Lesson 3: "The Big Rock" Lesson: Introduction to Rocks

Target Grade or Age Level:
Sixth grade earth science

Scientific Process(es) Addressed:
Observing, communicating, inferring and defining operationally

Science Concepts Addressed/Proposed PDE Academic Standards:
- 3.2.7 Inquiry and Design
  - Explain and apply scientific and technological knowledge
    - Answer "What if" questions based on observation, inference or prior knowledge or experience
  - Identify and use the elements of scientific inquiry to solve problems
    - Generate questions about objects, organisms and/or events that can be answered through scientific investigations
- 3.5.7 Earth Sciences
  - Recognize earth resources and how they affect everyday life
    - Identify and locate significant earth resources (rock types) in Pennsylvania.

Instructional Objectives
- Students will observe properties of rocks
- Students will make inferences about what they understand about rocks from prior experience and their observations
- Students will be able to define operationally what a rock is from literature connections and Internet resources
- Students will begin to communicate their ideas about rocks to their classmates

Materials Needed
The Big Book illustrated by Bruce Hiscock, science journal or notebook, pencils, samples of rocks, Web exploration worksheet, Internet, computer lab

The "5Es" Instructional Model
1. **Engage**—I will introduce the topic of rocks by sharing and reading a picture book entitled *The Big Rock* illustrated by Bruce Hiscock. Students will be encouraged to look closely at the pictures of the rock and to pay close attention to how rocks came about. After reading the story, I will ask students to write a brief paragraph about their favorite rock in their science journals. The students must give at least 6 descriptive adjectives that explain what their rock looks like. Students are encouraged to give the name of the rock. Students will be called on to share and communicate with the rest of the class. Lastly, I will pose a question, "What stuff are found inside of rocks?" This will be the basis for our exploration.

2. **Explore**—During the first day of instruction, the students will pick a rock at random from a bag. This activity will be a free exploration. The students will have the

following tools at their disposal: paper clips, nails, water, pennies, small hammers, and other materials that the students may want to use (if available). The students must record any observations that they have in an orderly fashion. If they use any tools, such as scratching the rock with a penny, they must record the result of that action as an observation. At the last 10 minutes of class, the students will make any inferences they have about the rock they observed. I will make a running list of those inferences to be used for further exploration.

During the second and third day of the lesson, I will call on students to explain their inferences to the class. I will choose inferences that make reference to what rocks are composed of to help guide the lesson in that direction. After 10 minutes, students will work in triples at a computer and begin their Web exploration activity at http://www.leo.lehigh.edu/envirosci/geology/rocks/rocks.html. They will use the following links on that page: "What is a rock?" and "Major categories". Each group will be responsible for all of the material listed and will answer the questions and fill out all tables given and make a list of key terms that are important for studying rocks.

3. **Explain**—During the fourth day of instruction, the class will be structured around constructing a concept map that will help the students define what rocks are and the major categories they fall under. Based on the information they collected, I will guide the students toward making connections between sedimentary rocks, common examples and minerals found in those rocks. The same will be repeated for igneous and metamorphic rocks. During this instruction, key terms such as extrusive, intrusive, erosion, weathering, and contact metamorphism will all be developed and defined.

4. **Elaborate—**At the conclusion of the fourth day of instruction, the students will draw a series of pictures that describes how sedimentary, igneous and metamorphic rocks are formed. This will be assigned for homework and the students can only give one-sentence phrases that explain their picture.

5. **Evaluate**—All of the following activities listed above will be used for assessment. The breakdown for each activity is given below: (RUBRIC PROVIDED)
   - *The Big Rock* descriptive adjectives—Journal entry assessment (1 pt for each descriptive adjective used…5 is the most)
   - Free exploration with rocks (handout provided)—observations and inferences will be collected
   - Web exploration activity (handout provided)—process skills used during the activity, group participation, and new content discovered (key terms and vital information)
   - Visual descriptions of how rocks are formed (handout provided)—homework assessment grade. I am looking for the students to include information of how they are formed, legibility of sketch, content terms (heat and pressure), and neatness.
   - Quiz—given at the conclusion of the lesson

Name:_____ Date:_____

Science 6—Rocks & Minerals School:

Exploring Rocks

After you have chosen your rock out of a bag I want you to explore and record what you see. You can use pennies, nails, fingernails, water, hammers, paper clips, and other materials that you would like to use.

Observations: Write down all of your observations as you perform your tests. If you scratch the rock with a penny, then you write that observation down. Look at the color of the rock, luster, etc. Have FUN!!!

Based on what you have observed…write down 5 inferences that you can make about your rock. In other words, what can you say about your rock based on what you learned today.

Web Exploration Activity: What is a Rock? What are the major categories of rocks?

Answer the questions below in complete sentences. Use information that you studied from the Internet.

1) What is your definition of a rock?

2) What are rocks composed of?

3) List the major rock types and give a brief description of how they are formed in nature.

4) Where are sedimentary rocks commonly found? Is it the same for igneous and metamorphic rocks? Explain your answer.

5) List three rock examples for each type (sedimentary, igneous and metamorphic)

6) What are the common minerals found in each of the rocks you listed in question 5?

7) List the key terms necessary to understand this lesson.

Web Exploration Activity: Observation and Data Table

Use the information you gather on the Internet and your answers to the questions from the Major Categories sheet to fill in the following table. Use this as a study guide and to help you organize your thoughts. Comment on any patterns that you notice.

ROCK TYPE	How are they formed?	Where would you find these types of rocks?	How are these rocks classified? (e.g Igneous has extrusive and intrusive rocks)	Give 3 examples of each rock type	Common minerals found in each type
Sedimentary					
Igneous					
Metamorphic					

Name:_____ Date:_____

Science 6—Rocks & Minerals School:

How are Rocks Formed?

You have read and looked at pictures of how sedimentary, igneous, and metamorphic rocks are formed. Please draw a model of the processes involved that leads to the formation of rocks. Please label each part of your drawing and include key terms that describe the process that is involved. Draw as many pictures as needed. Use both sides of this page.

Name:_____ Date:_____

Science 6—Rocks and Minerals School:

Quiz—Rocks

Matching: Please match the appropriate term with the definition on the right hand side.

Collumn A	Collumn B
1. Extrusive rocks	A) This is the process of breaking down rocks and minerals into smaller pieces by water, wind, and ice.
2. Intrusive rocks	B) Igneous rocks where magma has intruded into pre-exiting rock layers.
3. Weathering	C) It is molten (melted) rock under the surface of the Earth
4. Contact metamorphism	D) It occurs when magma comes in contact with an already existing body of rock.
5. Regional metamorphism	E) Process where huge forces of heat and pressure cause the rocks to be bent, folded, crushed, flattened, and sheared
6. Dynamic metamorphism	F) Rocks that are formed from the lava cooling and hardening
7. Magma	G) Process where rocks are formed by geologic processes such as mountain-building. It occurs over a much larger area.

Answer the following question in a sentence or two.

8. Give three examples of metamorphic rocks

9. List the two major factors needed for forming metamorphic rocks.

10. What is the most common rock found on earth?

Rubric for Lesson 3—The Big Rock

Outstanding—Students completed task above and beyond expectation. Great examples and well-thought out explanations. Student demonstrated understanding at an advanced level.

Good—Student completed task and met expectation. Good example used and explanations were satisfactory. Student demonstrated understanding at a proficient level.

Fair—Student completed some parts of the task and was below expectation. Some evidence of examples are used, but explanations lacked depth and clarity. Student demonstrated understanding at a basic level.

Unsatisfactory—Student didn't complete tasks or minimally. Little to no examples used and explanations were minimal or none was given. Answers lack clarity and student demonstrated understanding at a limited level.

Criteria	Outstanding	Good	Fair	Unsatisfactory
Observations Made on Free Exploration Sheet	9-10	7-8	5-6	0-4
Inferences Made on Free Exploration Sheet	9-10	7-8	5-6	0-4
Defining and Observations Made on Web Exploration Sheet 1	18-20	15-17	12-14	0-11
Defining and Observations Made on Web Exploration Data Sheet 2	23-25	20-22	17-19	0-16
Communication Skills Used During Web Exploration	9-10	7-8	5-6	0-4
Drawings of Rock Formations	9-10	7-8	5-6	0-4
Descriptive Adjectives of The Big Rock	5	4	2-3	0-1
Quiz Results	9-10	7-8	5-6	0-4

Final Score	90-100	75-89	65-74	0-64