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**Content Area: Earth Science Grade Levels: 9/10 Topic: Rocks & the Rock Cycle**

**Standards (SOL):**

**E. S. 1:** The student will plan & conduct investigations in which ……

**E. S. 6:** The student will investigate & understand the rock cycle as it relates to the origin & transformation of rock types & how to identify common rock types based on mineral composition & textures. Key Concepts include **a.**) igneous (intrusive & extrusive rocks; **b**.) sedimentary (classic & chemical) rocks; and **c.**) metamorphic (foliated & unfoliated) rocks.

**Objectives**:

To understand the processes by which rocks are formed define the 3 major groups of rocks.

The Rock Cycle is the process by which all rocks are formed and how basic Earth materials are recycled through time.

To illustrate the rock cycle and the 3 main types of rocks with crayons.

To demonstrate knowledge of the vocabulary associated with the formation of rocks.

**Materials & Resources**:

Lab worksheet and worksheets of the Rock Cycle & 3 Main Types of Rocks

Notes from Power Point on the Types of Rocks & the Rock Cycle

Crayons- 3 different colors per group- wrapped

Plastic knives- one per group or hand held pencil sharpeners

Aluminum foil- approximately 3”x 3” per group

Styrofoam cup- one per group

Hot water- from sink or Hot pot or Hot plate with beaker of hot water

Pie plate, tongs

Pot holders

Bowl with cold water (could have ice)

**Safety Concerns**:

Be careful with the hot plate. May have it at front table in lab where the teacher is in charge of it.

**Engage:**

**Time**: 5 minutes

Who can name any of the types of rocks? Have they always stayed the way they are now? Can they change? How do they get transformed from one to another? How can you tell how they originated? Will they continue to change? How?

**Explore:**

**Time**: 35 minutes for the Lab.

Students read and complete the **Understanding the Rock Cycle & the 3 Main Types of Rocks Lab** sheet with partners. The handout goes into detail about the content, directions, and inquiry as to what they are to get out of the lab. The papers are turned in when they are completed and then the teacher and class will go over them.

**Explain:**

**Time**: 30 minutes

Watch Power point on the **Types of Rock: Rock Cycle**. Complete **Three Main Types of Rocks** chart using the information presented. Students should then complete the **Diagram of the Rock Cycle** with their lab partners. They should then go over the information via the Power point to make sure it’s correct. They should go over the Lab in terms of how each step represented each part of the Rock Cycle. Vocabulary should be reviewed at this time.

**Extend:**

**Time: 5 minutes**

Go back and review the Objectives and questions in the Engage section.

**Evaluate**:

**Time**: **5 minutes**

Students write the 3 types of rocks and a short description of how they are formed to turn in as they leave class.

Teacher will grade and return Rock Cycle Lab. Students keep **Three Main Types of Rocks** and **Diagram of the Rock Cycle** for test review.

**Plans for Diversity**:

Sometimes, ADD, ADHD, ED, and LD students skim through labs and miss sections or do not realize that questions are asked and need to be answered. The lab has numbers and alphabet letters next to each question. Tell the students to READ the entire lab. Remind them that the blanks are places where questions are asked and need to be answered. They may not need the entire line. One word answers may do- keep their vocabulary word lists with them for spelling and definitions. Visually handicapped learners will need assistance of an aide who can make sure all steps are followed and be able to record all answers. The entire lab- more crayons, lots of shavings, etc. may be required to help with understanding. ED students may need to be reminded to take one step at a time. Students may put a check mark by each section as they complete it.

**Connections**:

How rocks change from one type to another over time through the Rock Cycle is the final concept in the Rock Unit. Students have completed various labs on each of the rock types. They will watch a summarizing video on the Rock Cycle. Afterwards, they will review with a Jeopardy game and take the Unit Test on the next day.

**Earth Science Demonstration: Understanding the Rock Cycle & the 3 Main Types of Rocks**

**Purpose: To illustrate the rock cycle and the 3 main types of rock (Igneous, Sedimentary, Metamorphic) with crayons.**

**Procedure:**

1. **Take 3 unwrapped crayons from the teacher and study them.**

A. Can you see different particles making up each crayon or does each crayon seem to be the same

 throughout? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B. How do you suppose the crayons were made? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

C. Which of the 3 types of rocks do the crayons represent? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

D. How does this type of rock form in nature? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Use a knife or a hand pencil sharpener to shave each crayon into small bits. Collect the bits on a piece of aluminum foil.**
	1. What is the name of the process in nature by which rocks are broken down into small bits

 \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

* 1. What are the small bits of rocks called? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	2. In nature, the small bits of rocks may be moved along by wind or water. What is the name for this process? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
	3. In nature, the small bits of rocks may collect somewhere, often at the bottom of a large body of water. Year after year, layer after layer of small bits of rocks may pile up. What is the term for this piling up? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
1. **Make a few layers of crayon bits on the sheet of aluminum foil. Wrap the foil up into a little packet.**

 **Place the packet on the floor and stand on it.**

1. In nature, the weight of the water, soil, or other rock on top of the rock bits presses & squeezes them. What is the term for this squeezing process? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Water containing dissolved minerals also helps to hold the rock bits together. What is the term for this process? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Together these 2 processes (squeezing & being held together by minerals) turn the rock bits into

a new rock. What is the term for this rock-forming process? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Open the packet and observe the crayon “rock.”**

A. Do the bits of crayon hold together somewhat now? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

B. Are you still able to see the various bits from which this crayon “rock” was made? \_\_\_\_\_\_\_\_\_\_\_\_

C. Would you consider this crayon “rock” to be weak (fragile) or strong (durable)? \_\_\_\_\_\_\_\_\_\_\_\_\_\_

D. Could it crumble easily? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

E. Which of the 3 types of rocks is represented here? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. **Wrap the crayon “rock” in the foil packet again. Place the packet in some very hot water in a Styrofoam cup for a short time, just long enough to warm it but not long enough to melt it. Then squeeze the packet with our fingers. Then place the packet on the floor and stand on it with just one foot, trying to get all of your weight on the packet.**

 In nature, a rock might get buried deep in the earth where it is affected by heat and pressure. This

 happens a lot during mountain formation.

A. Open the packet and observe this new crayon “rock.” Describe it. Tell how it looks different than it did

before. \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

B. can you see the little crayon bits as easily as you could before or have they sort of blended? \_\_\_\_\_\_\_.

C. Which type of the 3 types of rocks is represented here? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

1. **Make a little bowl out of the aluminum foil and place the crayon “rock” in it. Place the foil bowl in a disposable pie plate on a hot plate. Heat it until it melts completely. Then, close up the foil bowl to make a little packet. Place the packet in a cup of cold water. Let it cool for several minutes (3 or 4).**

 A. In nature, a rock might get buried extremely deep in the earth, beneath the crust, where it is very hot. The

 rock may melt. What is the term for the molten (melted) material deep in the earth? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 B. In nature, this molten material may rise to the surface and explode as a fiery volcano, then cool as it

 comes in contact with the cool air or water.

 C. Open the packet and observe this crayon “rock.” Can you see the various crayon bits? \_\_\_\_\_\_\_\_\_\_\_

 D. Does this crayon “rock” appear to be weak or strong? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

 E. Which of the 3 types of rocks is represented here? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Using your notes and the information above, complete the following:**

Rocks continuously \_\_\_\_\_\_\_\_\_\_\_ from one type to another; this is called the Rock Cycle.

For example:

An igneous rock may \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ (break into bits/sediments).

The sediments may be carried downhill by a stream.

The \_\_\_\_\_\_\_\_\_\_\_\_\_may end up at eh bottom of a quiet body of water where they pile up in \_\_\_\_\_\_\_\_\_\_\_\_.

The sediments may eventually be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_together and harden into a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rock.

For example:

A sedimentary rock may be \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_deeper and deeper.

It may be exposed to \_\_\_\_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_\_\_\_\_ and change into a \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_rock.

For example:

A rock may be buried very, very deep where temperatures are very, very hot and \_\_\_\_\_\_ to become \_\_\_\_\_\_\_.

One day the magma may \_\_\_\_\_\_\_\_\_ (come up) and \_\_\_\_\_\_\_ and \_\_\_\_\_\_\_\_\_ to form an \_\_\_\_\_\_\_\_\_\_\_\_\_rock.

**Use the following words in order to complete the Rock Cycle diagram on the following page.**

**The terms with an \* by them are used more than once.**

Sediments Magma Sedimentary Rock Igneous Rock Metamorphic Rock

Weathering & Erosion \* Heat & Pressure\* Burial & Melting\*

Weathering & Cooling Uplifting & Cooling Deposition & Lithification