

# Let Them Eat Rocks

<b>Objective:</b>	To observe and describe physical characteristics of edible samples chosen as models of real rocks or meteorites.
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**Grade Level:** K-4  
**Subject(s):** Science  
**Prep Time:** > 30 minutes  
**Duration:** One class period  
**Materials Category:** Special

National Education Standards	
Science	2, 5
Mathematics	
Technology (ISTE)	
Technology (ITEA)	
Geography	

## Materials:

- Cookie dough or melted chocolate
- Assorted edibles such as jelly beans, raisins, chocolate chips, round candy-covered chocolate bits
- Water
- Sugar
- Light corn syrup
- Baking soda
- Peanut butter
- Cooking pans
- Measuring cups
- Cooking utensils
- Samples of igneous, sedimentary and metamorphic rocks

## Related Links:

NASA Ames Research Center — Lunar Prospector  
<http://lunar.arc.nasa.gov/index.htm>

## Supporting NASAexplores Article(s):

History Written In Stone  
[http://www.nasaexplores.com/show2\\_article.php?id=04-058](http://www.nasaexplores.com/show2_article.php?id=04-058)

Chip Off the Old Block  
[http://www.nasaexplores.com/show2\\_article.php?id=05-055](http://www.nasaexplores.com/show2_article.php?id=05-055)



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Teacher Sheet(s)

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## Pre-lesson Instructions

- Duplicate the Student Sheets.
- Prepare the following recipes for the edible rocks. You may make them in class, or have them ready before teaching this lesson.

### Sedimentary Rock Conglomerate

Ingredients:

Cookie dough or melted chocolate

Assorted edibles such as jelly beans, raisins, chocolate chips, round candy-covered chocolate bits

Directions:

If using the dough, mix the assortment of edibles into the dough and bake as directed.

If using the melted chocolate, line a cookie sheet with wax paper. Add several assorted edibles to the melted chocolate and mix until the edibles are coated. Make sure there is enough chocolate to cement the pieces together. Drop the mixture by teaspoonfuls onto the wax paper. Refrigerate the mixture until it's cold.

### Igneous Rock Pumice

Ingredients:

1/4 cup water

1-1/2 cups sugar

1/4 cup light corn syrup

1 tablespoon of baking soda, sifted

Directions:

In a medium-sized, deep heavy-duty saucepan, stir the water, sugar, and corn syrup together. Over medium-high heat, bring the mixture to a boil **without stirring**. Continue cooking until the sugar reaches **300 degrees** Fahrenheit (F) on the candy thermometer (hard crack stage). Remove the mixture from the heat. Add the baking soda all at once to the sugar mixture. Beat it for a few seconds until the baking soda is incorporated. Pour it onto a buttered baking sheet. Allow it to harden for about 20 minutes **without touching or moving it**. Cut the pumice into uneven half-inch pieces. If you're not using it that day, store it in an airtight container at room temperature. It will last –one or two days before it begins to lose its crunch.



## Metamorphic Rock Shale

### Ingredients:

1 cup white sugar  
1 cup light corn syrup  
1 cup peanut butter

### Directions:

In a three-quart saucepan, heat white sugar and corn syrup until it reaches 300 and 310 F. Remove the mixture from heat, and stir in peanut butter. Press the mixture into 9- x 13-inch pan, and cool it until it's firm. Break the candy into pieces.

## Background Information

Scientists have been studying the Moon for nearly half a century. On July 20, 1969, the dream of putting a human on the Moon became reality when Neil Armstrong stepped off the Apollo 11 spacecraft and onto the rocky, dusty lunar terrain. Ensuing Apollo missions returned the first scientific samples from an extraterrestrial body to Earth — nearly 850 pounds of Moon rock. Analysis of the Apollo rock samples revealed that the Moon consists predominantly of volcanic materials, and that its composition is very similar to that of the Earth.

What makes a rock? Geologists define rocks as substances that are made up of one or more minerals. For example, granite is a rock made up of the minerals quartz, mica, feldspar and sometimes hornblende. Most rocks are made up of several major types of minerals. The size and amount of mineral crystals may vary. So, different granites have different physical properties.

The Earth's crust is made up of dozens of different kinds of rocks. But, each rock is made in one of three ways:

Igneous rocks are called fire rocks and are formed either underground or above ground. Underground, they are formed when magma deep within the Earth becomes trapped in small pockets. As these pockets of magma cool slowly underground, the magma becomes igneous rocks. Igneous rocks are also formed when volcanoes erupt, causing the magma to rise above the Earth's surface. When magma appears above the Earth, it is called lava. Igneous rocks are formed as the lava cools above ground.

Metamorphic rocks are rocks that have changed into another kind of rock. These rocks were once igneous or sedimentary rocks. How do sedimentary and igneous rocks change? The rocks are under tons and tons of pressure, this causes a great amount of heat to build up, and this causes them to change. Gneiss is a kind of metamorphic rock. They once were granite, which is an igneous rock, but heat and pressure changed them.

Sedimentary rocks are made when little bits of our soil and particles are washed downstream and settle to the bottom of the rivers, lakes and oceans. Layer after layer of



eroded soil and particles is deposited on top of each. These layers are pressed down more and more through time, until the bottom layers slowly turn into rock. Conglomerate rocks are sedimentary rocks. They are made up of large sediments like sand and pebbles. The sediment is so large that pressure alone cannot hold the rock together; it is also cemented together with dissolved minerals.

In this lesson, students will observe and describe physical characteristics of these three kinds of rocks.

## Guidelines

1. Read the corresponding NASAexplores K-4 article orally.
2. Tell the students, "This story talks about rocks that have been found on the Moon. Today, we are going to pretend to be scientists who study rocks. The rocks we find on Earth are made in three ways."
3. Distribute the Student Sheets. Distribute the rocks samples. Have students complete the activity as directed.
4. Then, distribute the edible samples. Have students look at the descriptions of the real rocks and decide what type of rock each edible rock is.

## Discussion / Wrap-up

- Discuss each type of rock and how it is formed. Have students share ways they remember how each type of rock is formed.

## Extensions

- Have students collect rocks and bring them to school to classify.



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Student Sheet(s)

1. Take the rock from the bag.
2. Make a careful drawing of the rock. Be sure to show all you see.
3. Write two to three sentences telling about the rock. How does it feel? What colors are in the rock? Tell anything about the rock that surprises you.

<b>How Rocks Form</b>		
Igneous Rocks	Sedimentary Rocks	Metamorphic Rocks
<p>Igneous means made from fire or heat. When volcanoes erupt, the liquid rock comes up to Earth's surface. When it cools, it makes rocks. Sometimes, it cools inside the Earth and makes rocks, too.</p>	<p>These rocks form when layers of sand, soil, mud, pebbles and clay pile up. This puts weight on the bottom layers. They squeeze together.</p>	<p>Metamorphic rocks are rocks that have changed. Metamorphic rocks were igneous or sedimentary. They were changed by heat or pressure. When the Earth's crust moves, it causes rocks to get squeezed so hard that the heat causes the rock to change.</p>
Rocks		
<p>Granite Obsidian Pumice</p>	<p>Conglomerate Sandstone Shale</p>	<p>Slate Marble Quartzite</p>

