

LETTER TO PARENTS

Cut here and paste onto school letterhead before making copies.

SCIENCE NEWS

Dear Parents,

Our class is beginning a new science unit using the **FOSS Earth Materials Module**. We will investigate a selection of the most common rocks and minerals that make up Earth's crust, and learn some techniques used by geologists to identify them.



Geology requires analysis. To develop analytical skills and techniques, we will first take apart a simulated rock called a Mock Rock. We will observe them, break them apart, dissolve them in water, and evaporate the liquid to discover the ingredients from which our rocks are made. We will then move on to real **rocks and minerals**, using scratch tools and acid (vinegar) to test for specific minerals. Finally we will look at granite, the base rock from which continents are made, and analyze it to discover the minerals it contains.

You can increase your child's understanding and interest in earth materials by asking him or her to talk about the investigations we are doing at school. Rocks, which appear so commonplace, may become objects that inspire questions and promote close observation. You and your child may want to start a rock collection, or visit the library or (if possible) a rock and mineral display to expand your rock and mineral knowledge. A visit to a landscape materials center or a jewelry store (gems are minerals) can expose the broad range of uses for earth materials.

Watch for Home/School Connections sheets that I will be sending home from time to time. These activities describe ways the whole family can look more closely at rocks and minerals around your home. Your child will be asked to bring a rock or mineral to class for a few weeks to begin a class collection. He or she may choose to bring a special sample you picked up on a family outing, or a rock collected right around the neighborhood.

We're looking forward to weeks of fun with rocks and minerals! If you have questions or comments, or have expertise you would like to share with the class, please drop me a note.

Comments: _____

MATERIALS ASSEMBLY PROCEDURES

MOCK ROCK RECIPE

IMPORTANT:

Make mock rocks 1 WEEK BEFORE starting the activity. Allow them to air dry to become hard. Make one mock rock for each pair of students. Alum, sand, gravel, and oyster shells are in the kit.

INGREDIENTS

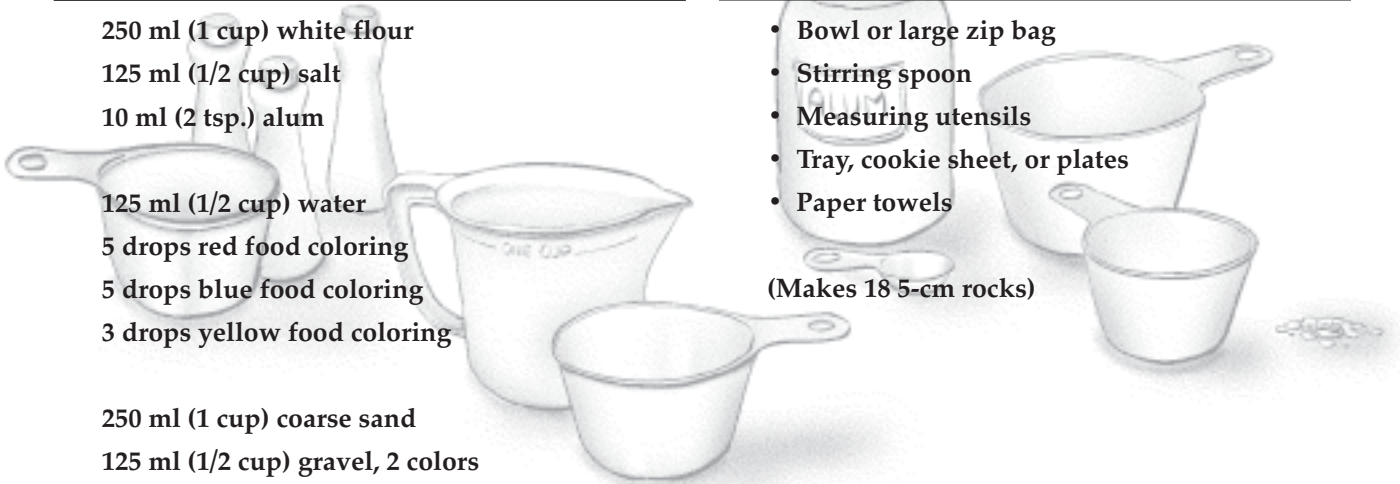
- 250 ml (1 cup) white flour
- 125 ml (1/2 cup) salt
- 10 ml (2 tsp.) alum
- 125 ml (1/2 cup) water
- 5 drops red food coloring
- 5 drops blue food coloring
- 3 drops yellow food coloring

- 250 ml (1 cup) coarse sand
- 125 ml (1/2 cup) gravel, 2 colors
- 30 ml (1/8 cup) oyster-shell pieces

EQUIPMENT

- Bowl or large zip bag
- Stirring spoon
- Measuring utensils
- Tray, cookie sheet, or plates
- Paper towels

(Makes 18 5-cm rocks)



MAKE THE MOCK ROCKS

1. Mix the flour, salt, and alum in the bowl or large zip bag.
2. Add the food coloring to the 1/2 cup of water.
3. Add the colored water to the flour mixture. Knead the mixture until it is uniform in color and texture and no longer sticks to the side of the bag or bowl. (Add a *little* more water if the dough is crumbly.)
4. Add the sand and the gravel to the mixture and knead until it is well mixed.
5. Divide the mixture into 18 balls, varying in size. Hold a rock ball in the palm of your hand, and with your thumb make a small hole in the center. Place 10–12 pieces of oyster shell in the hole and mold the dough around them.
6. Work the ball of dough in your hands, smoothing its surface. Flatten the rock so that it is 1–2 cm thick. (Thinner rocks dry more quickly.) Create a set of rocks that vary in size and shape by making each rock a little different.

7. Put the rocks on a plate or tray. Make sure the rocks do not touch each other. Place them in a warm area to dry. Turn them each day so they will dry thoroughly. It takes them about a week to dry, depending on the humidity.

- NOTE:** Do not put rocks in a microwave or electric oven; they get much too hard. Drying time can be reduced by placing the rocks in a traditional gas oven. Don't turn on the oven. The heat from the pilot light will dry the rocks in 24 hours.
8. Use a paper towel to wipe the sand and gravel pieces from the utensils so that the solid materials do not go down the drain.

TEST THE MOCK ROCKS

Break one of the rocks after 6 days to make sure they are thoroughly dry and hard, but not so hard that they can't be broken in half by hand and taken apart with the nail (the geologist's pick).

A large, stylized sunburst graphic with multiple curved rays emanating from a central point, rendered in a light gray color. The text 'EARTH MATERIALS NOTEBOOK' is centered over this graphic.

EARTH MATERIALS NOTEBOOK

Name _____

TAKE IT FOR GRANITE PAGE 14

MICA

Color _____

Hardness: Put a check (✓) after the tools that can scratch mica.

fingernail _____ penny _____ paper clip _____

Other observations

HORNBLLENDE

Color _____

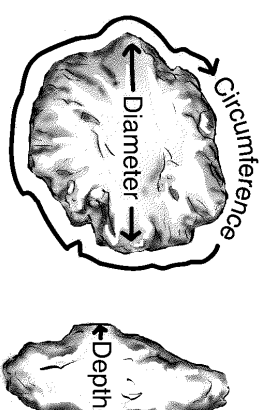
Hardness: Put a check (✓) after the tools that can scratch hornblende.

fingernail _____ penny _____ paper clip _____

Other observations

MOCK ROCKS PAGE 3

MOCK ROCK MEASUREMENTS DIMENSIONS



1. Diameter _____

Tool used _____

2. Circumference _____

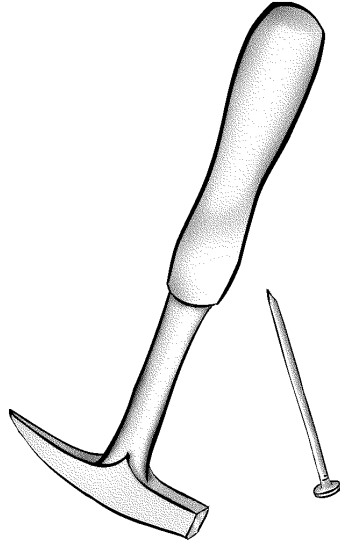
Tool used _____

3. Depth _____

Tool used _____

4. Other measurements _____

MOCK ROCKS PAGE 4



Observations about taking rocks apart with a "pick"

I have evidence to show the mock rocks contain these "minerals."

TAKE IT FOR GRANITE PAGE 13

FELDSPAR

Color _____

Hardness: Put a check (✓) after the tools that can scratch feldspar.

fingernail _____ penny _____ paper clip _____

Other observations

QUARTZ

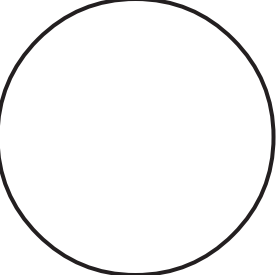
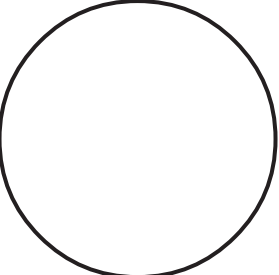
Color _____

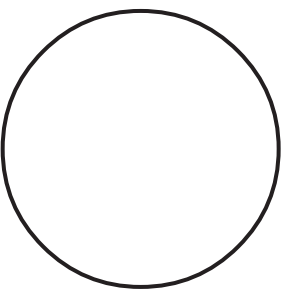
Hardness: Put a check (✓) after the tools that can scratch quartz.

fingernail _____ penny _____ paper clip _____

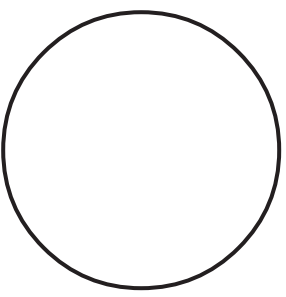
Other observations

EVAPORATION RESULTS _____

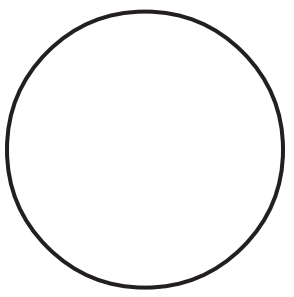
 Calcite	 Vinegar
--	--



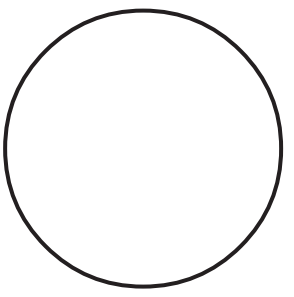
Basalt



Limestone



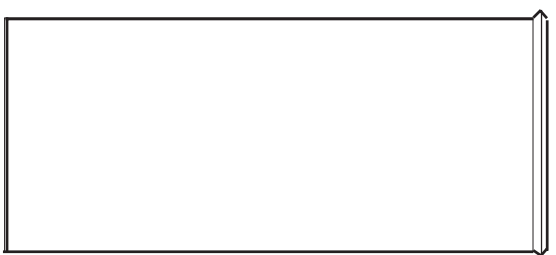
Marble



Sandstone

Put a check (✓) in the box next to the rocks that you are sure contain calcite.

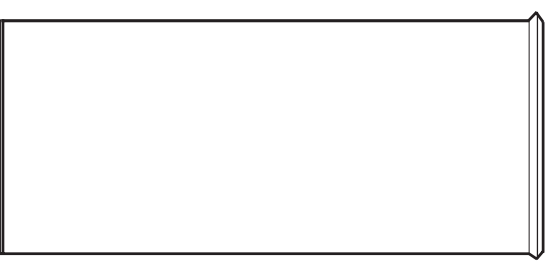
ROCKS IN WATER



Observations after shaking

Date: _____

Observations after settling



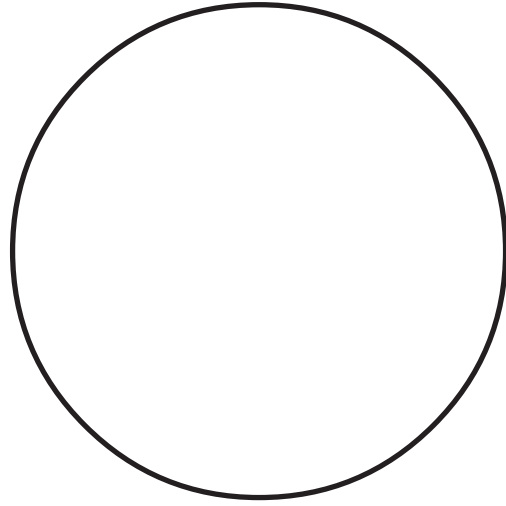
Date: _____

Date _____

MOCK ROCKS PAGE 6

EVAPORATING DISH

Draw what you see in your evaporating dish.



Explain what you see and how it got there.

Date _____

CALCITE QUEST PAGE 11

VINEGAR TEST

What did you observe when you put each rock in vinegar?
Write your observations below.

Calcite	
Basalt	
Limestone	
Marble	
Sandstone	

Put a check (✓) by the rocks that you think contain calcite.

CALCITE QUEST **PAGE 10**
PROPERTIES

BASALT	

LIMESTONE	

MARBLE	

SANDSTONE	

MOCK ROCKS **PAGE 7**
MOCK ROCK RECIPE

<p>MOCK ROCK MINERAL INGREDIENTS</p> <p>There is evidence to show all of the “minerals” listed below are in mock rocks.</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>
--

How is a mock rock like a real rock?

Date _____

SCRATCH TEST.....PAGE 8

PROPERTIES

MINERAL 1	
------------------	--

MINERAL 2	
------------------	--

MINERAL 3	
------------------	--

MINERAL 4	
------------------	--

Date _____

SCRATCH TEST.....PAGE 9

HARDNESS

MINERAL	TOOL			How many tools could scratch this mineral?
	Paper clip	Penny	Fingernail	
1				
2				
3				
4				

List the minerals in order of hardness.

(Hardest)

Name _____

Date _____

RESPONSE SHEET

MOCK ROCKS

A student wrote in her journal, "A rock is like a chocolate chip cookie." What do you think she meant when she wrote that sentence?

Name _____

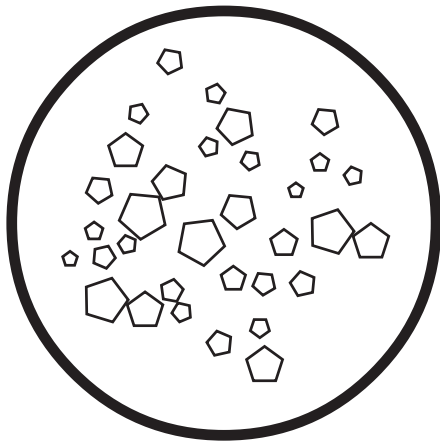
Date _____

RESPONSE SHEET

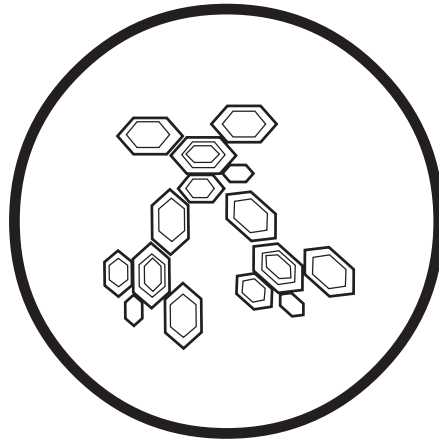
MOCK ROCKS

A student wrote in her journal, "A rock is like a chocolate chip cookie." What do you think she meant when she wrote that sentence?

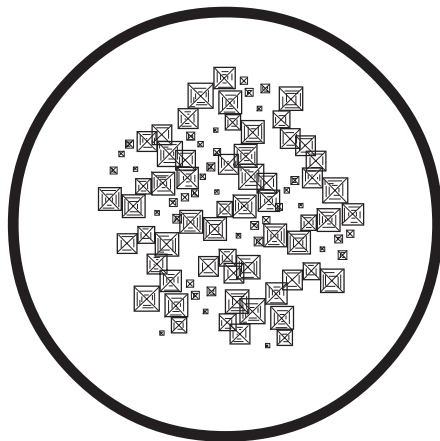
CRYSTAL IDENTIFICATION KEY



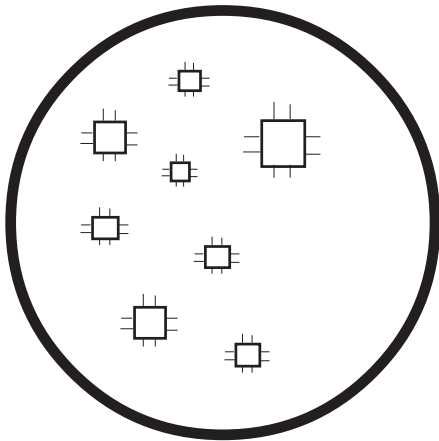
EPSOM SALT



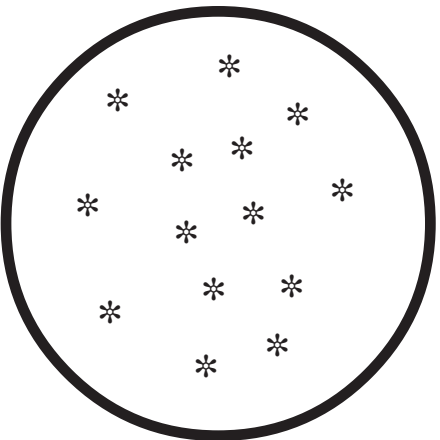
SODIUM THIOSULFATE



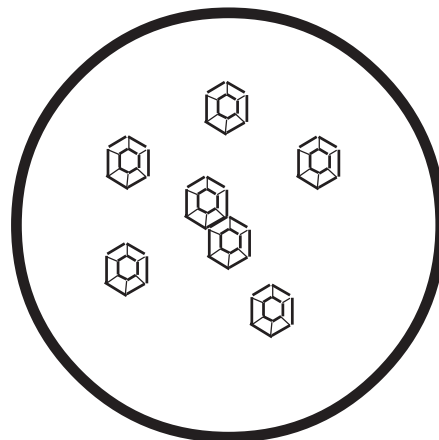
KOSHER SALT



SEA SALT



CITRIC ACID

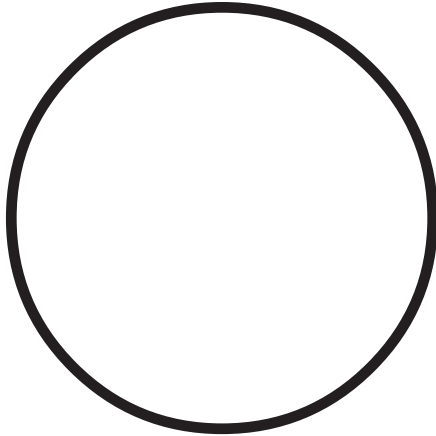


ALUM

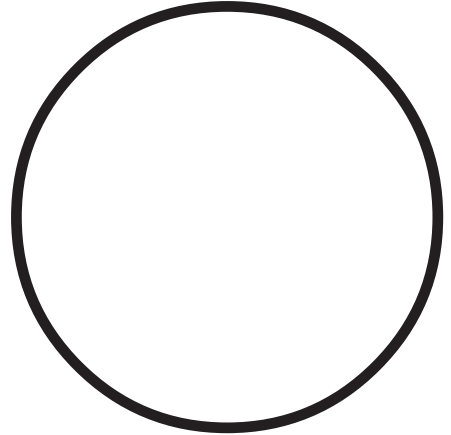
SCRATCH TEST

MINERAL IDENTIFICATION SHEET

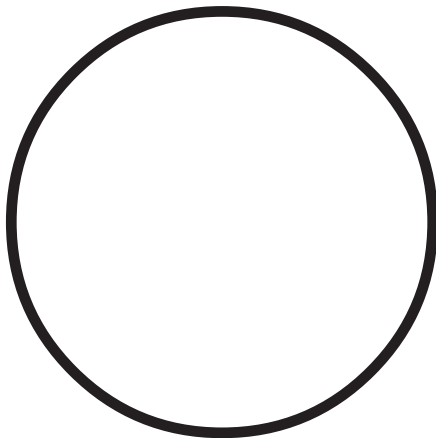
#1



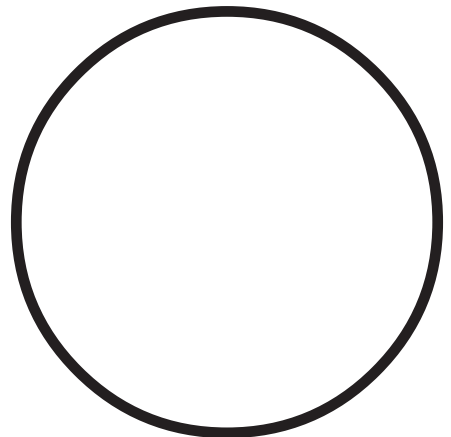
#2



#3



#4



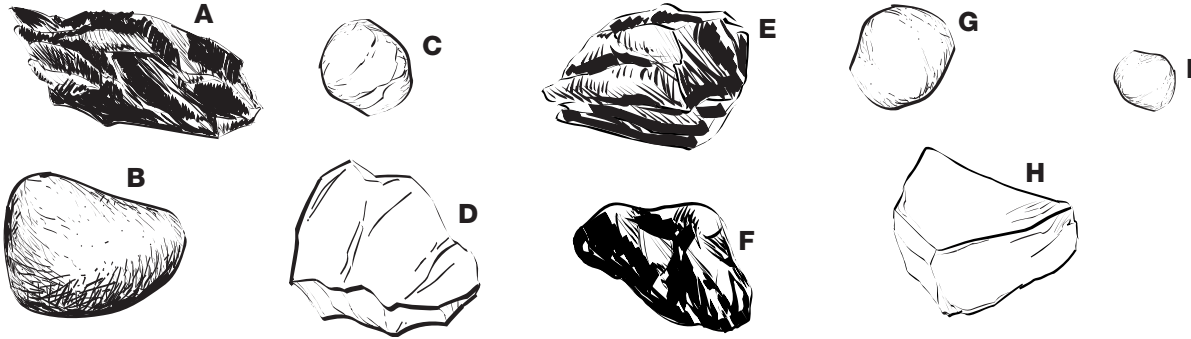
Name _____

Date _____

FOSS EARTH MATERIALS MODULE

MINERAL PROPERTIES

Look at the pictures of the minerals below.



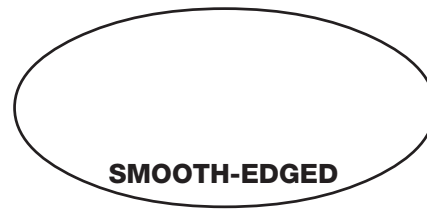
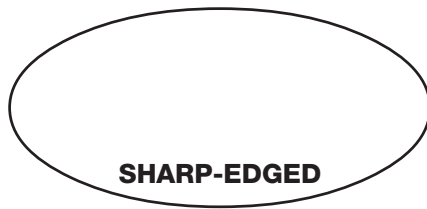
TASK 1

Use the letters by the minerals to show which minerals could be placed in each group.



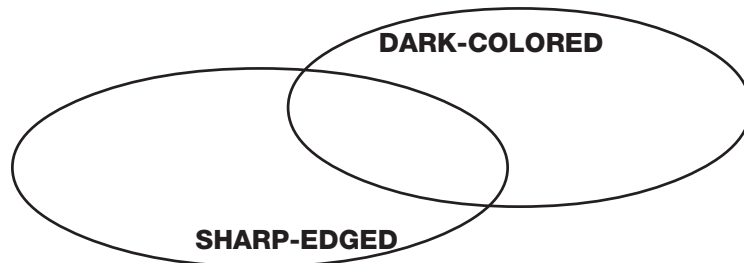
TASK 2

Use the letters by the minerals to show which minerals could be placed in each group.



TASK 3

Use the letters by the minerals to show which minerals could be placed in each group. Think carefully where you would put minerals that have more than one property.



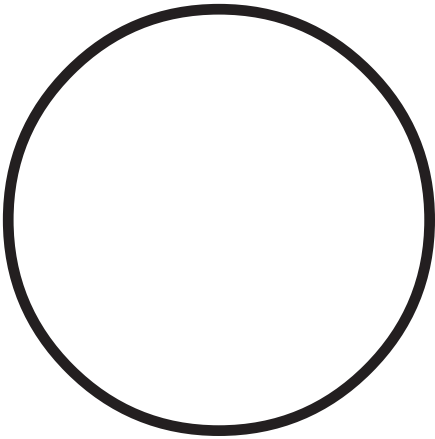
TASK 4

On the back of this sheet, explain how you decided where to put the letters for task 3.

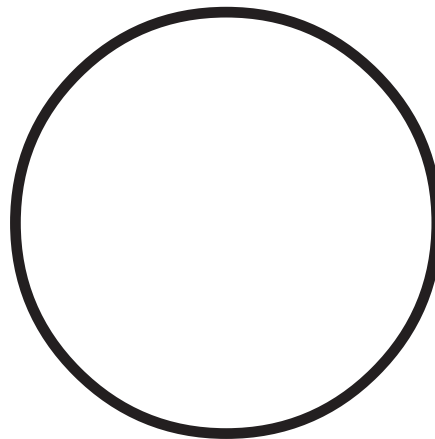
CALCITE QUEST

ROCK IDENTIFICATION SHEET

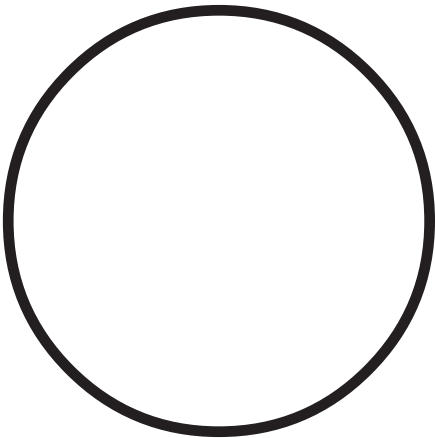
BASALT



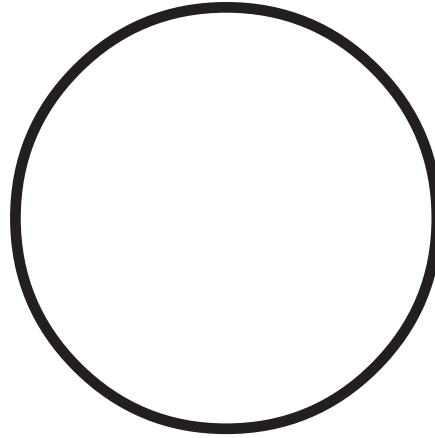
LIMESTONE



MARBLE



SANDSTONE



TAKE IT FOR GRANITE

ROCK AND MINERAL IDENTIFICATION SHEET

GRANITE



CALCITE



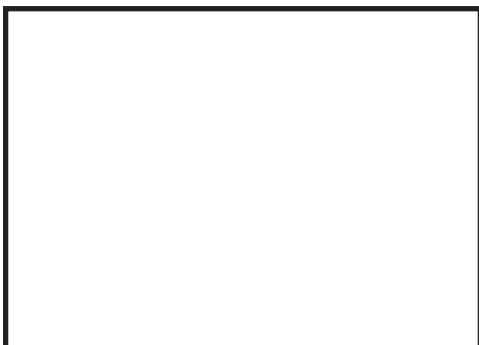
HORNBLLENDE



MICA



FELDSPAR



QUARTZ



FOSS EARTH MATERIALS MODULE

PROJECT IDEAS

- Make a batch of cookie rocks to share with the class. Be sure to list the “minerals” you used to make the cookie rocks.
- Bring in your own rock and mineral collection. In your presentation be ready to tell the class about each sample.
- Write a letter to the U.S. Geological Survey. See the teacher for the address and what to order.
- Interview a geologist. Write a list of questions, then interview a geologist in person or over the phone. Tell what you learn to the class.
- Seriate a set of rocks or minerals by a property such as weight, diameter, circumference, or other property. Explain your methods to the class.
- Research the Mohs’ scale. Make a poster to show a mineral for each hardness, 1 through 10.
- Find some other rocks that you can test for calcite. Show what rocks you used, how you tested them, and what your results were.
- Use warm vinegar to see if you get different results in the fizz test.
- Check with the U.S. Department of Agriculture or a garden supply company to find out how limestone and its products are used in farming.
- Research the uses of Portland cement. What is it and how is it used?
- What is your state rock or mineral? Why was that one selected?
- Each county has a Natural Resources Conservation Service unit, part of the U.S. Department of Agriculture. Find out what information on local rocks and minerals is available from the NRCS.
- Take a survey around the neighborhood about how different earth materials are used for construction of buildings, sidewalks, roads, decoration, and so forth.
- Library Research. Find the answer to one of the questions below and present information to the class.
 - How do caves form?
 - How many forms of calcite are there?
 - How do rocks such as limestone and marble form?
 - What is a sinkhole? How does one form?
 - Where do geologists look for petroleum?
 - How are some of the rocks and minerals we studied used?
 - What is spelunking? Would you like to try doing it?
 - What is a fossil? What kinds of rocks are fossils found in?
 - Where is most of the basalt or granite on Earth?
- Look in the *Science Stories* or books in the library for ideas about projects you might like to present to the class.
- What kind of rocks and minerals were found on the moon?

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking you will see the *green card* held up. When you see the *yellow card*, you have 30 seconds left. When you see the *red card*, it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

PRESENTATION GUIDELINES

You will have exactly 3 minutes to present your project to the class. In those 3 minutes you should answer these questions.

- What were you trying to find out (your question)?
- What materials or references did you need to do your project?
- What procedure did you follow to complete your project?
- What did you learn from doing your project?

When you begin speaking you will see the *green card* held up. When you see the *yellow card*, you have 30 seconds left. When you see the *red card*, it means you can finish your sentence, but you must stop within the next few seconds.

Practice your presentation so you will be sure it is at least 2 1/2 minutes long, but not more than 3 minutes long. Be sure you have included all of the information asked for above.

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 1: MOCK ROCKS

On his vacation Jay hunted for special rocks for his collection. On the first day he found two rocks. The next day he found four rocks. On each day of his vacation Jay found two more rocks than he had found the day before. On what day did Jay have 42 rocks in his collection?

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 2: SCRATCH TEST

Cheryl and Vincent were testing minerals for their hardness. After working all day they had tested 57 minerals. Cheryl tested nine more minerals than Vincent. How many minerals did each student test?

Name _____

Date _____

MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 3: CALCITE QUEST

Josiah and Parisa were playing a game. They had agreed that, at the end of each round, the loser would give the winner a rock from his or her collection. After playing the game for a while, Josiah had won three games. Parisa had three more rocks than she did when they began. What is the fewest number of rounds they could have played?

Name _____

Date _____

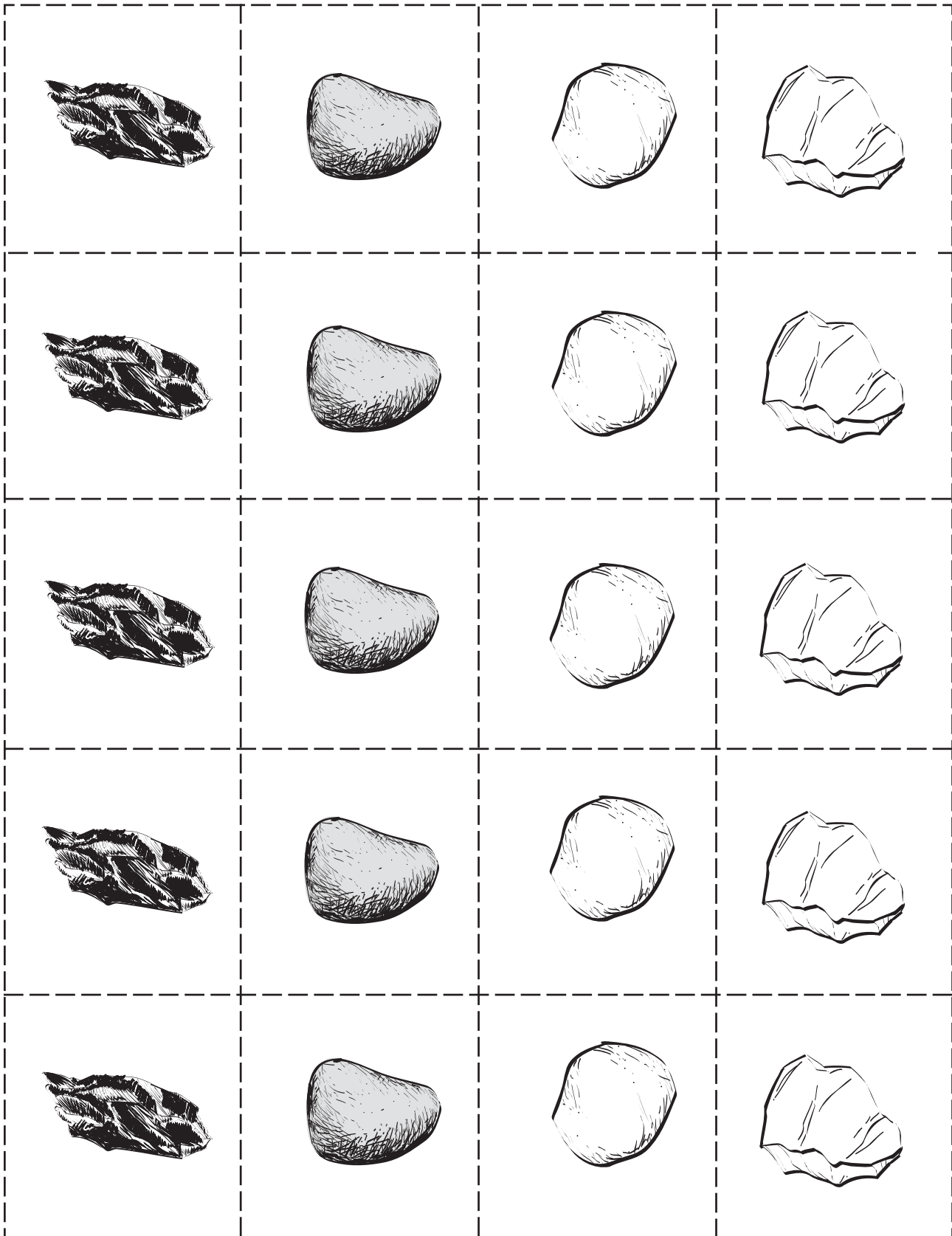
MATH EXTENSION—PROBLEM OF THE WEEK

INVESTIGATION 4 TAKE IT FOR GRANITE

Anders, Catherine, Dustin, Yelda, Rocky, and Maren are rock collectors. Each collector has chosen some rocks from his or her collection to trade. Each collector is going to trade with every other collector. How many different pairs of collectors will trade with each other?

ROCK PICTURE CARDS FOR ROCK LINEUP

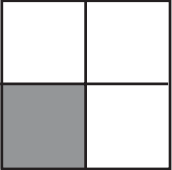
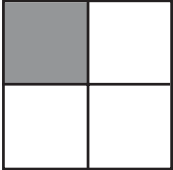
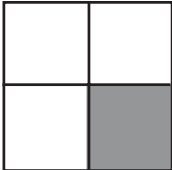
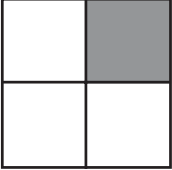
(CUT AND COLOR ONE SET FOR EACH GROUP)



COLOR THIS COLUMN OF ROCKS RED.

ROCK LINEUP #1

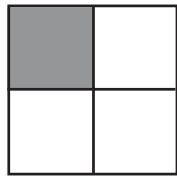
(CUT CARDS APART)

 <p>ROCK LINEUP #1</p>	<p>THERE ARE FIVE ROCKS IN LINE.</p>
 <p>ROCK LINEUP #1</p>	<p>TWO ROCKS ARE RED. TWO ROCKS ARE WHITE. ONE ROCK IS BLACK.</p>
 <p>ROCK LINEUP #1</p>	<p>A RED ROCK IS IN THE FRONT OF THE LINE. TWO WHITE ROCKS ARE AT THE BACK OF THE LINE.</p>
 <p>ROCK LINEUP #1</p>	<p>A RED ROCK IS IN THE MIDDLE OF THE LINE.</p>

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

ROCK LINEUP #2

(CUT CARDS APART)



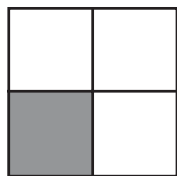
ROCK LINEUP #2

**ONE WHITE ROCK IS FIRST
IN LINE. ONE WHITE ROCK
IS LAST IN LINE.**



ROCK LINEUP #2

**TWO BLACK ROCKS ARE
JUST BEHIND TWO GRAY
ROCKS IN THE LINE.**



ROCK LINEUP #2

**THERE ARE TWO RED
ROCKS, TWO WHITE ROCKS,
TWO GRAY ROCKS, AND
TWO BLACK ROCKS IN LINE.**



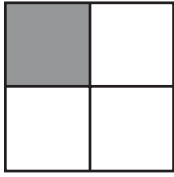
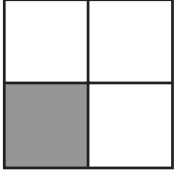
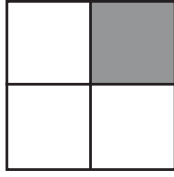
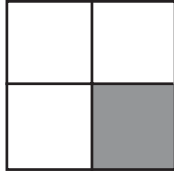
ROCK LINEUP #2

**TWO RED ROCKS ARE JUST
IN FRONT OF TWO GRAY.**

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

ROCK LINEUP #3

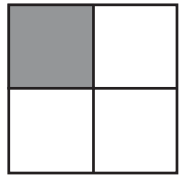
(CUT CARDS APART)

 <p>ROCK LINEUP #3</p>	<p>ONE GRAY ROCK IS AT THE FRONT OF EACH LINE.</p>
 <p>ROCK LINEUP #3</p>	<p>THERE ARE TWO LINES OF ROCKS. THERE ARE FIVE ROCKS IN EACH LINE.</p>
 <p>ROCK LINEUP #3</p>	<p>A WHITE ROCK IS AT THE BACK OF ONE LINE. A GRAY ROCK IS AT THE BACK OF THE OTHER LINE.</p>
 <p>ROCK LINEUP #3</p>	<p>IN ONE LINE, A RED ROCK IS BETWEEN TWO BLACK ROCKS. IN THE OTHER LINE, A BLACK ROCK IS BETWEEN TWO RED ROCKS.</p>

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

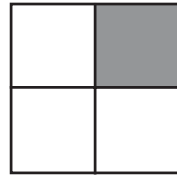
ROCK LINEUP #4

(CUT CARDS APART)



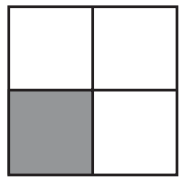
ROCK LINEUP #4

THREE GRAY ROCKS ARE AT THE FRONT OF ONE LINE.



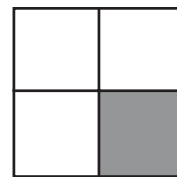
ROCK LINEUP #4

FOUR RED ROCKS ARE AT THE BACK OF ONE LINE.



ROCK LINEUP #4

THERE ARE TWO LINES OF ROCKS. THERE ARE SEVEN ROCKS IN EACH LINE.



ROCK LINEUP #4

IN ONE LINE, THERE ARE THREE BLACK ROCKS AND FOUR WHITE ROCKS. EACH BLACK ROCK IS JUST BEHIND A WHITE ROCK.

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

ROCK LINEUP #5

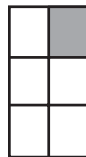
(CUT CARDS APART)



ROCK LINEUP #5

THERE ARE FOUR GROUPS OF ROCKS. THERE ARE FOUR ROCKS IN EACH GROUP.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #5

THERE ARE FOUR RED ROCKS, FOUR GRAY ROCKS, FOUR WHITE ROCKS, AND FOUR BLACK ROCKS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #5

ONE GROUP HAS TWO GRAY ROCKS. ONE GROUP HAS TWO RED ROCKS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #5

EACH GROUP HAS EXACTLY ONE WHITE ROCK.

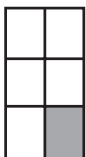
PUT THE ROCKS IN GROUPS!



ROCK LINEUP #5

ONE GROUP HAS ONLY BLACK AND WHITE ROCKS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #5

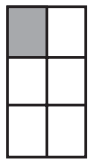
ONE GROUP HAS A ROCK OF EACH COLOR.

PUT THE ROCKS IN GROUPS!

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

ROCK LINEUP #6

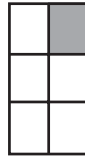
(CUT CARDS APART)



ROCK LINEUP #6

THERE ARE FIVE GROUPS OF ROCKS. EACH GROUP HAS THREE ROCKS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #6

THERE ARE FIVE RED ROCKS, FOUR GRAY ROCKS, THREE WHITE ROCKS, AND THREE BLACK ROCKS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #6

IN ONE GROUP ALL THE ROCKS ARE RED.

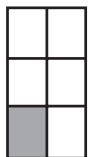
PUT THE ROCKS IN GROUPS!



ROCK LINEUP #6

TWO GROUPS LOOK THE SAME.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #6

BLACK ROCKS ARE FOUND IN THREE GROUPS.

PUT THE ROCKS IN GROUPS!



ROCK LINEUP #6

EVERY GROUP WITH A BLACK ROCK ALSO HAS A WHITE ROCK.

PUT THE ROCKS IN GROUPS!

NOTE: EACH GROUP NEEDS FIVE ROCKS OF EACH COLOR: RED, WHITE, GRAY, AND BLACK.

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 2: SCRATCH TEST

BIRTHSTONES

Tell your family what you learned about birthstones from the FOSS Science Stories book. Tell them about the difference between rocks and minerals.

Ask family and friends when their birthday is and see if they know their birthstone. (If they don't, you can tell them!) Then complete the chart below and make a bar graph to show which month among your family and friends has the most birthdays.

Month	Birthstone	Name of person	Birthday month
January	Garnet	1. _____	_____
February	Amethyst	2. _____	_____
March	Aquamarine	3. _____	_____
April	Diamond	4. _____	_____
May	Emerald	5. _____	_____
June	Alexandrite	6. _____	_____
July	Ruby	7. _____	_____
August	Peridot	8. _____	_____
September	Sapphire	_____	_____
October	Opal	_____	_____
November	Topaz	_____	_____
December	Turquoise	_____	_____

Garnet	Amethyst	Aquamarine	Diamond	Emerald	Alexandrite	Ruby	Peridot	Sapphire	Opal	Topaz	Turquoise

Name _____

Date _____

HOME/SCHOOL CONNECTION

INVESTIGATION 4: TAKE IT FOR GRANITE

EARTH MATERIALS HUNT

Use the clues to find items around your house that are made of earth materials.

1. See if you can find something made from bauxite. Bauxite (aluminum) can be refined into a very thin metal good for packaging liquids. _____

2. See if you can find something beautiful that someone might wear, made from an earth material. _____

3. Sometimes people use earth materials to make lamps and other decorative items for the home. Can you find something? _____

4. Look at the thermometer you use to find out if you have a fever when you're sick. Which part of the thermometer do you think is made from earth materials? _____

5. Look outside. Can you find something that you walk on everyday that is made from earth materials? _____

6. Can you think of a place that you have visited that had some interesting rocks or minerals? What is the name of the place? What was so interesting? _____

7. There is an earth material that most people eat all the time. Imagine that! Its mineral name is halite. It's shaped like little white cubes, and you use it a lot in cooking. _____