
and helpful links visit:  
[www.akresource.org](http://www.akresource.org)

# WHERE DO MINERALS COME FROM?

## Jelly Belly Geology & Rock Identification

Essential Question: How do you identify rocks and minerals?



### Time: 1-2 hours

Girl Scouts will learn to identify and classify rocks and minerals by their properties.

### Vocabulary

- Geologist
- Classification
- Characteristics
- Opaque
- Translucent

## Information and Procedure

### Materials needed

- Small cups or bag to hold Jelly Bellies
- Jelly Bellies (see the Jelly Belly Key for flavors)
- Jelly Belly key and Rock Key
- Alaska Rock and Mineral Collection (**40-specimen set can be checked-out at your local Girl Scouts office**)

### What to do in advance

Copy the attached handouts for the Girl Scouts. In each small cup, put 1 of each flavor of Jelly Belly.

### Gear up

1. Discuss prior knowledge of rocks and minerals to gauge how much introduction or review to include in the lesson. Let them describe a favorite rock they have by using one or two descriptive words.
2. Explain the term “geologist.” A geologist is a scientist who studies the solid and liquid matter that constitutes the Earth.

### Explore

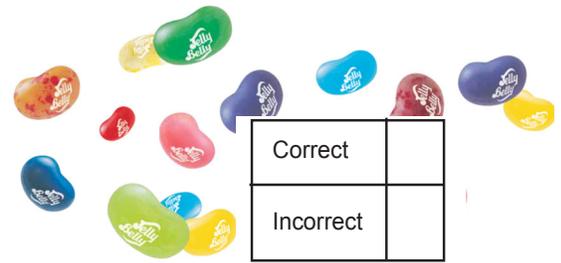
1. Hand out the Jelly Bellies and Keys for the Girl Scouts. Instruct Girl Scouts to NOT EAT the Jelly Bellies because they are the rocks that they are going to classify and identify.
2. Have the Girl Scouts start with the color of the Jelly Bean and follow the lines that most appropriately describe their Jelly Belly until they reach the flavor. Have them continue until all their Jelly Bellies have been classified.

3. When finished, have the Girl Scouts taste test their Jelly Bellies to see if they matched it with the correct flavor. Have them tally their answers as correct or incorrect and log it in the box on the Jelly Belly Key.
4. Discuss that geologists are not always accurate in their assessments. Rocks can have many similar characteristics but still be different. It is important for geologists to conduct several types of tests and to repeat their work to make sure they are accurate. A mistake in real life could cost millions of dollars to the company.
5. Have Girl Scouts partner up. Show them the Alaska Rock and Mineral Kit and explain that these are materials that are mined currently or historically in Alaska. Pull out the rocks listed on the Rock Key and hand one or two out (depending on class size) to each pair. Be sure to keep the lid of the Rock Key with you as they contain the answers.
6. Instruct the Girl Scouts to classify their rock samples from the rock kit using the Rock Key. Have them write their answer next to their rock on a sheet of paper. Confirm with them if they matched the correct rock with the name.

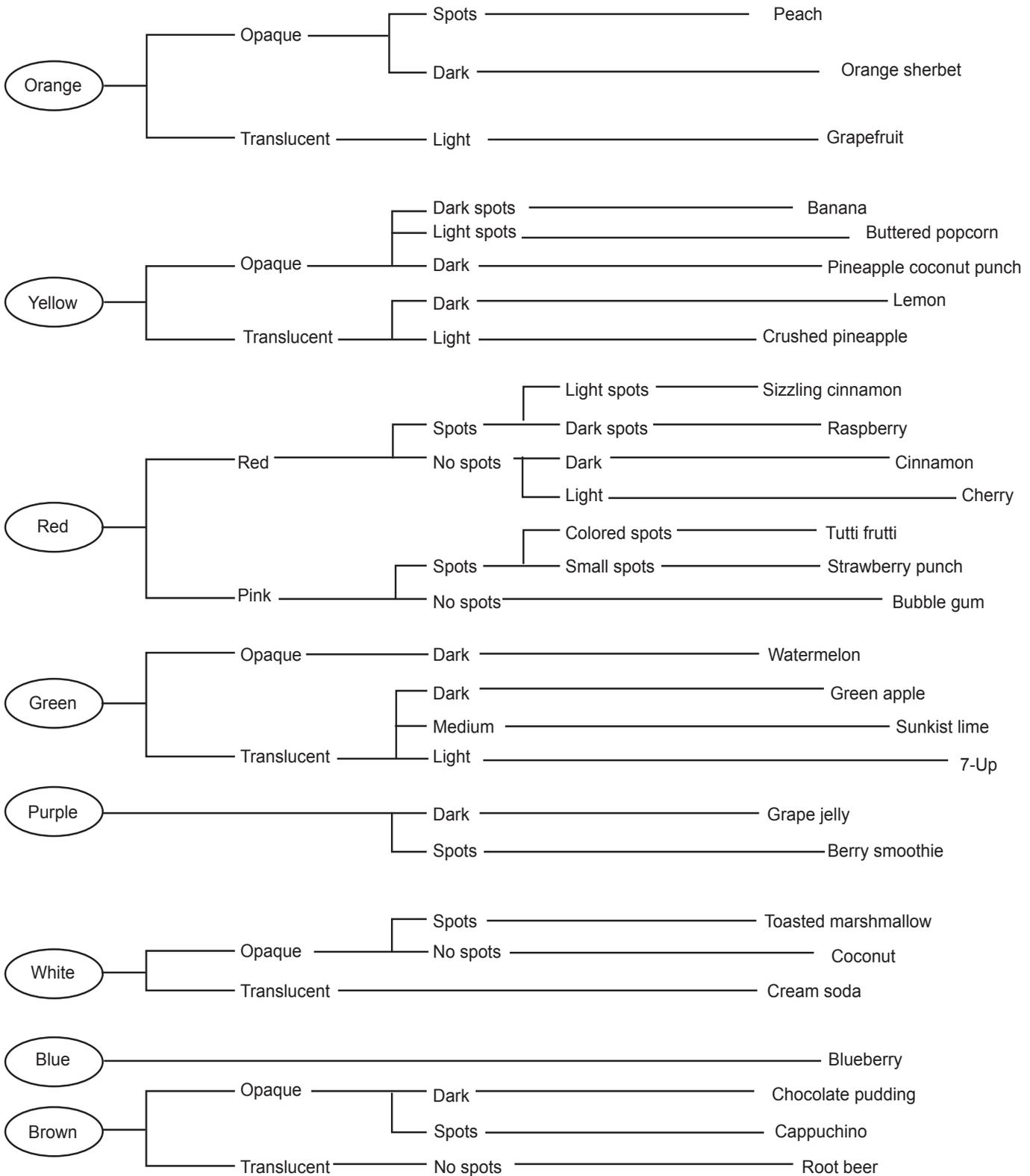
### Generalize

- What were some of the observable characteristics that helped you to identify one rock/mineral out of many?
- Why might it be important for scientists and geologists to observe and describe things carefully?
- What makes it difficult to identify one rock from another?

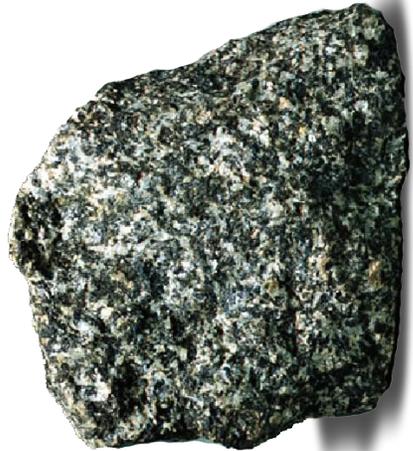
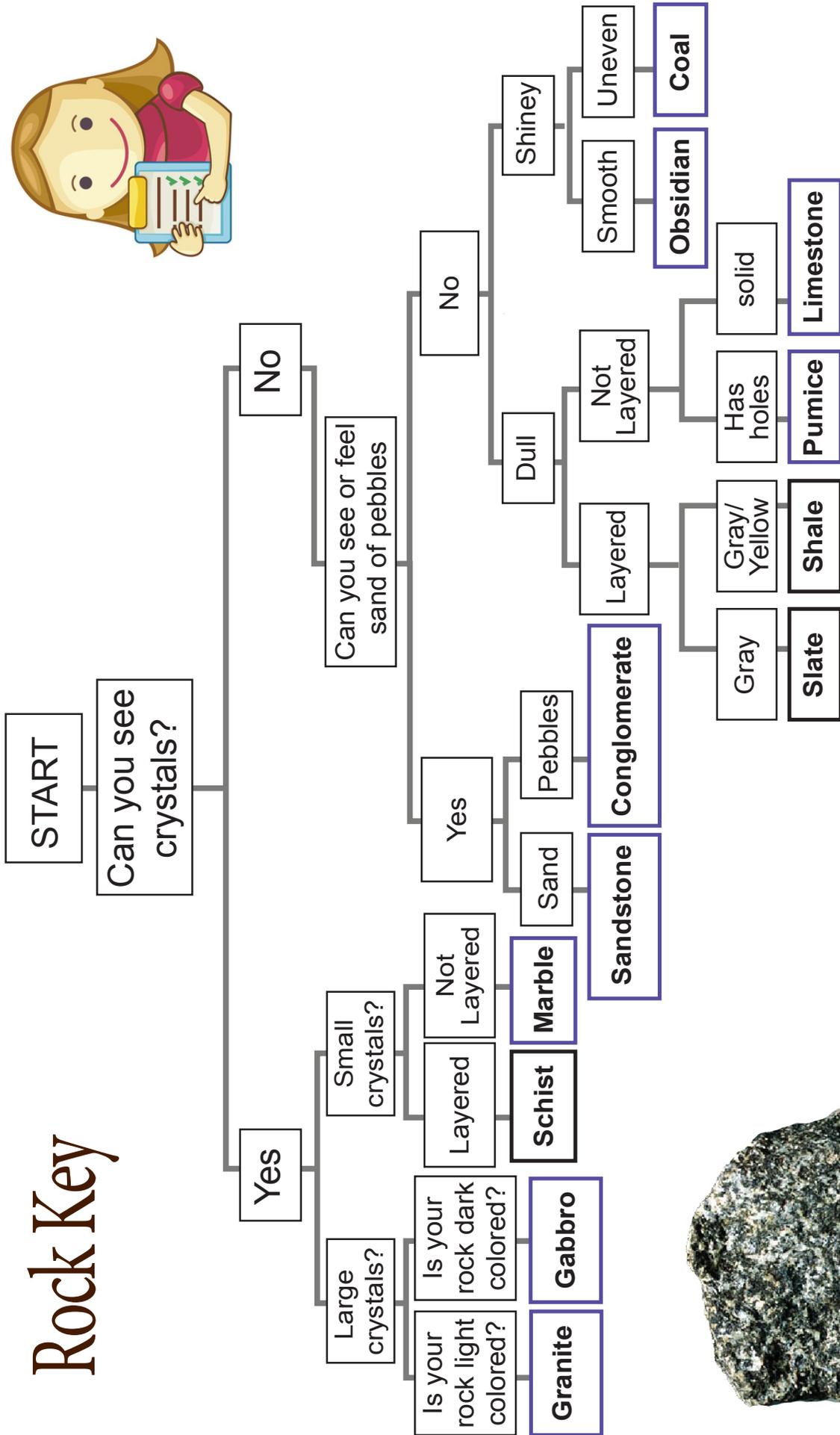
# Jelly Belly Geology Key



Correct	
Incorrect	



# Rock Key



# WHERE DO MINERALS COME FROM?

## Mine a Cookie

Essential Question: What is mining like and how does it work?



**Time: 1 hour**

Girl Scouts “mine” cookies to determine their “mineral” value

### Vocabulary

- Profit
- Mining
- Milling
- Reclamation
- Ore
- Extraction

### Information and Procedure

#### Materials needed (1 per student)

- cookie
- price chart
- tally sheet
- flat toothpicks
- popsicle stick
- plastic spoons
- plastic forks
- napkins
- small paper plates
- frosting

#### What to do in advance

- Use cookies that have at least 1 different “mineral” (nuts, chocolate chips, raisins, etc.) in it. (Softer cookies work better than hard ones.)
- Adjust the price chart and tally sheet based on the type of cookie you are using. Give the “minerals” which may be rarer a higher value than the others.

#### Gear up

Discuss what mining means and where mining happens in Alaska. Use a map to locate the active mines in the state.

#### Explore

1. Tell the Girl Scouts they will be “mining” their cookie for “minerals”. Tell them they may not eat their cookie until after they have mined it.
2. Review the price sheet.
3. Cover the cookies with frosting. Have Girl Scouts predict the type and amount of each mineral they will find in the “mine”. This is true to real life. Miners don’t know what is underground until they actually start digging; they can only predict.
4. Have Girl Scouts choose mining tool(s): a toothpick, popsicle stick, spoon, or fork. If they break their tool, they have to get a new one. They may NOT use their hands.

5. Have them try to extract the “minerals” from their cookie and place them on a plate. Once they have mined, tell them they must “mill” the mined material (ore) to concentrate the valuable minerals more. They do this by taking off as much cookie off the “mineral” as possible. Milling in real life separates the earth from the valuable minerals.
6. The clump of mined material (dough and “minerals”) is known as the “ore” and the leftovers are called the tailings. Girl Scouts “mill” their ore to get the minerals out.
7. After the “minerals” have been milled, Girl Scouts tally their totals. For older girls, you may want to add the concept of profit or loss and tell them they are starting off with a certain amount of debt and they have to make more than that to make a profit.
8. Tell Girl Scouts they must put their cookie back together as best they can without the minerals they mined, before they eat it. This is called reclamation.

#### Generalize

Compare the predictions and actual amounts mined. Were some of the cookies more valuable than others? How do you think this compares to the way that minerals are really mined? What are some of the things that miners have to pay for to get minerals?

#### Change it up!

Use colored frosting and/or sprinkles to create wetlands, parks, or preserves on the surface of the cookie. These must not be disturbed when mining. Instead of using food, make the mining cookie from clay, mud, gravel and objects like marbles, buttons, etc.



## MINE A COOKIE | Profit Analysis Sheet

### COST:

Land Lease		Cost
Half the Cookie		\$100
Whole Cookie		\$200
Equipment		Cost
Spoon		\$50
Fork		\$70
Toothpick		\$20
Land Lease	Cost	<div style="text-align: center;"> <h2 style="margin: 0;"><u>PERMIT</u></h2> <p style="margin: 5px 0;"><i>Regulator Signature</i></p> </div>
Equipment Items	Cost	
Reclamation	\$50	
<b>TOTAL</b>	<b>\$</b>	

### INCOME:

Item	Value
Chocolate Chips	\$200
# <i>Chocolate Chips</i> x \$200	

### PROFIT:

Income - Costs = Profit

..... - ..... = .....

# WHAT ARE MINERALS?

## The Rock Game

Essential Questions:

What are properties of rocks and minerals?

How and why do scientists describe things?



### Time: About 1-2 hours

Girl Scouts describe rocks in detail using new and common terminology in a game where teams try to identify the rock being described.

## Information and Procedure

### Materials needed

- 30-70 rocks of any kind
- Paper
- Markers

### What to do in advance

Set up Girl Scouts in stations of 2-4 girls each. Place 4 rocks, paper, and markers at each station, and assign 1 girl to be the recorder.

### Gear Up

Show rock samples to demonstrate vocabulary for describing rock properties:

- **Luster:** The way in which the surface of a mineral reflects light. Show samples of obsidian (glassy), talc (dull), pyrite or galena (metallic), graphite (waxy).
- **Texture:** General appearance of the rock surface in terms of its minerals or crystals. Show samples of gabbro, granite (coarse) halite, shale (fine), obsidian (smooth).
- **Stratification:** The accumulation of material as layers in rocks. “Stratified” is another term for “layered”. Sandstone or shale may or may not show stratification. If not, try to find a layered rock.

**Composition:** Describes “ingredients” of the rock. Girl Scouts will describe this in terms of what they see in the rock: Big white grains, black shiny grains, little

### Vocabulary

- Luster
- Texture
- Stratification
- Composition
- Classification

holes, white veins, etc. Conglomerate, granite, and other rocks can describe composition.

Encourage Girl Scouts to use other, more familiar terms for describing the rock samples. Describe the color, the way it feels (soapy, rough), or whether it is heavy or light. To prepare for future identification and classification of rocks, it is helpful if Girl Scouts don’t use “size” as a descriptor. Discuss the idea that smaller rocks come from the breaking and weathering of larger rocks as part of the rock cycle. Have the research groups replicate each others’ experiments.

### Explore

1. Have each group secretly select one rock from their station. Tell them to hide this from the other groups. Give them 5-10 minutes to write adjectives describing their rock on paper.
2. Switch stations and have each group read the previous group’s description and try to guess the original group’s rock. Give the reading group 5 minutes to come to a consensus.
3. Have each group present which rock they think was described by the previous group. Which clues helped them most?

### Generalize

What did all of the rocks have in common? What were some of the characteristics that helped you identify each rock? Why might it be important for scientists to observe and describe things carefully? Why do rocks sometimes have the same characteristics, even though their sizes and shapes are different?