



ROCKIN' IN THE ROCKIES* 2021

Grade Level: 4th grade

Setting: Prairie Natural Area

Theme/Bottom Line: Rocks have unique properties that create the foundation for plant and animal life.

Description: Students observe and sort rocks by their properties, and learn how rocks are connected to life at a natural area.

BIAS: [Biology](#)

Recommended Time- 30-45 minutes

Recommended Group Size: 15-20

FOSS Kit: Environments

State Standards: Earth and Space Science 3: Students can use the full range of science and engineering practices to make sense of natural phenomena and solve problems that require understanding how human activities and the Earth's surface processes interact.

Materials:

- Journals handed out at the beginning of the day, clipboards and pencils
- Rock sample sets
- Background material, 4 laminated focus questions for the adults to guide sorting activity
- 4 rock sorting mats, 4 tool kits (washers to scratch rocks for hardness, hand lenses)
- 2 story rocks (Pierre shale, granite)
- Goggles, hammer, and rock samples to break
- Laminated pictures (hawk, black-footed ferret, prairie dog, grass soil, rock)

ENGAGE/INTRODUCTION:

- Introduce yourself, welcome students. Ask if they are enjoying being in an outdoor classroom today? Remind them that our Natural Areas are open and free for them to return to and keep on learning every day of the year.
- Tell students that they are going to be geologists today. Geologists are scientists that study rocks. Engage students with some leading questions:
 - a. Can you name some types of rocks?
 - b. What are some characteristics of different rocks?
 - c. How can rocks change over time?
 - d. What do you think these rocks tell us?

EXPLORE:

- Walk on a path and point out rocks that you think have a story to tell.
 - a. Talk about similarities and differences in characteristics and what they tell you.

- b. It would also be a great time for them to notice that the materials they are finding in the rock can be spotted in the soil around where they are standing. This is because the soil is partially made up of the rocks broken up by nature.
- c. Characteristics:
 - i. Hardness (How fast the rock will erode or crumble; how the water will run through it)
 - ii. Color (How many different materials are in the rock: more diversity in the soil means more diversity of plants and animals in the ecosystem)
 - iii. Texture (How smooth or dense do the rocks feel: what could cause a rock to be bumpy or smooth; what part might water play?)

Nat Note: *This is a very important part of the activity as a whole. Allow at least 5-8(+) minutes for this. Please note that they are NOT identifying rocks and minerals. The purpose is to observe closely for properties. This activity reviews the basic rock concepts they are learning in class, and it gives a hands-on field experience to see the connection of the rocks to both the soil and landforms. It also models the properties of rocks that they will be using to sort their rocks for the group activity.*

EXPLAIN:

- Rocks do silently tell us stories if we know how to listen. For example, this rock (Pierre shale) tells me that it was formed when this area was a huge inland sea. This rock (granite) tells me that it was formed slowly deep inside the earth and pushed to the surface when the mountains uplifted. This rock (pick up a piece of the red stone from the Bobcat ridges or some rock that came from the ridge at Coyote) tells me it fell from those foothills. This rock (point to a rock near where you are standing) tells me that a hawk could live here!
- Rocks are the foundation for plant and animal life. They make up the mountains, foothills, and riverbeds for example. They contain the minerals plants and animals need. Why do the students think this is so important? (Rocks provide what plants need to grow and plants provide the food animals need to survive.)
- How do you think I knew this rock told me a hawk could live here? Well, here is how that works. (Use the flip chart of pictures.) The hawk eats black-footed ferrets, which eats the prairie dog, which eats the grasses which grow in the soil, which comes from...THIS ROCK! Rocks are where all environments begin.

EXPLORE AGAIN:

- Tell students that they are going to be geologists today. Geologists are scientists that study rocks.
 - The first thing we need to do is understand the difference between a mineral and a rock. Ask the students if anyone can remind us of the difference. (A mineral is pure or the same material consistently all the way through. A rock is a composite of many different materials “glued” or pressed together.)
 - Since rocks are made up of many materials glued together it is valuable to break them open to see what is inside. Ask the students to make a big circle around you. Using the goggles and small hammer, break up one or two rocks that you have chosen. As you break them up, pass the chunks around to all the students to see closely.

- As you are doing this, have the students make observations about the characteristics discussed above (hardness, color, texture).
- Pass chunks of the rock around as they break off. Ask them to speculate how each property could be important.

ELABORATE:

- Once the breaking activity is completed, divide the students into 4 teams of geologists. Assign each team to one of the sorting mats where you have placed a bag of rocks for them to use. Next show the sorting mats and the tool kits. Explain that the tool-box has some items they will use to help carry out their job of examining the rocks.

Nat Note: This next step is very important! Most of the students do not have formal experience with using a dichotomous key to sort. This activity with you physically using them to sort into subgroups will demonstrate what they are expected to do with the rock collections.

- Now explain how the sorting mats work with the group as a whole. Have the whole group stand together in one spot. (The following are suggestions for easy ways to sort. You may choose whatever characteristics you like.) Ask the group to divide themselves into two subgroups (any way they like), or for time the instructor can divide the group into 2 separate groups. Point to the first two-part sort on the mats. Now ask the 1st group to form 2 subgroups based on long hair and short hair. Ask the 2nd subgroup to form 2 subgroups based on hats or no hats. Again show the sorting mats and explain that what you have just done with them they are going to do with the rocks. They may choose whatever properties they want to sort and they may do the sorting first one way and then another as many times as they can. Challenge them to do it several ways.
- Ask the groups to all unpack their bags of rocks now and place the entire pile in the top oval.
- Allow about 10 minutes for this sorting to occur. (*Enough time to get the job done...not enough time to fool around!*) When you call time ask each group to explain how they chose to sort their rocks. Give each group one minute to summarize their work. If a group finishes quickly they can start over and resort the rocks with all new properties. They can also use their tools to examine the soil and see if they can find similar properties there.

EVALUATE/CALL TO ACTION:

1. Compliment their observations. Ask the group to explain how rocks can tell stories.
2. Show the journal page with the reverse food chain. This is a visual explanation of the interdependence between living and nonliving elements in the environment.



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