

## **Lesson 1: Introductory Lesson on Minerals; What is a Mineral? (Web Quest Activity)**

### Target Grade or Age Level:

Sixth grade earth science

### Scientific Process(es) Addressed:

Communicating, hypothesizing and defining operationally

### Science Concepts Addressed/Proposed PDE Academic Standards:

- 3.2.7 Inquiry and Design
  - 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
    - Explain the value and uses of different earth resources (selected minerals)

### Process-Oriented Objective(s)

- Students will develop hypotheses of what minerals are composed of
- Students will define operationally what a mineral is
- Students will communicate their inquiries and ideas in a cooperative setting
- Students will communicate their inquiries and ideas through exploration

### What Do I Want Children to Discover?

I want children to discover that minerals are inorganic substances made from the elements of the earth (oxygen, iron, silicon, etc.). There are hundreds of minerals found on earth, but students should have a grasp of the common minerals that they use everyday. Ultimately, I want students to construct a meaningful definition of a mineral to begin to form questions of how they affect their lives.

### Description of Introductory Activity (Anticipatory Set) and Discussion

I will begin the lesson by asking students if they had cereal for breakfast. Many students should respond with a variety of both cold and warm cereals. Next, I will ask the students what are the healthy components of cereal or what does cereal have that is good for our bodies. Some answers that I will expect are milk, grains, raisins and hopefully vitamins and minerals. Then I will ask the students what kind of minerals do we find in cereals. Some answers are: Vitamin B, A, D, Zinc, Potassium. If the students have trouble with this, I will have cereal boxes available for students to look at.

During the second half of the discussion I will begin to ask the students what they know about minerals in general. I will use a K-W-L strategy on the overhead projector to get students to write the answers that they know and what they hope to learn. Once I have received 5-6 answers for what they know already, I will assign pairs of students to work with each other. They must devise 5 questions about what they want to learn about

minerals. Some questions that I can use to encourage inquiry are listed in the typical discussion questions section.

### Materials Needed

Overhead projector, slide of K-W-L chart, K-W-L chart for each student, pencil, paper, Web exploration sheet for mineral definition, Internet access, computer laboratory

### Description of Activities

Once students have been assigned to a partner they will be given a worksheet that will be used during the Web exploration activity. Each pair will work at a computer and will take turns navigating through designated websites. The operator will begin their search at <http://www.leo.lehigh.edu/envirosci/geology/rocks/rocks.html>. The students will click on the link "What is a mineral?" On this page, gives a brief outline of the definition of a mineral. After they have read this material the class will proceed with their Web exploration by clicking on "More about minerals". This site, <http://www.netSPACE.net.au/~mwoolley/top.htm>, gives more detailed descriptions of the properties, structure, and formation of minerals.

Students will be given designated questions that they will use along with the questions that they have developed in their K-W-L strategy. During the exploration I will guide the students so that both their questions and those that I have designated are answered.

Once the students have finished they must complete their Web exploration worksheet with their answers (as a group) as well as their K-W-L sheet. They will write down anything that they still need to learn in the final column of their K-W-L sheet. To conclude the lesson, the students will write a narrative of what a mineral is. They can use metaphors, similes, write poems or give a paragraph definition with examples. This lesson will take 2 full (55 minute) periods to complete.

### Typical Discussion Questions

The following questions will be used during the anticipatory set of the lesson:

- Besides cereals, are there any other places where minerals are found?
- Where can we find minerals in nature?
- Why are we studying minerals? What is the purpose of the lesson?

The following questions will be used during the Web exploration activity

- Are there different categories of minerals? If so, what are they?
- Do all minerals have crystal structures? Explain.
- Are minerals compounds or mixtures? Explain.
- How are minerals formed? Are they all formed the same way or different?
- List and explain four different crystal structures and give a sketch of both of them?
- Write a poem, story or paragraph that demonstrates your knowledge about minerals. Please use terms that you found during your exploration.

### How Children Will Be Encouraged to Investigate On Their Own in the Classroom

Students are encouraged to investigate on their own from the use of developing their own questions about minerals in this activity and exploring and defining what a mineral is through the use of the Internet. Also, I will encourage students to continue their investigations outside of the classroom as well. Each student must bring in a substance that contains a mineral for display. This will tie into our next lesson on common minerals and how to classify them.

### Expected Conclusions

Minerals are found in commonly in nature and our environment. They are inorganic chemical substances that are solid. Most common minerals are made of crystal structures, which entail: tabular, concretionary, botryoidal, oolitic and others. It is not important that students memorize the names but that they recognize the patterns. Minerals form by sedimentary, igneous and metamorphic processes. Minerals are the building blocks of rocks.

### Assessment

Students will be assessed by the following criteria: (RUBRIC PROVIDED)

- Process skills used during K-W-L discussion
- Communication skills among the pair groups during the Web exploration
- Process skills and answers from Web exploration discussion
- Poem, story or paragraph that demonstrates knowledge of minerals

### Application to Real Life Situations

Students interact with minerals without recognizing what they are. Minerals are important because they are the building blocks for rocks, which is present in nature but also for our bodies (vitamins). Also, it is important that students develop proficient use with exploring for information using the Internet because of the major shift towards using technology in education.

Name: \_\_\_\_\_  
Grade 6 Science—Rocks & Minerals

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

**Web Exploration: What is a Mineral?**

Please log on to <http://www.lehigh.edu/~cda3/rocks.html> and click on “What is a mineral?” link. Please read the brief description and then proceed by clicking on “More about minerals” link. Work with your group and proceed through the web lesson. Answer all the questions below.

1. Are there different categories of minerals? If so, what are they?

2. Do all minerals have crystal structures? Explain.

3. Are minerals compounds or mixtures? Explain your answer.

4. How are minerals formed? Are they all formed the same way or differently?

5. On the back of this sheet, please give a sketch of the four different crystal structures of minerals. Please label them and give a brief explanation of each.

### **Web Exploration Activity: What is a Mineral?**

In your journals, please write a poem, song or a paragraph description that summarizes your definition of a mineral. If you choose to write a poem, use metaphors and similes that you learned in English class. You must include information regarding:

- Composition of minerals (What are minerals made of?)
- Crystal structures of minerals
- What are common elements found in minerals?
- Examples of minerals

Good luck!!

## Rubric for Lesson 1—What is a Mineral?

**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
K-W-L Questions	9-10	7-8	5-6	0-4
Communication Skills Used During Web Exploration	18-20	15-17	5-6	0-4
Hypothesizing During Web Exploration	9-10	7-8	5-6	0-4
Defining Operationally—Answers Given on Web Exploration	27-30	24-26	20-23	0-19
Sentence Structure of Journal Entry	9-10	7-8	5-6	0-4
Key Concepts Used During Journal Entry	18-20	15-17	5-6	0-4
Final Score	90-100	75-89	65-74	0-64