



# OUTDOOR NATURE AWARD



## PROJECT: ROCKS & MINERALS

### GOALS

- A. **ROCK FACTS:** Learn at least four types of rock.
- B. **ROCK CHALLENGE:** Complete one of three.

### A. ROCK FACTS

Geology is the study of the earth. Geologists study the earth's processes (earthquakes, floods, landslides, and volcanic eruptions, etc.), the earth's materials (oil, metals, precious jewels, rocks and minerals), and the earth's history. Geologists also predict the ways the earth will change.

#### Key Terms (Identify four.)

- Magma:** Hot liquid rock below the earth's crust. On the earth's surface, it is called lava.
- Igneous Rocks:** Rocks formed by cooled magma or lava. Examples: granite, basalt, obsidian, pumice, etc.
- Sedimentary Rock:** Loose sand, mud, minerals and gravel that settled under water is formed into stone by great pressure over time. Examples: sandstone, limestone, etc.
- Metamorphic Rock:** Sedimentary rock changed by heat, pressure, or chemicals below the earth's surface. Examples: marble, slate, quartzite.
- Crystallized Minerals:** Minerals (non-living chemicals) with a repeating structure. Crystallized minerals can be part of a rock (quartz) or found in deposits among the rocks. Examples: salt, alum, zinc, copper, gold, titanium.

### B. ROCK CHALLENGE

Complete one of the following experiments about rocks and minerals.

#### Option 1—Igneous Rock Baking

This experiment will help show how volcanic rock is formed.

- pie pan or brownie pan
- spray cooking oil
- 1 cup of sugar
- 1/8 t. of baking soda
- 1/8 t. salt
- 1/2 t. vanilla

**FUN FACT:** Magma that cools slowly forms rocks with large crystals. Magma that cools quickly (from a volcano) forms igneous rocks that have small crystals such as obsidian. Your experiment represents the "lava" volcanic rock formation!

1. Spray the pie/brownie pan with cooking oil and set aside.
2. (Adult help needed) Put 1 cup of sugar on medium heat and constantly stir until the sugar melts into a golden syrup. Remove from heat.
3. Quickly stir in baking soda, salt, and vanilla.
4. Immediately, before the mixture has time to cool, pour the hot "lava" into the oiled pan.
5. Put the pan in the refrigerator for one hour to let it cool and form "igneous rocks." Remove from the fridge and crack it into pieces to eat and enjoy.

## Option 2—Sedimentary PB & J Sandwiches

Create a PB & J sandwich “model” of how sedimentary rocks are formed.

- 2-3 slices of white bread (crust removed)
- 2-3 slices of wheat bread (crust removed)
- peanut butter
- jelly
- straw (as wide as possible)

### **Part 1: Sedimentary Rock Layered Sandwich**

1. Remove crusts from 2-3 slices of white, and 2-3 slices of wheat bread.
2. (Alternate white and wheat bread as you stack layers.) Spread peanut butter between the bottom layer and the next layer up.
3. Spread jelly on the next layer up. Continue to alternate peanut butter and jelly (do not spread anything on the top).

### **Part 2: Core Sampling**

1. Put your model on a plate and grab a drinking straw. The wider and more clear the straw, the better your core sample will be.
2. Put one end of the straw on the center of the rock model and slowly turn the straw back and forth, helping it pass through the layers of “rock.”
3. Observe your layers (as geologists do when drilling into the earth) and identify them.
  - Bread*: Represents layers of rock
  - Peanut Butter*: Represents mud
  - Jelly*: Represents dissolved minerals that solidify when dried

**FUN FACT:** Core sampling of layers of rock is how geologists find coal, oil, and metals.

### **Part 3: Pressurized Rock Formation**

1. Learn how your sedimentary rocks turn into metamorphic rock with heat and pressure! Place foil on top and bottom of your “sandwich”.
2. Then place 3 heavy books on top of it for 1 hour.
3. Then remove and wrap your “pressurized sedimentary rock” in foil. Ask an adult to help you by placing this foil wrapped “rock” in the oven at 400 F for 2 hours. Remove and let cool.
4. The following changes should have taken place. First your layers became very flat and squeezed through pressure, then your rock heated and changed color!

**FUN FACT:** With heat and pressure, limestone will turn into marble, and sandstone will turn into quartzite.

### Option 3—Growing Crystals and Minerals:

Make crystals using the three minerals: alum, kosher salt, and epsom salt.

- |  |  |
|--|--|
| <input type="checkbox"/> 1/2 cup measuring cup | <input type="checkbox"/> 3 shallow dishes                        |
| <input type="checkbox"/> 2 1/2 T kosher salt   | <input type="checkbox"/> 2 1/2 T alum (grocery spice aisle)      |
| <input type="checkbox"/> 2 1/2 T epsom salts   | <input type="checkbox"/> 1/2 cup hot tap water                   |
| <input type="checkbox"/> 3 pencils             | <input type="checkbox"/> 3 pieces of string, one foot long each. |

Label one dish “alum,” another “kosher salt,” and the last “epsom salt.”

#### *Alum Crystals:*

1. Stir in 2-1/2 tablespoons alum and 1/2 cup hot tap water (if adult available, use boiling water).
2. Keep adding additional alum until no more will dissolve; keep stirring.
3. Tie a piece of string or pipe cleaner to the middle of a pencil. Lay the pencil across the top of the dish so that the string hangs into the solution.
4. Put the dish in a warm place and wait for the crystals to grow. They are usually visible in 30 minutes and grow in size after a few hours. Leave dish for several days until all the water evaporates.

#### *Kosher Salt & Epsom Salts:*

1. Repeat steps 1-4 above, except use kosher salt instead of alum.
2. Repeat steps 1-4 again with epsom salts. Make sure to use a clean spoon when stirring.
3. Remember to leave the dishes out for several days until all of the water evaporates!

#### What will each crystal look like?

- Alum: Diamond shaped
- Epsom Salt: Long rectangular columns
- Kosher Salt: Cubes

### **RESEARCH MORE**

- *Smashing Science Projects about Earth's Rocks and Minerals* by Robert Gardner (See pages 10-11, 30-31, 34-45).
- *Science and Craft Projects with Rocks and Soil* by Ruth Owen
- *Let's Go Rock Collecting* by Holly Keller
- Look up videos of the Grand Canyon to see sedimentary rock at its finest.
- Find a Rocks and Minerals field guide from your library and start a rock collection, using egg cartons to hold them and label each type.

*My child has successfully completed the Project Goals for the topic—Rocks & Minerals.*

Adult Signature: \_\_\_\_\_ Date: \_\_\_\_\_

*(Complete SIX projects to earn your NATURE award)*