CLEVELAND MUSEUM
OF NATURAL HISTORY
100 YEARS OF DISCOVERY

Rocks and Minerals:

It's NOT "Hard" Science

BONUS RESOURCE
Monday, October 25
2:00 P.M.

Watch on the Hudson Library
Facebook page anytime before 11/3

Plan a visit to the Cleveland Museum of Natural History.
Advanced Ticket Purchase is Required.

MUSEUM HOURS
Tuesday–Sunday: 10am–5pm, (Closed Monday)
For more details visit:
https://www.cmnh.org/visit

HUDSON LIBRARY
& HISTORICAL SOCIETY

Rocks and Minerals

Vocabulary Guide

- **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.

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Rocks and Minerals

Vocabulary Guide
Continued

- **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

- 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!

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Extension Activities
Continued

- 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

"HARD" SCIENCE AROUND YOUR HOUSE WORKSHEET

Ready to discover how many rocks and minerals YOU use every day? Check off how many of these items you can find in your home, and have them with you when your Museum Educator starts the program!

ROCKS

✓

AN INTERESTING ROCK _____

FOOD WITH MORE THAN ONE INGREDIENT _____

SOMETHING PLASTIC _____

Listen for these answers during our program and fill in the blanks. Can you do the math?

About how hot is a flow of basaltic lava?

_____ degrees F°.

1,221 degrees F° is hot enough to melt an aluminum can.

What is the difference between those temperatures?

_____ degrees F°

MINERALS

✓

SOMETHING SHINY _____

SOMETHING NOT SHINY _____

SOMETHING METAL _____

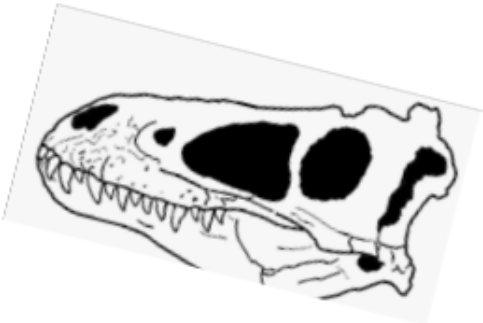
SOMETHING GLASS _____

TOOTHPASTE _____

A PENCIL _____

SOMETHING ELECTRONIC _____

MINERAL SUPPLEMENTS (ASK PERMISSION FROM AN ADULT) _____



THE CLEVELAND MUSEUM OF NATURAL HISTORY

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1 Wade Oval Dr., University Circle, Cleveland, OH 44106 9/4/20

Name:_____

Rocks and Minerals

Find the hidden words. The words are horizontal, vertical, or diagonal.

c	o	w	v	d	w	r	o	c	k	k	k	f	f	t
t	s	k	i	g	n	e	o	u	s	r	o	c	k	s
l	u	v	o	l	c	a	n	o	l	z	q	i	o	v
s	x	u	i	n	n	e	r	c	o	r	e	n	b	m
s	l	m	i	n	y	c	r	y	s	t	a	l	f	t
e	w	a	x	g	q	r	y	l	m	c	x	o	a	p
s	h	g	r	m	a	u	z	a	o	i	s	q	h	e
q	u	m	g	e	r	s	c	v	i	s	b	j	s	b
r	h	a	a	o	n	t	w	a	i	m	e	e	m	n
n	k	o	f	e	n	i	a	l	b	m	d	a	w	q
p	n	b	q	o	n	q	m	k	t	f	y	x	k	h

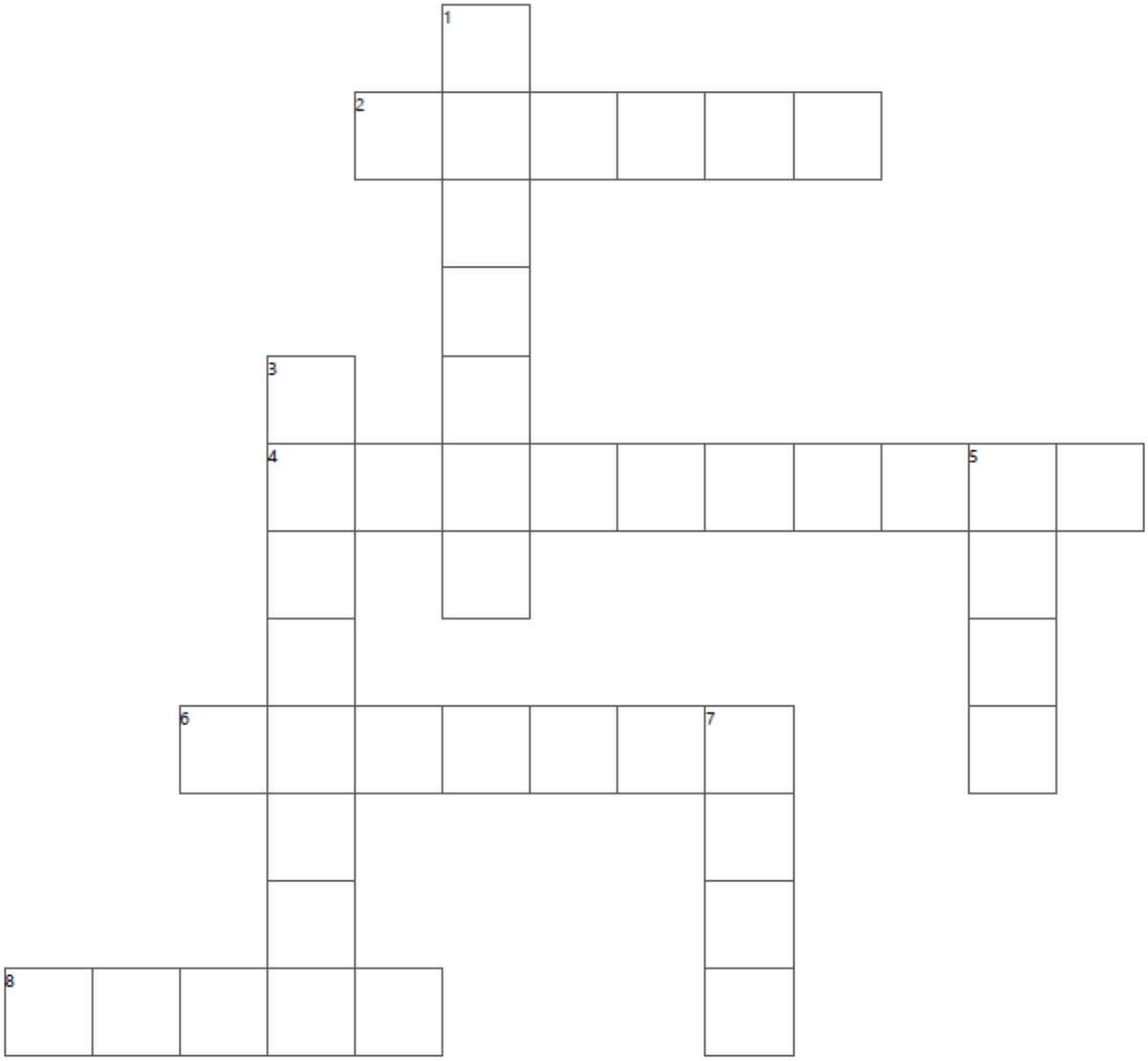
1. fossil
2. rock
3. magma
4. minerals
5. inner core
6. igneous rocks
7. volcano
8. lava
9. crust
10. crystal

Score: /12

Name:_____

Rocks and Minerals

1. Look at the clues below and determine the word that fits in the cross word puzzle either across or down.



ACROSS

2. Found in rocks, imprint of animal or plant from long ago.
4. The center of earth.
6. Grain of a mineral with a smooth side.
8. The outer layer of earth.

DOWN

1. Opening in the earth's crust.
3. Building blocks of rocks.
5. Solids made of minerals and rock pieces.
7. Magma that has erupted on the earth's surface.

Score: /12

Name:_____

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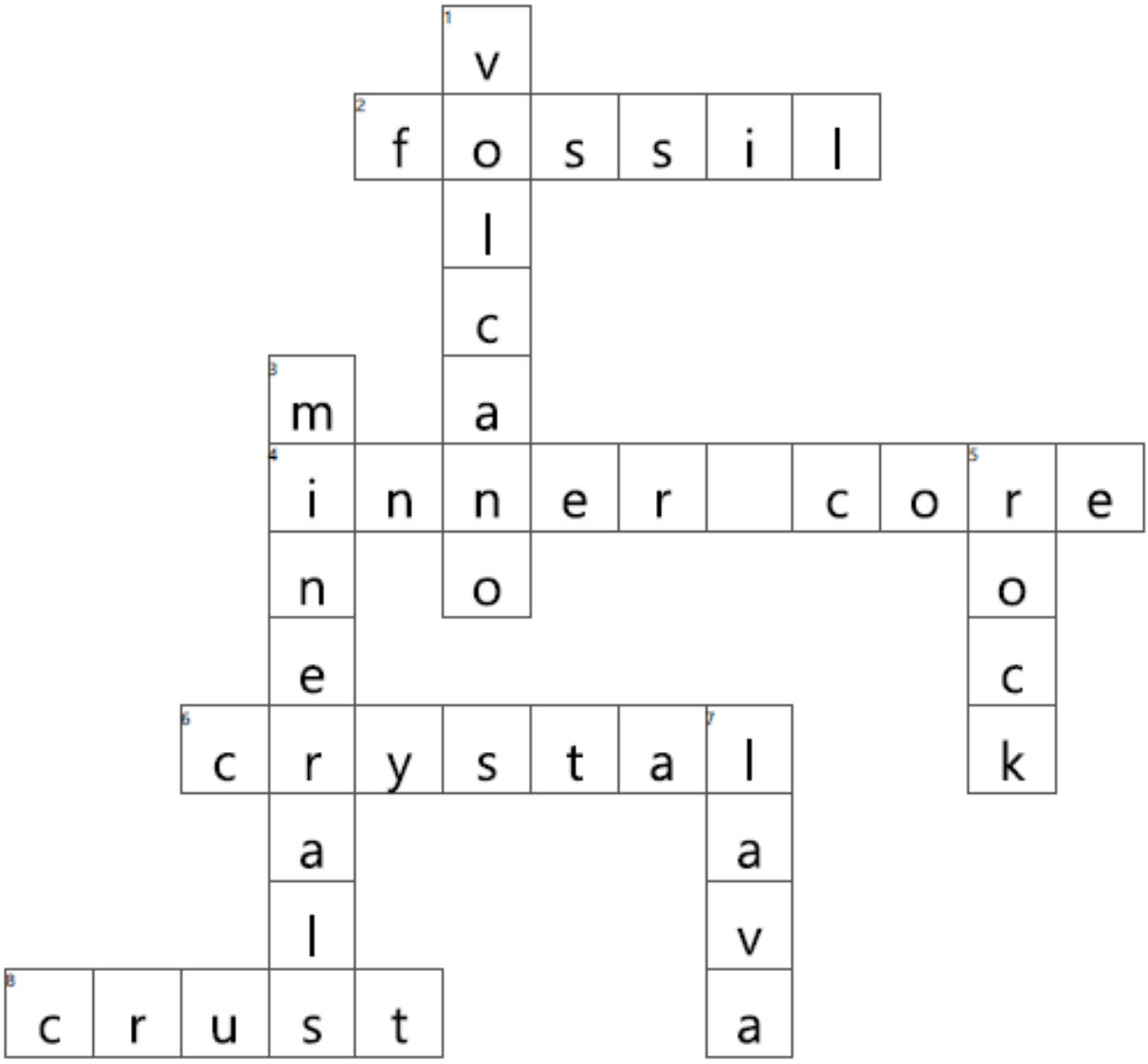

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The Rock Cycle

The earth is always changing. Processes like erosion, weathering, deposition and heat and pressure from the middle of the earth are all responsible for our changing earth. The rock cycle has been going on for millions of years and it takes millions of years for rocks to go through their cycle. The longest and slowest cycle on earth is the rock cycle. The rock cycle has been going on for as long as Earth has been around and it is going on right this minute. The rock cycle is the process on earth that causes rocks to continuously change from one rock type to another.

The three types of rock, igneous, sedimentary and metamorphic are found in the earth's crust which is over 40 miles deep (70 km) Below that is magma, molten or semi molten which means it is still too hot to harden. Melted rock in the form of hot magma from the inner core of the earth comes to the surface of the earth. This hot magma then cools which causes it to harden and form igneous rocks. Rocks will fall and then water, glaciers, weather and the wind will carry the rocks to different places which causes them to break up into smaller rocks. The broken rocks slowly build up into layers. When the rocks start to layer they become the next cycle of rock which is sedimentary rocks which is why when we see sedimentary rocks, we can see the various layers. Over many, many more years, the sedimentary rocks become buried deep into the earth's crust. The heat and pressure from the center of the earth heats this rock up and it then changes to metamorphic rocks. The metamorphic rock melts and then the process starts over again. Sedimentary rocks cover 70% of the earth's surface.

Questions:

1. **In your opinion, why does the rock cycle take so long?**
2. **What does heat and pressure have to do with the rock cycle?**
3. **How do rocks get moved from one place to another?**
4. **Why is the earth always changing?**
5. **Why are there many layers in sedimentary rocks?**
6. **Describe the rock cycle in your own words.**
7. **If rocks are always moving, why aren't they considered a living thing?**
8. **What processes on earth help with the rock cycle?**