

# ROCKS AND MINERALS

## Science and Social Studies Standards Covered:

SS (9-12) Geology

3. Explain natural phenomena that shape the surface of Earth, including rock cycles, plate motions and interactions, erosion and deposition, volcanism, earthquakes, weathering, and tides.

5. Classify rocks as sedimentary, igneous, and metamorphic.

7. Describe processes of rock formation.

15. Identify geological regions in Alabama and the southeastern United States.



The Alabama Museum of Natural History (AMNH) is part of the University of Alabama Museums and is located on the UA campus in Smith Hall. Opened in 1910, it is the oldest natural history museum in Alabama, and one of the oldest natural history museums in the nation. AMNH's

mission is to broaden the knowledge of natural sciences and human culture through collections and quality programs of research, instruction, and service.

Rocks and Minerals: Have you ever wondered what the difference between a rock and a mineral was? Have you ever seen a diagram of the rock cycle and thought 'What is that?' This Rocks and Minerals program is designed to answer those questions and many more. It discusses the definitions of both rocks and minerals, and explores their characteristics and how they are formed. The program includes hands-on experience with rocks and minerals as well as the chance to test minerals for various characteristics. Your students will get to let loose their inner geologist and use these tests to try and figure out the names of some mysterious mineral samples. This program is free and takes place in your classroom.



# ROCKS AND MINERALS

## *Did you know?*

The Alabama Museum of Natural History is right on the University of Alabama campus? It is housed in Smith Hall near the Gorgas Library.

## *Did you know?*

AMNH is a great destination for school field trips. Guided tours cost \$2 per student. If you would like a hands-on component added, a tour and Discovery Lab is only \$5 per student.

## **For information**

regarding field trips, you can call (205) 348-7550 or email [programs@ua.edu](mailto:programs@ua.edu).

## **For more info or to schedule**

this in-school program for your room, email [programs@ua.edu](mailto:programs@ua.edu)

[www.amnh.ua.edu](http://www.amnh.ua.edu)



## Suggested Pre-visit activities:

- The Rock Cycle
- Moh's Hardness Scale
- Rocks and Industry

## Suggested Post-Visit activities:

- Rocks vs. Minerals
- Its Elemental My Dear Watson
- Types of Rocks
- Rocks and Industry



## Books about rocks and minerals:

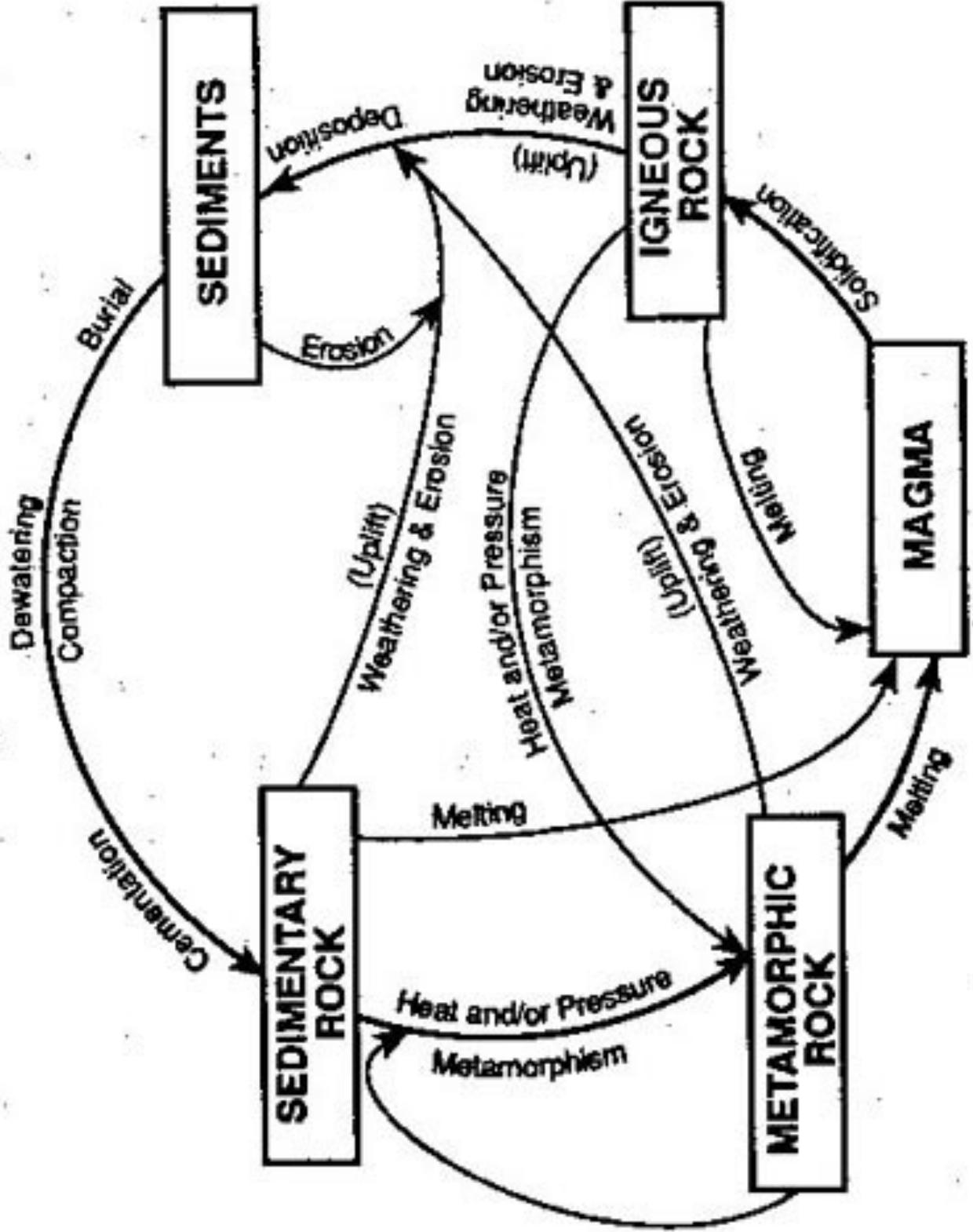
- *The Practical Geologist* by Dougal Dixon
- *Rocks and Minerals* from Eyewitness Books
- *Lost Worlds in Alabama Rocks* by Jim Lacefield

## Videos and websites about rocks and minerals:

- [USGS Secondary Education Website](#)
- [Rock and Minerals Videos](#) at National Geographic Digital Motion



# Rock Cycle in Earth's Crust



## Rock Cycle Questions:

1. The recrystallization of unmelted material under heat and pressure result in what type of rock?
2. Weather and erosion only create sedimentary rocks from sediments after what key process?
3. Can form either above or below ground, but always from melted materials.

# MAKE YOUR OWN MINERAL TESTING KIT

## ***ALL YOU NEED IS:***

- Your fingernail
- A penny
- A steel nail
- Piece of glass with smooth edges
- Vinegar
- Eyedropper
- White ceramic plate
- Rock and mineral samples
- Moh's Hardness Scale
- Black light (optional)
- A box or container for your kit

## ***WHAT TO DO:***

- ⇒ Your fingernail, the penny, the nail, and the glass plate are all used to test hardness. You can determine the type of mineral you have based on Moh's Hardness scale.
- ⇒ The vinegar and eye dropper are used to test for calcium carbonate. If a mineral fizzes when vinegar is dropped on it, it has calcium carbonate in it. Calcite and aragonite are two minerals with calcium carbonate.
- ⇒ The ceramic plate is used to test for streak color. Wipe a mineral across the plate to discover what streak color it leaves.
- ⇒ You can test for fluorescence with the black light. Only a few minerals fluoresce.

# MOH'S HARDNESS SCALE

Hardness	Mineral	Description
1	Talc	Fingernail scratches it easily.
2	Gypsum	Fingernail scratches it.
3	Calcite	Copper penny scratches it.
4	Fluorite	Steel knife scratches it easily.
5	Apatite	Steel knife scratches it.
6	Feldspar	Steel knife does not scratch it easily, but scratches glass.
7	Quartz	Hardest common mineral. It scratches steel and glass easily.
8	Topaz	Harder than any common mineral.
9	Corundum	It scratches Topaz.
10	Diamond	It is the hardest of all minerals.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# ROCKS vs. Minerals

What is the difference between a rock and mineral? Read each fact and decide whether it is about a rock or a mineral. Write the correct term next to each fact.

1. A naturally occurring, inorganic solid with an ordered internal structure.

\_\_\_\_\_

2. A naturally occurring solid substance that is usually made up of minerals.

\_\_\_\_\_

3. Has a specific chemical composition.

\_\_\_\_\_

4. Can be classified as either clastic or crystalline.

\_\_\_\_\_

5. Amber and coal are examples of \_\_\_\_\_.

\_\_\_\_\_

6. Can be identified based on a series of tests for specific characteristics.

\_\_\_\_\_

7. Can contain unconformities which indicate a disruption in the deposition.

\_\_\_\_\_

8. Diamond and copper or examples of \_\_\_\_\_.

\_\_\_\_\_

9. Grouped into three main types, which can be converted into each other.

\_\_\_\_\_

10. Silicates, halides, sulfates, and nitrates are some categories of these.

\_\_\_\_\_

BONUS: Table salt is a \_\_\_\_\_.

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# ITS ELEMENTAL MY DEAR WATSON

Can you discover the elements which make up these minerals? Read each chemical formula and write the names and amounts of each element below it.

1. Topaz       $\text{Al}_2\text{SiO}_4(\text{F},\text{OH})_2$

\_\_\_\_\_

2. Talc       $\text{Mg}_3\text{Si}_4\text{O}_{10}$

\_\_\_\_\_

3. Selenite       $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

\_\_\_\_\_

4. Eosphorite       $\text{MnAl}(\text{PO}_4)(\text{OH}_2) \cdot \text{H}_2\text{O}$

\_\_\_\_\_

5. Endlichite       $\text{Pb}_5\text{Cl}[(\text{As},\text{V})\text{O}_4]_3$

\_\_\_\_\_

6. Chondrite       $(\text{Mg},\text{Fe})_3(\text{SiO}_4)(\text{F},\text{OH})_2$

\_\_\_\_\_

7. Beryl       $\text{Be}_3\text{Al}_2(\text{SiO}_3)_6$

\_\_\_\_\_

8. Sodalite       $\text{Na}_4\text{Al}_3\text{Si}_3\text{O}_{12}\text{Cl}$

\_\_\_\_\_

9. Microcline       $\text{KAlSi}_3\text{O}_8$

\_\_\_\_\_

10. Vesuvianite       $\text{Ca}_{10}\text{Mg}_2\text{Al}_4(\text{Si}_4)_5(\text{Si}_2\text{O}_7)_2(\text{OH})_4$

\_\_\_\_\_

**\*\*BONUS:** What is the chemical formula for diamond?

\_\_\_\_\_

Name: \_\_\_\_\_

Date: \_\_\_\_\_

# MINERAL CHARACTERISTICS

Use your knowledge of mineral characteristics to decode the message at the bottom of this sheet. Match the letter in front of each description to its appropriate mineral characteristic to reveal the message.

- R. How resistant a mineral is to being scratched.
- L. The shape of the crystal formed by the mineral.
- K. How minerals break apart.
- O. How light shines off of the surface of a mineral.
- Y. The color a mineral makes when streaked.
- E. Whether or not a mineral glows when exposed to ultraviolet light.
- S. How heavy a mineral is when compared to an equal amount of fresh water.
- G. The color of a mineral.
- C. How a mineral reacts under deformation.

\_\_\_\_\_  
Color    Fluorescence    Luster    Crystal Habit    Luster    Color    Streak Color

\_\_\_\_\_  
Hardness    Luster    Tenacity    Cleavage    Specific Gravity    !

# Science Journal Questions

## Before visit:

- ⇒ What is a rock?
- ⇒ What is a mineral?
- ⇒ Where do minerals come from? Why are some valuable?
- ⇒ How are rocks used in everyday life?
- ⇒ What geologic formations and types of rock are present in your county?

## After visit:

- ⇒ Why is the rock cycle not a one-way process?
- ⇒ What are the three types of rocks? What are characteristics of each?
- ⇒ What is the difference between an intrusive and an extrusive rock?
- ⇒ What minerals are treasured in our culture? What about other cultures? Are the same minerals and rocks valued the same way?

# ROCKS AND MINERALS ACTIVITIES

- Igneous and Sedimentary Rocks- Teacher will take some old candles and melt them in a pan, and then pour the melted wax into a mold. Observe the wax as it melts and again as it cools in the mold. Carefully touch the wax at various stages with the eraser end of a pencil. Record your observations. Take hardened wax, and carefully scrape off some of the wax with the edge of a plastic knife. When you have made a large pile of wax shavings, cover it with a piece of paper and a heavy book and press it as hard as you can. What happens to the pile of wax shavings? Hold a piece of either your “igneous rock” or “sedimentary rock.” Warm it for a while in your hands and then squeeze it. What happens to the “rock”?
- Igneous Rocks- Teacher will demonstrate the formation of igneous rock by heating granular sugar in a pan on a hot plate. As soon as the sugar melts. He or she will remove it from the heat and carefully pour it down an inclined board. Observe how it moved and how it cools. Why do bubbles form on the surface of the cooling “magma”? Record your observations in your journal.
- Types of Rock- You will need two different colors of modeling clay. Form about 10 small spheres from each color of clay. These represent rock fragments of two different mineral types. Place all the spheres together in a loose pile. This represents the original sediment. Press the pile of clay spheres with the palm of your hand, but do not press hard enough to remove all the spaces between the spheres. What kind of rock does the pile represent? Now press the pile of spheres until their shapes are completely destroyed. What kind of rock have you now formed?

# MORE ROCKS AND MINERALS ACTIVITIES

- How can you make models of clastic sedimentary rocks?

Materials: 20 pieces of assorted hard candies, plastic bag, mallet or hammer

Procedure:

1. CAUTION: Do not eat any of the candy. Place 20 pieces of assorted hard candies into a plastic bag.
2. Carefully break the candy into pebble-sized fragments with a mallet or hammer.
3. Take half of the fragments, warm them in your hands, and press them together into a ball.
4. Place the remaining candy in a beaker of water, and stir until the fragments lose their sharp-edged appearance. Remove the rounded fragments, and form a second rock into the same manner as you did the first one.

Application: 1. Which candy “rock” is similar to a breccia? Which is similar to a conglomerate? 2. How do pebbles become rounded in nature?

- Practical Uses of Rocks- Contact an industry in your area, and inquire about metals and minerals used to manufacture their products. Some metals or minerals may be used as raw materials in the manufacturing process. Others may play a role in cleaning equipment or in making a manufacturing process safer or faster. Find out where they buy the resources they need. Record your information in your journal and report back to your class. (Holt Earth Science 1994)
- Rocks and Industry- Use your school or community library to find information about early industries near your home, such as the iron and steel industry of Pennsylvania and Birmingham or the copper industry of Colorado. Find out what materials these industries depended on and why they might have begun where they did. Record your findings in your journal.