

MULTICOLORED ROCK CYCLE

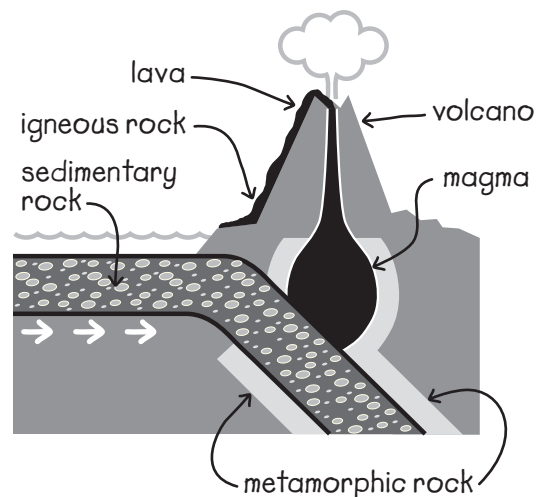
Background Information for Activity Leaders

Overview

Children will use crayon shavings to model how sedimentary, metamorphic and igneous rocks are formed. Children will be encouraged to observe and describe the differences and similarities between each type of rock in the rock cycle.

Key Concepts

- **Sediments** are made of separate small particles of rocks, soil, volcanic ash or decomposing matter that vary in size. Sediment can be made from remains of a living thing or by rocks that have been broken up by prolonged exposure to various weather conditions.
- Sediments can collect on the bottom of oceans, rivers and lakes. They can also be deposited by wind, rain or the movement of glaciers into canyons, hollows or depressions.
- Rocks are divided into three types, according to how they are formed:
 - **Sedimentary rock** forms when sediments are cemented together by the pressure of overlaying layers of sediment. They are usually formed where water once flowed.
 - **Metamorphic rock** forms when any type of rock is pressed down and heated. Even though it gets very hot, the rock does not melt. They are usually formed deep under the Earth.
 - **Igneous rock** forms when any type of rock completely melts and then cools forming solid rock again. They are usually formed by volcanoes.
- **Geologic time** describes major biological and geological eras, defined by major events, eons, eras, periods and epochs. Geologic time is measured in millions of years.
- The **rock cycle** is an illustration that is used to explain how the three rock types are related to each other and how Earth processes change a rock from one type to another over geologic time.
- During the rock cycle rock is recycled. Liquid rock or magma solidifies either at or below the surface of the earth to form igneous rocks. This rock rises up because of pressure below the earth to form mountains made of rock.
- **Plate tectonics**, the movement of the Earth's crust, is responsible for the recycling of rock materials and is the driving force of the rock cycle. The example of the volcano shows how metamorphic rock and sedimentary rock are melted to form magma and then released as lava which cools and forms igneous rock.



Rock Cycle

MULTICOLORED ROCK CYCLE

Background Information for Activity Leaders

What to Expect

- Younger children need help cutting the aluminum foil that will enclose the crayon shavings.
- Children need to be reminded that crayon shavings will be used to model the rock cycle much more quickly than it occurs in nature.

Common Misconceptions

- *Children may think: "Rocks are made of a single substance."*
By carefully observing and describing the properties of many rocks, children will begin to see that some rocks are made of a single mineral, but most are made of several minerals.
- *Children may think: "A rock is a rock, there is not much to describe."*
Younger children should be encouraged to talk about and draw what they see and think. Older students can keep journals, use instruments, and record their observations and measurements.
- *Children may not know that gem stones are really minerals/rocks.*
A diamond is the metamorphic form of coal.
- *Children may think: "That rocks never change."*
Rocks are continually changing as they go through the rock cycle. The sedimentary rock limestone becomes the metamorphic rock called marble.

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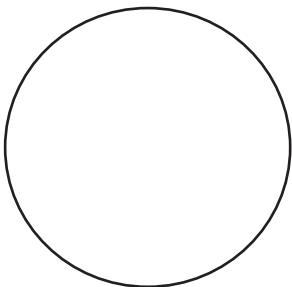
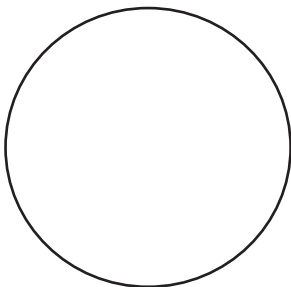
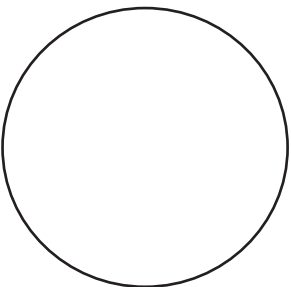
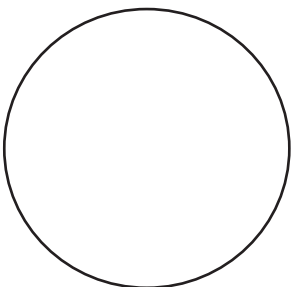
Data Collection Sheet

Name: _____

Date: _____

WONDER How will pressure and heat affect crayon sediments?

RECORD During the activity your crayon sediment changes as it goes through part of the rock cycle. Identify which steps are represented and draw what you observe.

crayon Sediment	sediment pressed between two books	sediment placed between hands	sediment placed in toaster oven
			
type of rock	type of rock	type of rock	type of rock
_____	_____	_____	_____

EXPAND Describe what you did to complete the rock cycle.

CONCLUDE Consider what you noticed. How is each step of the rock cycle represented by your exploration?

How did you make sedimentary rock from sediments?

How did you make metamorphic rock?

How did you make igneous rock?

Set Up the Expedition

Materials:

For the activity leader:

- (1) roll of heavy duty aluminum foil
- (1) small toaster oven
- (1) hammer
- (1) dish towel
- (2) cups of various colors of broken crayons
- (1) cheese grater or crayon sharpener

For each group:

- **Multicolored Rock Cycle** Learning Cards
- (1) ruler
- (1) safety scissors
- (2) sturdy hardcover books
- (1) permanent marker

For each child:

- (1) **Multicolored Rock Cycle** Data Collection Sheet
- (1) pair of goggles

Prepare the demonstration:

1. Walk around the park or school grounds and collect various types of rocks. Three to five rocks should be sufficient. Make sure that one of the rocks is easy to crush with a hammer.
2. Place the rocks, the hammer and a dish towel where you will conduct the demonstration.

Prepare the exploration:

1. Make crayon shavings that will represent sediments by using a cheese grater or a crayon sharpener. Use different colored crayons. Each child will need 3 tablespoons of crayon shavings.
2. When working with younger children who have difficulty measuring and cutting, pre-cut two pieces of heavy duty aluminum foil about 20 cm by 10 cm for each group. Children will place one inside the other to have double thickness.
3. Identify an electrical outlet that can be used to plug in the toaster oven.

MULTICOLORED ROCK CYCLE

Activity Leader's Guide

Group Size: 4-6 children

Time: 45 minutes

Engage

- 1 Gather the children together. Display various types of rocks where children can see.

Ask:

“Where do you think these rocks came from?”

Allow children time to contribute their ideas.

- 2 Wrap one of the rocks in a dish towel and hammer it into powdery small pieces. Open the dish towel and ask the children what they see.

Say:

“What you see are tiny pieces of rocks called sediments. Nature does not act as quickly as this hammer. It takes thousands of years for rocks to break apart and become sediments. What natural forces might contribute to the creation of sediments?” Allow children time to contribute their ideas. Guide them through questioning until they have mentioned some of the forces that cause sediments to form such as wind and water.

Say:

“Over thousands and even millions of years, natural forces such as wind and water wear down rocks to form sediments.”

Say:

“Sediments collect and can form rocks again. In fact, rocks go through cycles where they may become cemented, exposed to great pressure or melted into liquid rock called magma. This whole process is called the rock cycle.”

MULTICOLORED ROCK CYCLE

Activity Leader's Guide

Explore/Expand

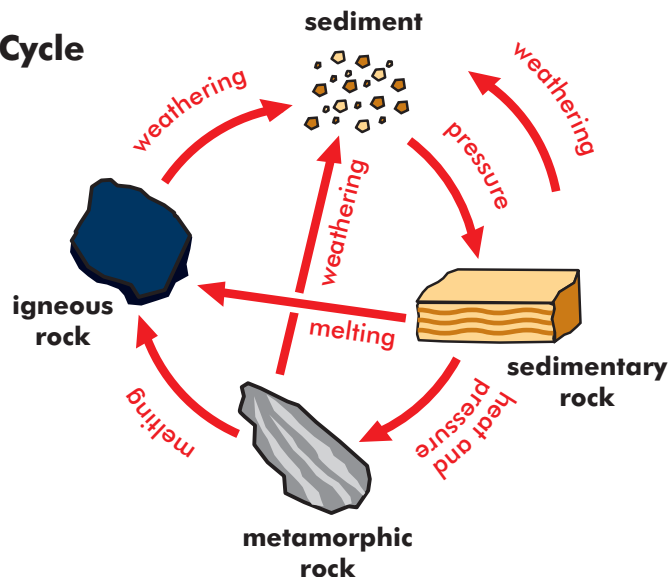
- 3 If you are working with a group greater than 4-6 children, divide the children into groups. Distribute the Data Collection Sheet, the Learning Cards, and the materials.

Say:

“These crayon shavings represent a mixture of sediments. Use your Learning Card and your Data Collection Sheet to investigate the rock cycle”

- 4 Allow children enough time to complete the WONDER, EXPLORE, RECORD, EXPAND and CONCLUDE sections of their Learning Card.

A Rock Cycle



Conclude

- 5 Gather the children together and ask the following questions:

“How did you make sedimentary rock?” Children modeled how forces cause sedimentary rock to form when they pressed crayon shavings between two hardcover books.

“How did you make metamorphic rock?” Children modeled how metamorphic rock forms by pressing it between the palms of their hands and warming their crayon sedimentary rock with their body heat for three minutes.

6 *“How did you make igneous rock?”* Children modeled how igneous rock forms by melting their crayon rock in an oven and then allowing it to cool.

“How did you create sediment from your rock to complete the rock cycle?” Help the children understand that any type of rock can be broken apart to form sediment.

Say:


“Congratulations! You have earned your ‘Ask Me About Rocks and Minerals’ stamp. You are ready to tell people about properties of rocks and minerals.”

MULTICOLORED ROCK CYCLE

Expedition Learning Card

? How do rocks form?

 sedimentary
metamorphic
igneous

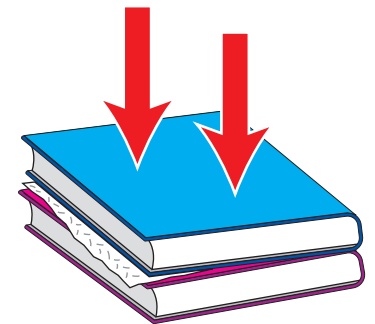
 Explore how rock changes as it goes through the rock cycle.

1 WONDER How will pressure and heat affect crayon sediments?

 Write or draw your ideas on your Data Collection Sheet.

2 EXPLORE

1. Using a ruler and scissors, measure and cut out two sheets of aluminum foil that measure 10 cm by 20 cm.
2. Place one aluminum foil sheet on top of the other so that it has double thickness.
3. Place 3 tablespoons of crayon sediment on top of the double thickness of aluminum foil.
4. Fold the aluminum foil in half and then fold over the edges so that all the crayon sediment is sealed inside the foil.
5. Place the sealed crayon sediment packet between two sturdy books and press down with all your strength.
6. Carefully open the packet without breaking the aluminum and notice what has happened to the crayon sediment. What does it look like now?



MULTICOLORED ROCK CYCLE

Expedition Learning Card

7. Press and warm the packet between the palms of your hands for 3 minutes, then repeat Step 6.
8. Carefully seal the packet and write your name on it using a marker.
9. Ask your activity leader to place your sediment in the toaster oven for 5 minutes, and allow the sediment to cool for 5 minutes. Then, repeat Step 6.

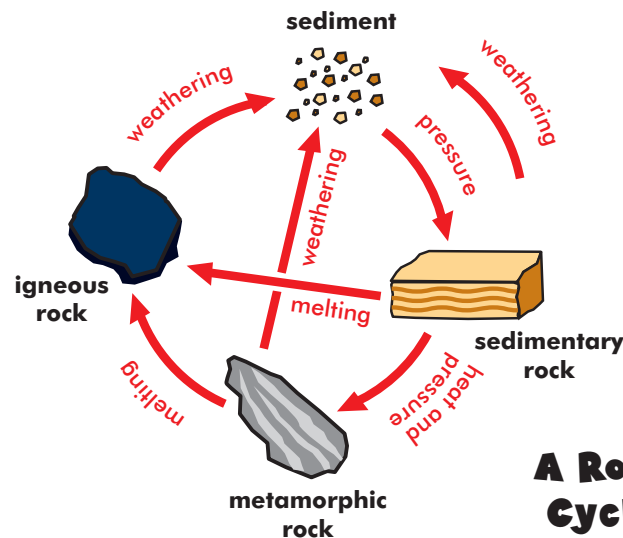
3 RECORD How does the crayon sediment represent the rock cycle?

 Draw or write on your Data Collection Sheet what you notice as the crayon sediment is pressed between the two books, pressed and warmed by your body heat, and then melted in the oven.

4 EXPAND Can the crayon rock you formed become sediment again to complete the rock cycle? Try it!

 Describe what you did to complete the rock cycle.

5 CONCLUDE How is each step of the rock cycle represented by your exploration?



A Rock Cycle

Discovery

Why did we do that?

- The rock cycle describes how rocks are formed.
- Sedimentary rock forms when sediment from one or various rocks are cemented together.
- Metamorphic rocks form when other rocks are heated and pressed together.
- Igneous rocks form when rocks melt and then harden as they cool down.

Congratulations!

You have earned your "Ask Me About Rocks and Minerals" stamp! Now you are ready to tell people about rocks and minerals!

