Cleveland Museum of NATURAL HISTORY

**TEACHER GUIDE**

# Rocks and Minerals: It's NOT "Hard" Science

60 Minute Earth Science Lesson
Interactive Video Conference
Grades: 3-8

## Rocks and Minerals: It's NOT "Hard" Science

### Description

Are you 'losing your marbles' when it comes to getting 'sedimentary' students interested in the rocks beneath their feet? Don't 'sulphur' alone…we'll help you unearth an avalanche of appreciation for the original 'hard' sciences. This overview of geology and mineralogy basics will whet your students' 'apatite' for Earth Sciences as they plow through the rock cycle.
Can spectacular museum specimens make studying rocks fun? …Of 'quartz' they can!

### Objectives

- Define the difference between a rock and a mineral
- Describe the three rock groups, how they are formed, and give an example of each
- Determine whether a rock is sedimentary, metamorphic or igneous based on its physical properties
- Practice common geologist methods of observing and categorizing rocks and minerals

### Ohio's Learning Standards

**Grade 3:** Earth and Space Science – Earth's Resources
- Earth's nonliving resources have specific properties
- Earth's resources can be used for energy
- Some of Earth's resources are limited

**Grade 4:** Earth and Space Science – Earth's Surface
- Earth's surface has specific characteristics and landforms that can be identified
- The surface of Earth changes due to weathering
- The surface of Earth changes due to erosion and deposition

**Grade 6:** Earth and Space Science – Rocks, Minerals and Soil
- Minerals have specific, quantifiable properties
- Igneous, metamorphic and sedimentary rocks have unique characteristics that can be used for identification and/or classification
- Igneous, metamorphic and sedimentary rocks form in different ways
- Soil is unconsolidated material that contains nutrient matter and weathered rock
- Rocks, mineral and soils have common and practical uses

**Grade 8:** Earth and Space Science – Physical Earth
- A combination of constructive and destructive geologic processes formed Earth's surface.
- Evidence of the dynamic changes of Earth's surface through time is found in the geologic record.


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## How You Can Help Us Make This Virtual Program A Success…

- If your students are joining us from your classroom computer, please arrange your room and projection screen so everyone can see us clearly.
- If you and your students are joining us from your homes, we will have an educator monitoring the Chat feature for questions. We request that you or another staff person serve as a Co-Host to help monitor students for any inappropriate Chat or camera behavior.
- If you will have a hybrid class (some at school, some joining from home), our educator will monitor the Chat and camera behavior, and we reserve the right to temporarily move any disruptive students to our Waiting Room so we or school staff can correct the undesired behavior.
- If you prefer, we can turn off all cameras and interact solely via the Chat feature.

## Vocabulary

**atom** - the smallest particle of matter that possesses the properties of an element.

**clastic** - describes rocks made from fragments of older rocks.

**cleavage** - the tendency of certain minerals to break along planes of weakness, producing flat surfaces.

**compound** - a substance composed of two or more chemical elements. Most minerals are compounds.

**crystal** - a solid object with flat sides (called faces) that meet in straight lines and sharp points produced by an orderly arrangement of chemical elements or compounds.

**crystal system** - a classification method for identifying crystals by shape, dividing them into seven groups: isometric, tetragonal, hexagonal, trigonal, orthorhombic, monoclinic and triclinic.

**element** - a substance made of only one kind of atom.

**deposition -** the settling out or placement of rock, particles of rock, or organic matter, generally referred to as sediments, after transportation by wind, water, ice, or gravity.

**extrusive** - igneous rock formed outside of Earth's crust.

**fluoresce** - to emit light or another type of radiation.

**gem** - any precious or semi-precious stone, especially those used for jewelry or ornamentation.

**hardness** - resistance of the surface of an object to scratching/abrasion. Measured on Mohs scale of hardness: a sequence of 10 common minerals arranged according to their ability to be scratched by specific materials.

**igneous rock** - rock that has cooled and hardened from magma.

**intrusive rock** - igneous rock formed inside of Earth's crust.

**lava** - molten rock that flows out of a volcano or other crack in the crust; also the name for the rock formed this way.

**magma** - naturally occurring molten rock or liquid rock below the surface of the earth.

**metamorphic rock** - a rock that has been changed by heat, pressure or heat and pressure together.

**mineral** - a naturally occurring inorganic solid composed of an orderly arrangement (crystalline structure) of one or more chemical elements, OR a necessary chemical nutrient.

**Plate Tectonics** - a theory explaining the movement of Earth's plates.

**pyroclastic -** composed chiefly of rock fragments of explosive origin, especially those associated with explosive volcanic eruptions. Volcanic ash, obsidian, and pumice are examples of pyroclastic materials.

**rock** - natural collections or aggregates of one or more minerals.

**sedimentary rock** - a type of rock formed by weathering or chemical buildup as mineral particles are deposited, buried and squashed into layers by water, wind or ice and cemented together.

**sediments** - particles eroded or broken from rocks or minerals, or produced by plant, animal or natural chemical activity.

**tectonic** - relating to the movements of Earth's crust.

**weathering** - the chemical or mechanical breakdown of rocks into sediments by water, wind, ice and/or the action of plants and animals.

## Extension Activities

1. **Beautiful Borax**

- Borax, also known as sodium tetraborate, is a mineral with small crystalline structures that dissolve easily in water, and is often used to make laundry detergent work better. There is a town called Boron, California, where a huge open pit mine is one of the richest borate deposits on the planet. Here's how to use laundry Borax to make a cool crystal-covered ornament. *NOTE: Borax crystals may look delicious, but they are not edible.*
- Make a snowflake shape with several pipe cleaners. Tie it to a string, and then tie the other end of the string in the middle of a pencil. Place the snowflake in a jar or pot with a mouth small enough that the pencil can lie across it, suspending the snowflake in the container. Make sure that the snowflake hangs without touching any part of the jar. Take the snowflake out of the jar.

- Fill the empty jar with enough cold water to completely submerge the snowflake. Empty the water into a pot or kettle, measuring how many cups you need as you go. Bring the water to a boil, and for every cup of water it takes to fill your jar, measure 3 tablespoons of Borax and pour them into your jar. Once the water is boiling, pour it into the jar and stir it until all the Borax is dissolved.
- Hang your snowflake in the jar so that it is completely covered in the solution. Let it sit overnight. Gently remove your now crystal-covered snowflake in the morning and let it dry by hanging it somewhere you don't mind a bit of dripping Borax solution.
- Optional: To make colored crystals, add 1-2 drops of food coloring to the boiling water. To make your ornament glow in the dark, paint the pipe cleaner snowflake with glow-in-the-dark paint in step one and let it dry completely before going on to step two. Hang your ornament somewhere those crystals can reflect sunlight!

**2. Mini-Volcano Mayhem**

- You will need: 2 film canisters (use a hammer and nail to poke a small hole in the lid of one canister), effervescent antacid packets, water and dish soap (several small drops)
- Conduct this experiment on a table that can get wet. Have paper towels ready!
- Fill one film canister halfway with water, and add a few drops of dish soap.
- Open effervescent antacid packet and break one tablet in half.
- Place the half tablet into the soapy water and, using the lid with a hole poked in it, seal canister tightly.
- Observe! Foamy "lava" will come oozing out of your tiny volcano. This is similar to the bubble-filled lava that forms pumice rocks, on what is called a *shield volcano*.
- Repeat same steps for a tiny exploding *stratovolcano*, but switch to the film canister WITHOUT a hole on the lid. Once the lid is placed tightly on the canister the trapped gas will cause the lid to pop off with a loud "BANG!", similar to the explosions from volcanoes that result in "bomb" lava rocks. Make sure no students are standing near the canister once you put the lid on!

## Online Resources for Teachers and Students

Click the link below to find additional online resources for teachers and students. These websites are recommended by our Museum Educators and provide additional content information and some fun, interactive activities to share with your class.
CMNH Educators regularly review these links for quality. Web addresses often change so please notify us if any links have issues.

Cleveland Museum of Natural History https://cmnh.org/edlinks