



Properties of Rocks
Grade K-2

BACKGROUND

This lesson centers on students making detailed observations of rocks. Through their observations, students will begin to develop an understanding that there are many types of rocks with a multitude of different attributes. Although students in the K-2 level are not yet ready to learn about the names of different kinds of rocks or the geological reasons for different rock formations, they are ready to understand that there are many sizes and shapes of rocks in our environment. They are able to recognize that our earth has sand, which is very small particles of rock; pebbles and small rocks that they may find in the dirt; and large mountains.

Taking students outdoors to view rocks in their natural surroundings is an ideal way to introduce the idea that rocks of various shapes and sizes are part of our earth. If it is possible, take your class outdoors and ask them to look for the different places they see rocks. To keep this lesson focused on the benchmark, ask them questions that help them consider the different rock sizes and shapes they see. (For example, there may be gravel in a parking lot, rocks large enough to sit on near a tree, and sand around a pond.) Since students have already begun thinking about some of the different attributes of rocks from their rock collections, this walk works well as a transition from thinking about rocks individually to thinking about them as part of our environment. If it is not possible to take an outdoor walk, try finding magazines and books with photographs of rocks to invite this kind of discussion.

BASIC LESSON

Objective(s)

Students will be able to...

- Observe rocks of various types and sizes and to record these observations through drawings.
- Sort rocks according to differing properties.

State Science Content Standard(s)

Standard 4. 2: Describe and measure the physical properties of the Earth's basic materials (including soil, rock, water, and gases) and the resources they provide.

- a. Identify that soil is made from rocks
- b. Identify that different rocks exist (color, texture)
- c. Compare and classify rocks based on color and texture

Materials

Safety

From the Kit

Provided by Teacher

- Nails
- 25 Pennies

- Each student needs an egg carton
- Plastic or paper bags for collecting rocks

- Please place the handheld lens back into the plastic

<ul style="list-style-type: none"> • 20 Handheld lens (See safety note) • 6 Toothbrushes • Sand Bucket (See safety note) • 8 Red cans • Student Balance • KWL Chart – binder or website • Rocks: Let's Take a Closer Look handout – binder or website • Sorting Challenge handout – binder or website • My Rock handout – binder or website • "Everybody Needs a Rock" by Byrd Baylor • Strawberry "weigh" basket • Fluorescent kit for Extension • UV light source – black bag 	<ul style="list-style-type: none"> • Fine Point Sharpie • Paper plates to put sand on. • Projector and computer to show Rocks http://sciencenetlinks.com/esheets/rocks/ • Small Paperclips • Extra rocks for students who do not bring enough 	<p>cover. This will help prevent the lens from scratching.</p> <ul style="list-style-type: none"> • Return the sand the plastic container.
Key Vocabulary		Mastery Questions
<ul style="list-style-type: none"> • Rocks • Soil • Texture • Color • Shape • Heavier • Lighter • Particle Size 		<ul style="list-style-type: none"> • See Lessons
Detailed Plan		
<p align="center">Activity 1 - Rock Hunters</p> <p>Engage Prior to this lesson have each student bring in an egg carton for their rock collection or cut them in half so students will only have to collect six rocks.</p> <p>Before they start collecting the rocks, have the students, as a class fill out a <u>KWL chart</u> (see KWL Handout – binder or website) or complete as a class on poster board (flip chart). Explain how this</p>		

chart can be used to organize information. Have the students fill out the first column – What Do I Know about rocks. Then have them fill out the second column – What Do I Want to know about rocks. The last column will be saved for the assessment. This can be done as a class activity at the end of the lesson.

Show them a rock and ask: “What do you know about rocks? What do they look like? What are some of their characteristics? Where do they come from?” “What else would you like to know about rocks?”

Exploration/Explanation

Begin by having students collect a variety of rocks. Read to the students “Everybody Needs a Rock” by Byrd Baylor. If it is possible, go for a rock hunt around the school. Each student can carry a bag for collecting the rocks that s/he finds. Tell them to collect DIFFERENT looking rocks and only 3 or 4 unless this is the only way the students will be able to obtain their rocks. Later in the lesson, students will measure their rocks with paper clip chains, so you may want to ask students to include at least one rock in their collection that is big enough to measure in this way. If a rock hunt is not feasible at your school, have students collect rocks near their homes and bring them into school. You may want them to collect half of the rocks at home and half on the rock hunt around school.

- Explain to students that together you are going to start a classroom rock collection and look at the characteristics of rocks.
- Each student will need an empty egg carton with their names on it to collect rocks in. These can be collected and brought to school by students prior to collecting rocks.
- Encourage students to bring in at least 10 different rocks. Assign a day when their rock collections need to be completed. Rocks collected on their School Rock hunt will count.
- Have extra rocks on hand for students who don't bring in their rocks on the appointed day.
- General rules of rock collecting (besides those stated in the Byrd Baylor book:
 1. Rocks should not be purchased from the store.
 2. Each rock should fit into a section of an egg carton.
 3. Ask permission before taking rocks from private property.
 4. Try to get rocks from different locations.
- When students bring in their rocks, allow them to clean them with an old toothbrush and water. They need to write their initials and a number, if possible, on them with a Sharpie marker and put them in the same numbered section of their egg carton.
- On the appointed day, have students get their rock collections and get together with a partner.
- Give each student a hand lens and a piece of paper.
- Have students observe and discuss the characteristics of their rock collections.
- Students should make a list of characteristics on their paper.
- After students have had time to observe their own rocks and make their list of characteristics, have students share their information and make a combined class list of characteristics of the class rock collection.

Activity2: Rock Sorting:

Engage

Have the students look at sand with hand lenses. On each table or station, place a small sample of sand on a paper plate so the students can observe the sand. Ask "Is each piece of sand the same shape, color, and size? Does it look like it is made of the same type of material?" Help students discover that sand is a lot of itty-bitty rocks and each piece of sand is different in shape, size, and color. Next, the students will look at their rock collections and determine the different characteristics between their rocks.

Exploratin/Explanation

- Have students get their individual rock collections and get in groups of 3-4 students.
- Give each student a copy of the *Rocks: Let's Take a Closer Look* (see web page or binder).
- Allow students time to sort their individual rock collections according to the information on the *Rocks: Let's Take a Look* paper.
- Have students share their individual rock sort with the other members in their group.
- Now, as a group have students make a collective sort of all of their rocks using the *Sorting Challenge* page (see web page or binder).
- Explain to the students how they can test for certain characteristics in their rocks. Show examples of what these characteristics will look like when students see them. (You do not need to do all of these. 1-3 would be fine for younger grades.)
 1. Hardness: Students can use their fingernail, a penny and a nail to scratch on their rock. Students then compare the hardness of their rock to the object that left a scratch on their rock. "My rock is harder than a penny but not as hard as a nail."
 2. Texture: Students can compare the texture of their rocks to smooth, slightly rough and very rough.
 3. Color: Students can sort according to colors.
 4. Particle Size: Students can test this by shaking their rocks in a small red metal can for a couple of minutes. The small bits of rock left in the can shows the particle size.
 5. Layering: Students sorts rocks according to the visible layers seen on the rocks. (No layers, colored layers, same layers, different layers, straight vs jagged layers)
- Give students time to test and sort their group rock collection in any way that their group chooses. They should only sort **by one characteristic at a time**.
- Each group should then explain how they sorted their rocks to the rest of the class.
- If time allows, let student groups sort their rocks again using a different characteristic.
- Take pictures of the groups; sorts so that students can see other's work and further class discussion can be made. These pictures can then be put on a bulletin board or in a PowerPoint to share with parents.
- Have each student make an illustration of one of his/her rocks that shows two different characteristics. Students should put as much detail and color in their pictures as they can. Have the students write a description of the rock they drew. Encourage students to share their illustrations and written descriptions with their partners or with the class if time allows.

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Activity 3: More Rock Sorting

Engage

Engage

Let students walk around and look at the rocks that their classmates collected. Once students have had a chance to look at all the rocks, encourage them to talk about the variety of rocks there are in their class collection. To give them an opportunity to view even more types of rocks, show students [Rocks \(http://sciencenetlinks.com/esheets/rocks/\)](http://sciencenetlinks.com/esheets/rocks/) esheet to view the Rocks slide show, which provides a visual array of rock types. Students can click on any of the ten choices provided to view different kinds of rocks.

Exploration/Explanation

Have students return to looking at their rock collections. Divide the class into small groups of 3-4. Ask each student to choose a different rock than they used in Activity 2 to bring to the small group (biggest rock would work best). Allow students time to look at each other's rocks. Give students hand lenses to allow for a closer inspection. Ask them to tell each other about their rocks.

Give each student the My Rock student sheet. Ask them to complete item #1.

Next, give each group a box of small paper clips. Show students how to link them together to make a paper clip chain. Ask them to make a chain that is long enough to fit around their rock. (If a student notices that the length of the last paper clip makes the chain a little longer than they need, but without it, it is not long enough, you can use language like, "Your rock is six paper clips and part of another around." This introduces the concept of whole and part without going beyond their cognitive level.) Have students record their measurement on their student sheet (item #2), and then document their measurement pictorially.

At this point, it would be helpful to bring students back together for a large group discussion about how these measurements help to describe their rocks. Talk with students about why they think people measure things. You might ask:

- What do you think people learn when they measure something?
- How do you think measuring something might be helpful?
- What did you learn about your rock when you measured it with paper clips?
- Did you each use the same number of paper clips? (Have students compare their paper clip chains to give them an opportunity to see the many different lengths they needed for their different rocks.)
- When you look at one of these paper clip chains, what does it tell you about the rock it measured?
- When you look at these paper clip chains (use two from the class to demonstrate), what do you know about the two rocks they measured?

So far, students have made observations and recordings about the shape, size, color, and circumference of their rock. To help them think about weight, allow students the opportunity to use a scale for weighing their rock. Many types of scales will work for this exploration, and, if you have more

than one kind of scale, students can “read” their rock’s weight in different ways. The goal of this exploration is for students to think about the fact that different rocks have different weights. Students can also experiment with weighing various combinations of rocks. To do this next part, use the student balance provided in the kit and if you do not have access to another scale, or are interested in making a scale from a few basic materials, see the *Making a Scale* at the end of this lesson in ExPloreMore. A strawberry basket is included in the kit if you want to use this along with the student balance. A food scale or balance would work well.

To respond to item #3 on the student sheet, have students weigh their rock (the same rock they have been examining throughout this exercise). Now ask students to find rocks from their collection that are lighter than this rock, then rocks that are heavier than this rock or they could compare the weight of their rock to the rocks of others in their group. They should place these rocks in the appropriate spaces in the table provided for item #3. If students in your group seem ready for another challenge, you might ask them a few questions about the similarities and differences between the light and heavy rocks. You could ask:

- What is similar about your group of light rocks? Heavy rocks?
- Is there anything different among these light rocks? Heavy rocks?
- Are small rocks always light?
- Are the heavy rocks all the same color?
- Do the rocks with the same shape weigh the same?

These questions will help students think even more critically about various attributes and their relationship to weight. You can help students know that it is what a rock is made of that determines its weight, not the color or shape, etc. Since this idea involves concepts beyond their cognitive level, it is not necessary to spend much time discussing it, but it introduces students to the idea that when weighing a rock, some attributes are more important to consider than others.

Again, this measuring activity should encourage students to consider the concept of weight but not exact weight measurements. Students will practice with a measuring tool (a scale); perhaps have an opportunity to use more than one kind of scale, yet see that each has the same job—to measure; and they will begin to formulate hypotheses about their rocks, the scale, and the idea of weight. This strengthens the foundation of measurement concepts that will become more detailed and exact in later years.

Bring students back together in a large group. Facilitate a discussion to review their observations.

- What did you learn about your rock?
- What did you learn about the rocks in your group?
- How did you find out how big around your rock is?
- How did you find out about your rock’s weight?
- What words can you use to describe your rock (have them focus on the attributes they observed in this lesson—size, shape, color, etc.)?

- What description words could help someone else learn about your rock, even if they could not see your rock? How would this description help someone else know about your rock?

Extension

Using the small rock kit, demonstrate to students the unique property of fluorescence in rocks. Darken the room or go to a room that is dark. Have the students gather around you. Explain that many rocks absorb energy from light and give it off in ways that can be seen with only special lights. Have someone turn the lights off. Turn on the UV lamp and notice which rocks glow or “fluoresce”. Switch the lamp to the other wavelength and notice how different rocks now glow. Discuss where on the rock they are glowing and the different colors that are present.

Assessment

- A. Use the KWL chart from the beginning of the lesson and as a class fill in the last column – What Did I Learn.
- B. Describe a rock as a writing assignment. Select a rock and study it. Have students describe it. Draw a picture of it. Introduce and discuss other rock attributes such as hardness, patterns, crystals, etc. Complete the description of the rock.

Resources

- <http://www.uen.org/core/science/>
- <http://www.middleschoolscience.com/earth.htm>
- <http://www.msnuclous.org/membership/html/k-6/rc/pdf/rc5minerals.pdf>
- *The Nature and Science of Rocks*, by Jane Burton and Kim Taylor, ISBN:0-8368-1945-4
- *If You Find a Rock*, by Peggy Christian, ISBN: 0-15-239339-0
- *Rock Collecting*, by Roma Gans, ISBN: 0-690-04265-5
- *The Pebble First Guide to Rocks and Minerals*, by Zachary Pitts, ISBN: 1-4296-1711-X
- *Rocks, Rocks, Rocks* by Nancy Elizabeth Wallace, ISBN: 978-0-7614-5528-8
- *Sylvester and the Magic Pebble*, by William Steig, ISBN: 0-671-66269-4
- *Everybody Needs a Rock*, by Byrd Baylor, ISBN 068971058
- [KidsOLR: Geology](#)
- [Rock Hounds](#)
- [Think Quest: This Planet Really Rocks!](#)
- [Utah LessonPlans](#)

ADVANCED LESSON		
BACKGROUND		
We use rock and mineral products every day. In fact, each person in the United States uses an average of 10 tons of rock and mineral products every year. They are used in agriculture, science and technology, communications, transportation, construction, medicine, manufacturing and arts. From metals, building materials, and fertilizer, to baby powder and the graphite in our pencils, rocks and minerals provide us with many essentials in our modern everyday life.		
Objective(s)		
<i>Students will be able to...</i> <ul style="list-style-type: none"> Explore and know the uses of different kinds of rocks. Understand different characteristics of rocks determine how they are used. 		
State Science Content Standard(s)		
Standard 4. 2: Describe and measure the physical properties of the Earth's basic materials (including soil, rock, water, and gases) and the resources they provide. <ol style="list-style-type: none"> Identify that soil is made from rocks Identify that different rocks exist (color, texture) Compare and classify rocks based on color and texture 		
Materials		Safety
From the Kit	Provided by Teacher	<ul style="list-style-type: none"> None
<ul style="list-style-type: none"> Rock Interview worksheet – binder or website Creative Uses for My Rock worksheet – binder or website Chalk 	<ul style="list-style-type: none"> Various art materials, such as paint, markers, scraps of fabric, fake fur, glue-on eyes, sequins, etc. Clipboard or surface to write on 	
Key Vocabulary		Mastery Questions
<ul style="list-style-type: none"> Rock Color Streak Smell Rough Smooth Shape 		<ul style="list-style-type: none"> See Lesson
Detailed Plan		
How We Use Rocks: Part 1		
<u>Engage</u>		

Have the students pick from their collection their favorite rock. Ask them to think about what characteristics makes their rock special and be ready to share it with the class. Have them observe their rock with the hands lens.

Exploration

1. Tell the students to get to know their rocks even better they will interview the rock by using the Rock Interview worksheet (see website or binder).
2. Divide the class into small groups (4 to 5 students). Give each small group a paper bag. Have students place their rocks in the bag and mix them together. Next, **based** on a person's Rock Interview, the other members of the group will try to identify the rock.
3. Have the students use their special rock to create a pet rock or a "pebble person." Provide extra rocks for those who don't want to decorate their special rocks. Make a variety of craft and art supplies available for them to use. Encourage creativity. Students can also name their rocks.
4. As an assignment (could be a family homework assignment), have the students try to find five uses for their rocks. Encourage them to be creative; the rock's uses are limited only by their creativity. Use the Creative Uses for My Rock worksheet (see website or binder).

Display the students' special rocks.

Assessment Plan:

- Write a story about your pet rock. Include the some of the characteristics that make it special in the story.
- Review each child's completed worksheets to check concept mastery.

How We Use Rocks: Part 2

Engage

With an ordinary piece of chalk, write the title of the lesson on a chalkboard or dark colored piece of construction paper: **How We Use Rocks**. Have the students read the title silently.

Exploration

1. Say to the students, "What I just did used rocks and minerals. Do you know how?" If they don't know, explain that chalk is made from calcite, a mineral, and some chalkboards are made from slate (at least in the good old days).
2. Tell the students: "Today we will discover lots of ways we use rocks." Give each pair of children a clipboard (surface to write on), a piece of paper and pencils. Before going outside to the schoolyard, set a purpose. Challenge the pairs of students to discover and write down as many different ways that they can see rocks used outside. Set a time limit of around 10 minutes (adjust as necessary).
3. Return to the classroom and have the students share their lists. Write the uses they discovered on the board (or have a student do this). Now have the students look around the classroom and

see if they can discover any more uses of rocks inside the classroom. Add these to your list. Lastly, have the students refer to their homework assignment where they wrote down creative uses for their special rock. You should have quite a list now. (You may want to have your list on chart paper, rather than the chalkboard, so that it will be more permanent and can be added to during your study of rocks.)

4. Lead a class discussion about rocks and their uses. Go through the list you have made and talk about the types of rocks and how they are used. Questions to ask might include:

- What could soft rocks be used for?
- What could hard rocks be used for?
- What could shiny rocks be used for?
- What could rough rocks be used for?
- What could smooth rocks be used for?
- What could happen if we used soft rocks to build highways?
- What kinds of rocks are used to create buildings?

Post pictures of various uses of rocks. Invite students to record tally marks beside the uses they observe during the schoolyard or neighborhood walk. Ask them to draw or write down other uses they observe.

Assessment Plan:

- Have the students write a story--"If I were a rock . . . ". Have them include what they would be used for if they were a rock.
- Schedule a time in the computer lab when students can use the internet and complete this assessment. Using these internet sites (see Resources), have the students list or draw, on a sheet of paper, two uses for rocks or minerals. Have them also list one way in which they themselves use rocks. Check for concept mastery and assignment completion.

Assessment

See above

Resources

- **Rocks**
This virtual tour will focus on how rocks are created, the different types of rock, characteristics of rocks, and rocks in everyday life.
- **Smithsonian Gem and Mineral Collection**
A visual collection of gems and minerals housed at the Smithsonian's National Museum of Natural History.
- Adapted from: Utah Lessons

EXPLORE MORE

Students can dip rocks into paint or on an ink pad to make rock prints. You can make your own board game using rock prints to create the paths and real small rocks as the playing pieces. With a spinner or a die, you can play any number of fun games that would incorporate math. You can easily make the

game one in which students learn more about rocks by making playing cards out of index cards or heavy paper. Each card could be a question that the player answers as s/he follows the path. (You can make this game yourself or allow students to create the game. When students make the game, they are practicing math and science skills and learning about problem solving as they determine what the rules of the game will be.)

Extensions:

- **Movement:** Take a walk outdoors with children. Have children stop by a large rock. Ask children: "If this rock could talk, what do you think it might say? How do you think it would feel about where it lives and how it spends each day? How do you think it would feel about having visitors?" When you return to the classroom, have children write or dictate stories about the magic rock that came to life. Later, have children illustrate their stories and share them with their classmates.
- **Math:** Using the pebbles and stones your child collected in the science lesson, have children make a bar graph of rocks by color, texture (smooth, rough), size, etc. Have them group the rocks in different ways, and look for their input as to how they would graph each one. This can be done in groups so that students have more rocks to use as data. Have each student create his/her own graph.
- **Art:** Have the students bring in a rock that they could decorate. They may even want to bring in several rocks and make a person or object using their rocks. Finished projects can be displayed in the classroom or school library or shared with parents.

Writing: Cut out a red, shiny pebble for the students to glue on their picture. Use red cellophane or scrapbook paper. Give them a piece of paper with the following directions: Draw a picture of what you would wish for if you had a magic pebble. Glue your magic pebble onto your picture. Write what you would wish for below the picture

Sit in a circle on the floor with each student holding a rock. With masking tape or string, mark off some areas within the circle. As a class, put the rocks into groups. Students may classify rocks as shiny or dull, smooth or rough, hard or soft, multicolored or plain. Some rocks may fit into more than one group. If so, adjust the areas to overlap (like a Venn diagram). Challenge the students to return to their seats and make an illustration of their rock that shows two of its characteristics.

Weighing Basket Instructions

Introduction

Use the following instructions to create a simple scale that will allow students to think about their rocks in terms of lightness or heaviness

Materials Needed:

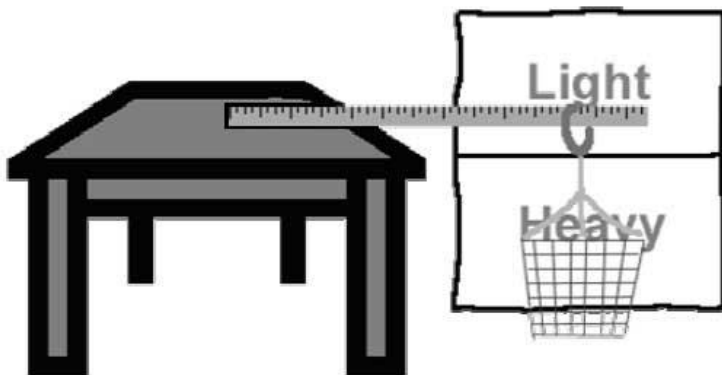
- Duct tape
- Yardstick or other sturdy piece of wood
- String
- Strawberry basket
- Large, sturdy rubber band

Instructions:

Using duct tape, tape one end of a yard stick onto a table top. Tie two pieces of string to the top edges of a strawberry basket, so that they criss-cross at the middle point. (This allows the basket to hang evenly). Before knotting the string, thread the string ends through a large, sturdy rubber band. Once done, the rubber band should be in the center, where the strings criss-cross. Use duct tape to attach the rubber band to the end of the yardstick. The basket should now hang down from the yardstick.

Students will be able to put rocks into the basket. Heavy ones will make the basket hang down low, while light rocks won't. From the edge of the table, hang a piece of newsprint. Write "light" on the top portion of the paper and "heavy" on the bottom portion (see diagram below). Draw a line to visually divide the top and bottom. This paper will be directly behind the basket, so that students will now be able to weigh their rocks and determine whether their rocks are light or heavy. (Hint: Make the string pieces long enough to allow room for students to place rocks in the basket. Also, this scale works well with a number of different items.)

Think about making one for a more permanent part of the classroom to allow for spontaneous, student-initiated weighing.)



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