

## Mary Ann Mutrux: Missouri State University – West Plains

**Lesson Title:** Rocking Through the Rock Cycle

**Grade Levels:** 5- 8

**Earth Science Area / Unit:** Geology - Rocks Unit

**Topic:** Rock Groups and Rock Cycle

**Earth Science Literacy Concept:** BIG IDEA 4. Earth is continuously changing.

4.6 Earth materials take many different forms as they cycle through the geosphere. Rocks form from the cooling of magma, the accumulation and consolidation of sediments, and the alteration of older rocks by heat, pressure, and fluids. These three processes form igneous, sedimentary, and metamorphic rocks.

**Lesson Summary:** The students will participate as matter traveling through the rock cycle while drawing cards from 4 rock matter stations (magma, igneous, sedimentary, and metamorphic). Afterwards, the student will demonstrate their path using a laser pointer in a projected large the rock cycle diagram.

**Materials:** This lesson requires cut out *Rock Station Cards* (3 copies of each station sheet), a laser pointer, a projected picture of the rock cycle and 4 small containers (baskets or boxes for cards). If possible, sample rocks from each rock group can be set around the card station for each of the three rock groups for students to observe while they wait to draw cards. Provide hand lenses at each station so the students can observe the rocks samples closely. Optional materials include a lava lamp for the magma station and a microscope with sediment sides at the sedimentary station.

**Safety Considerations:** The students need ample room to move about in the activity. In addition, students need to be directed on how to use the laser and NOT to point that laser at anyone at any time. If using a lava lamb tell students not to touch and have a sign next to the lamb to remind them.

**Prerequisite Knowledge:** Students should know the following terms: *igneous rocks, sediments, sedimentary rocks, metamorphic rocks, magma, lava and weathering.*

**Vocabulary:** The lesson introduces the term **rock cycle**.

**Embedded Science Vocabulary:** The following terms will be embedded in the instruction (see lesson steps): *quantitative data, frequency, scenario, extrapolate*

### **Qualitative Observations and Quantitative Measurements**

The students will make qualitative observations by examining any rocks displayed at the rock group stations (sight and touch) and observing the pathways that students make through the rock cycle diagram. Students will be making quantitative measurements by counting how many times they traveled through each rock station and the percentage of time that they spent in each station.

**Strategies and Delivery Methods Addressed:** This activity utilizes nonlinguistic representation because students move through rock group stations and draw cards directing their motions. In addition, they trace their paths through the rock cycle in a picture with a laser pointer. The lesson is also inquired based for students are not given facts, they activity focus' on student discovery.

**Depth of Knowledge:** This activity fits the Depth of Knowledge Skill Concept. Students USE the information to contrast and compare concepts (rock types and stations) and convert information into the rock cycle diagram.

**Possible Misconceptions:** Students will have difficult conceptualizing the vast amount of time that this activity represents. Students need to understand that this lesson is a random presentation of complex processes that occur between the Earth's geosphere, hydrosphere and atmosphere over millions of years. In addition, the rock cycle occurs over a vast area both on and under the Earth's surface.

### **Lesson Instructions:**

#### **Preparation:**

Make 3 sheets of each set of station cards. If possible, copy each set on a different color of paper so each set won't get mixed up.

Make a sign for each of the following stations:

Magma Station (1's start here) / Sedimentary and Sediments Station (2's start here) / Metamorphic Station (3's start here) / Igneous Station (4's start here)

Cut out the cards, mix them up and place them face down. Place each set of cards with the corresponding sign at the desired station location. Place the cards in a small box or basket.

Gather hand lenses, sample igneous rocks, sedimentary rocks and metamorphic rocks with hand lens for corresponding stations. If available, include a lava lamp if possible for lava station and a microscope with sediments slides for the sedimentary station. Have a rock cycle picture projected and a laser pointer ready.

**Warm Up:** Have students make a brainstorm list of things that they know go through a cycle. Facilitate a group discussion of their lists. Tell students that rocks also go through a cycle and that they are going to be matter traveling through the rock cycle. Inform them that they will be traveling through the *rock cycle* activity very quickly, but in reality this cycle takes thousands, millions and even billions of years to occur. Explain that they will change as they travel through the rock cycle as a result of internal forces in the Earth (heat and / or pressure) and external forces outside the Earth in the atmosphere and hydrosphere (weathering agents: frost wedging, wind and water abrasion, expansion/ contraction, action of gravity, chemical decomposition, glaciers, and root wedging). If students have covered physical and chemical changes of matter, explain that these processes are occurring as well as matter moves through the rock cycle. Include review of the following terms: *igneous rocks, sediments, sedimentary rocks, metamorphic rocks, magma, lava and weathering*.

### **Main Lesson / Activity Steps:**

1. Have the students count off from one to four.
2. Tell the ones that they will start at the magma station, the number two will start at the sedimentary station, the threes will start at the metamorphic station and the fours will start at the igneous station.
3. Tell students to number a sheet of paper from 1 to 25 and write *Rocking Through the Rock Cycle* at the top.
4. Have them number their paper from 1 to 25 before hand. Tell them that they are going to draw a total of 25 cards during the entire activity. Each number on the paper should correspond with the location that they draw the card. If they draw a "stay" card they need to record the name of the station they are at and then draw again. Explain that rocks spend a lot of time "staying" in one place for many many years! Therefore, they may have to stay and draw at the same station several times, before they can move on!

Explain that they need to take their paper and a pencil with them as they travel through the rock cycle to record their rocking journey as they go from station to station. Each person goes on their own journey!

5. Tell the students to draw a card read and record what happens to them and then do what the card tells them to do. After they draw a card the card should be placed at the bottom of the pile in the basket or box. Each time they draw they need to record the location designated on the card and follow the directions (stay or go to...)
6. Let the students travel through the rock cycle and record their journey for 25 trips.
7. Have students share their trip by using the laser pointer and showing the path of their rocking journey on the overhead of the rock cycle. Discuss the processes involved with each step.
8. Have students count the number of times they were in each station. Embed the *terms, frequency, and quantitative data* into instruction.

**Wrap Up:** Have the students share what they learned in the activity and what things surprised them. Ask the students if they went to all stations or just some. Have them speculate as to why they may or may not have traveled to all stations. Emphasize that the rock cycle is a very slow process that occurs over thousands and even millions of years between the geosphere, hydrosphere and atmosphere. Have students identify areas of the hydrosphere and atmosphere that were involved in the rock cycle. Be sure students comprehend the difference between internal forces (heat, pressure and mantle convection currents inside the Earth) and external forces outside the Earth (weathering) are both rock cycle forces of change. Embed the term *extrapolate* and *scenario* during the wrap up by noting that they can *extrapolate* how matter moves through the rock cycle based on the *scenario* they each encountered during the activity.

**Remediation:** To assist students with difficulty writing and recording information, give students a form with all four stations listed. Have the students place the number for each drawing they make under the name of the station. If students may have difficulty reading the cards, pair those students with a stronger student. Have them go through the journey together.

**Enrichment / Extension:** Have the students create a comic strip of several frames showing at how matter moves through the rock cycle. Have them make the rock matter (atoms) in the comic strip tell about the changes that are occurring to them.