



Crinoids - Smithsonian Display
A. Sharon

Level I Kindergarten to Fourth Grade

The activities in this section are designed for kindergarten through fourth grade. All activities can be changed to best suit the teachers need. The activities and levels are designed as building blocks. All of the items in Level I correspond in some way and are introductory to the items in Level II.

Activity 1 Geology

JUST A PLAIN OLD ROCK? By Jim Staebler

The Earth is always changing. Some change we all notice such as the changing seasons. Some we won't see unless we looked close before and saw and remembered what there was to see. If we start to pay better attention to the world around us, we might notice more of the changes taking place. Sometimes we need to look closer. Sometimes we need to look at everything over a period of time. Those big rocks at the bottom of the canyon came falling down from the cliff

above. The sand and pebbles on the shore of the lake are arranged in a special way. Where are the tracks we made in this dry stream bed the last time we walked there? It sure seems dryer here the last few years. Maybe we can find out just how dry it has been.

Geologists study Earth looking for changes and trying to understand what the rocks are able

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to tell us. We can find fresh mud along the riverbanks after a spring storm. Seashells can be found in rocks. By studying the rocks and the mountains and canyons made up of rocks, geologists have discovered many of the secrets the rocks have to tell. Geologists know Earth is over 4.5 billion years old. That is a lot of time and many, many things have happened. We are beginning to understand why that mountain is over there and how it got there. But there is so much more to discover. If you start studying the rocks, they may speak to you also.

Rocks come in many different colors and can vary in size from ones we can hold in our hands to ones it takes hours to drive across. Some are hard and others we can easily break apart with a hammer. Some are smooth and some are rough. But they all have one thing in common: they are made up of different minerals in different combinations. Minerals are different kinds of atoms combined in a specific manner. With all the different kinds of atoms there are that means we can make up many, many different kinds of minerals and with all those minerals we can make up a lot of different kinds of rocks. Maybe it is a good thing that a relatively few kinds of rocks make up most of the mountains and canyons we see near here and we can study those kinds of rocks first.

Scientists have discovered that there are three main ways that rocks form and have thus separated rocks into three main groups. Scientists like to put things into groups of things that have the same characteristics. The three groups of rocks are igneous, sedimentary and metamorphic.

Igneous rocks form from hot liquid magma that turns into rock as it cools. If it happens below the surface they are called intrusive and if it happens on the surface where we can watch they are called extrusive or volcanic rocks. Talk about exciting and dangerous – nothing like watching volcanoes!

Sedimentary rocks are formed when small or even sometimes large or various sized particles and brought together in some place where they are eventually buried by more and more rock material. This often happens in the deep oceans or along the shallow shore as well as in vast sand dunes. The particles may be cemented together by a kind of chemical that acts as glue or they may be turned into rocks just by all the weight of the rock material they are buried under.

Metamorphic rocks start out as any of the three different kinds of rocks, but then they are changed into a different kind of rock through great heat and pressure deep beneath the surface. Yes one kind of metamorphic rock can become another kind of metamorphic rock. Some

times they look like they have been squeezed or twisted or bent.

When a rock gets to or near the surface it can start to break apart through the actions of water, chemicals, hot and cold, what vegetation is growing in the area. Gradually soils may develop and they are very important because soils are what vegetation grows upon, and vegetation is the base for the animal populations.

But rocks also move! They may fall down from steep cliffs. Little pieces may get blown around by the wind. Rivers and streams can wash them away. When a rock moves it is eroding. One amazing thing you may some day come to see is just how much rock material has been eroded away. When you look at the canyon, match up the layers of rock from one side to the other. That space used to be filled with rock matching those layers. And that is just part of the erosion that has happened here.

If we start to study the layers of rock we can get an idea of how things used to be when each layer formed long, long ago. The Madison Limestone is made of lime material and has some shells in it so we know it formed when there was an ocean here. Now the Madison Limestone makes up the top 700-800 feet of the canyon walls for the entire 50 mile length of the canyon. Now that's a big rock. The Tensleep Sandstone has ripple marks made of sand grains that were formed as a result of deposition by waves in a near shore environment. We can find that exact same kind of ripple marks along our shores today and in fact that is why we know how they were formed that way in the first place.

Perhaps most exciting is studying the different layers in order to learn how the mountains and canyons came about. What do you need to look for when studying the rocks? While visiting Big-horn Canyon will you be able to hear the rocks tell their story?

Rock Building



Science, Language Arts, Speaking and Listening

- Standards:** Wyoming Science : Standard 1, Benchmark 6 & 7
Standard 2, Benchmark 1
Wyoming Language Arts: Standard 3, Benchmark 1 through 5
Montana Speaking and Listening: Standard 2, Benchmark 1 & 2
Standard 4, Benchmark 3
- Duration:** 1 hour to make the rock and talk about the process, one day of good sun to cure the rock
- Class Size:** Any, broken into teams

Objectives

At the conclusion of the rock building exercise, students will:

1. Understand the rock building process
2. Understand the element that work together to build a rock

Materials

- Used coffee grounds
- Flour
- Water
- Bowl
- Cookie sheet
- Treasures
- Pan of gravel

Vocabulary

Igneous rocks: are formed as hot liquid magma cools and turns to rock

Sedimentary rocks: are formed when small or even sometimes large or various sized particles and brought together in some place where they are eventually buried by more and more rock material.

Metamorphic rocks: start out as any of the three different kinds of rocks, but then they are changed into a different kind of rock through great heat and pressure deep beneath the surface.

Procedure

1. To symbolize how minerals are forced together to form rocks, combine used coffee grounds and flour into a bowl. There should be twice as much coffee as flour in your rock mixture. Depending on how old the coffee grounds are, they may still retain some of their moisture.
2. Stir water in a little at a time until you get a stiff, sticky, batter-like mixture. Add more flour if the batter isn't sticky. This symbolizes the water of the inland seas that covered Bighorn Canyon.
3. Scoop out handfuls of the mixture and form into balls. At this point you can poke a hole in the ball and add treasures to the center, reshaping it into a ball. Roll the balls through the pan of gravel. Some small, colorful rocks are a nice addition to the gravel. To symbolize the pressures that compress the minerals into rock, push and pull the ball into a rock shape.

Rock Building Cont.



Science, Language Arts, Speaking and Listening

Procedures Cont.:

4. When you are done, put the rocks on a cookie sheet. You can either harden these rocks by cooking them in the oven at 350 degrees or put them in a sunny window for a day or two.
5. When the rocks have hardened, you can hide them around the class room or playground. Have a scavenger hunt and then break them open to discover the treasures inside.

Closure

After building the rocks, discuss how this activity is similar to the way rocks are formed.

1. What caused the shape of the students' rocks?
2. How is that similar to the way rocks are formed?
3. Which of the three sedimentary rocks found in Bighorn Canyon does this one most resemble?

Additional Activities

1. Students could make rock candy.
2. Conduct a rock scavenger hunt along the State Line Trail looking for rocks with the traits discussed in this activity. Remember only take notes or draw what was found.

The Ever Changing Earth



Science, Language Arts, Speaking and Listening

Standards: Wyoming Science: Standard 1, Benchmark 6
Wyoming Language arts: Standard 3, Benchmark 1 through 5
Montana Speaking and Listening: Standard 2, Benchmark 1 & 2
Standard 4, Benchmark 3

Duration: 20 Minutes
Class Size: Any

Objectives

It is easy to study some changes to the world around us, but others are harder to study. For instance, the change of seasons is easy to study. Most people remember the change from winter to summer. However, geologic change is more difficult to study. Changes to the landscape can happen over decades of time or can happen quickly. This activity will illustrate that the earth is always changing. Even though we don't always notice the changes, how do they affect us and the world around us?

Materials

- One small carton of milk from the cafeteria
- 4 different colors of food coloring
- Eye dropper full of dish soap
- Deep sided cookie sheet

Procedure

1. Pour milk into the cookie sheet.
2. Have the students tell you the kinds of things they find on the earth. Animals and plants will be symbolized by a color, rocks and soil by another color, water elements by another color, and weather elements by the last color. Put one drop of food coloring in for each item the students tell you.
3. When they can no longer think of items that make the earth what we know it today, add one drop of dish soap. This will make all of the colors start to swirl together. It will do this for awhile, continually changing. If it starts to slow down you can add another drop of dish soap. It will begin to swirl again.

Closure

1. Discuss how the earth is always changing.
2. How does each element effect change on the earth?
3. How can scientist study these changes?