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The Wagner Free Institute of Science and its supporters
The National Science Foundation, through NSF# 0139303 and #0440506
Saint Joseph's University

Sample Lesson from Grade 1 GeoKids Unit: Rocks and Soil

Week 8: Metamorphic Rocks

Standards:

Pennsylvania Academic Standards for Science and Technology

- 3.1.4. B Know models as useful simplifications of objects or processes
- 3.1.4. C Illustrate patterns that regularly occur and reoccur in nature
- 3.2.4. C Recognize and use the elements of scientific inquiry to solve problems
- 3.4.4. A Recognize basic concepts about the structure and properties of matter
- 3.5.4. B Know types and uses of earth materials

Materials:

Books: *Let's Go Rock Collecting*, by Roma Gans if desired
Poster with instructions for lesson
Index cards (2 per student)
Wax paper squares (2 per student)
Balls of different colored clay (2 different colors per student)
Heat Lamps (1 per group)
Trays (1 per group)
Small Ziploc baggies (2 per student)
Chocolate chips (1 bag, 3-4 chips per student)
Chart paper
Markers

Lesson:

1. Remind the class that there are three different ways that rocks are made. Review the types of rocks that we have already studied. (5 minutes)
2. Today we will show how metamorphic rocks are formed. Using the "Types of Rocks" poster, remind the class that metamorphic rocks are formed when one rock gets very hot and gets pushed on with a lot of force. (Try to get across the idea that igneous, sedimentary and metamorphic rocks morph when exposed to heat and pressure.) This rock changes from one type of rock into another type of rock. We call this newly formed rock a metamorphic rock. (5 minutes)

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3. Explain that we can't make our own metamorphic rocks in the classroom because these rocks take years and years to form. However, today we can make our own model to help us understand how metamorphic rocks are formed. Ask the class if they remember the meaning of the word "model." (5 minutes)
4. Each student will make a model of a metamorphic rock. Build the model together, going through the instructions listed on the poster, step by step as a class.
 - a. Give each student two squares of wax paper and two balls of different colored clay that will represent two sedimentary rocks. Also, give each student three chocolate chips, which will represent igneous rocks.
 - b. Have the students flatten the two pieces of clay. Place the chocolate chips in between the two flattened pieces, making a sandwich. Place the clay onto one piece of the wax paper. (10 minutes)
 - c. Explain that we have now placed two sedimentary rocks beside three igneous rocks. Let's see what happens to these rocks when we expose them to heat. Have the students place their models under the heating lamp on a tray. Allow the models to sit in the heat long enough for the chocolate chips to melt (about 15 minutes).
 - d. While the chips are melting, have the students make a prediction regarding what the outcome of the experiment will be. Draw a picture illustrating their prediction (10 minutes).
 - e. After the 10 minutes, allow the students to reclaim their rocks. What happened to the chocolate chips when they were exposed to heat? Did the outcome match the prediction?
 - f. Next, have the students place their rock between the two pieces of wax paper. Using their hands, have the students apply pressure to either side of the clay. Ask the students what has happened when we applied pressure to our model. Can we separate the two pieces of clay from one another? It is impossible to separate the two colored pieces of clay exactly, but you can clearly see that two colors once existed. (10 minutes)
 - g. Explain that, when we applied heat and pressure to our models, we ended up with a new rock. In nature, when rocks are exposed to heat and pressure they can change into new metamorphic rocks.

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- h. Give each student a Ziploc baggie. Have the students write their names and "metamorphic rock" on the card. Have the students place their cards and the rocks into the Ziploc baggies and add these new models to their rock collections. (5 minutes)
5. In remaining time, complete the journal entry.