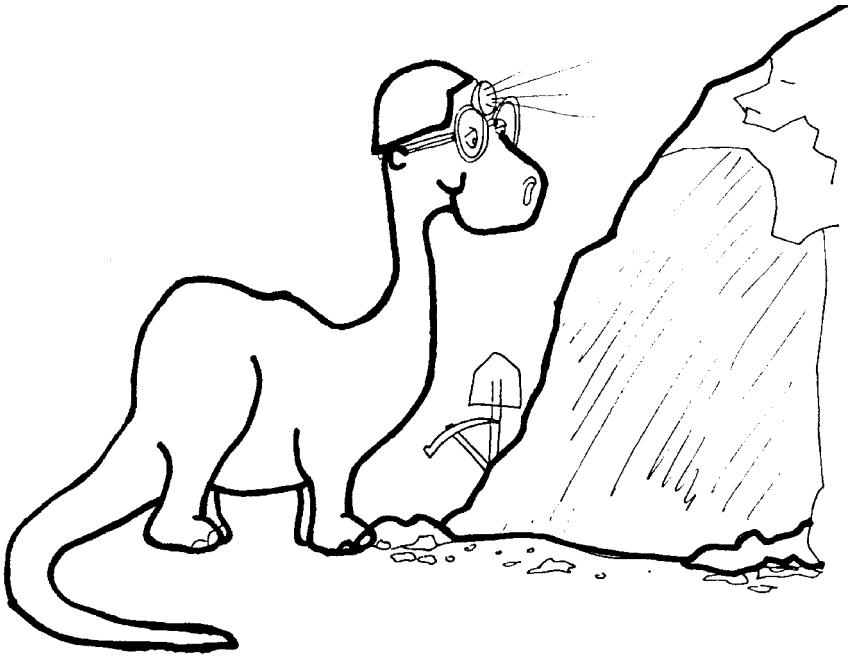
Rock Cycle

Understanding the Earth's Crust

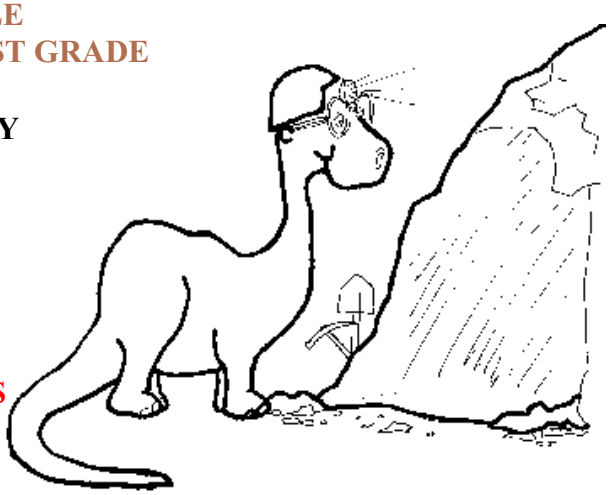
FIRST GRADE

MINERALS



1 WEEK
LESSON PLANS AND
ACTIVITIES

ROCK CYCLE
OVERVIEW OF FIRST GRADE



CHEMISTRY

WEEK 1.
PRE: *Comparing solids, gases, liquids, and plasma.*
LAB: *Exploring how states of matter can change.*
POST: *Introducing the periodic table.*

MINERALS

WEEK 2.
PRE: *Discovering the components of quartz.*
LAB: *Exploring which elements make up minerals.*
POST: *Comparing characteristics of minerals.*

ROCKS

WEEK 3.
PRE: *Comparing how minerals are different than rocks.*
LAB: *Distinguishing minerals from rocks.*
POST: *Discovering where rocks are formed.*

WEEK 4.
PRE: *Describing characteristics of rocks.*
LAB: *Recognizing rock characteristics.*
POST: *Contrasting the three types of rocks.*

PAST LIFE

WEEK 5.
PRE: *Comparing dinosaurs and dragons.*
LAB: *Distinguishing characteristics of dinosaur models.*
POST: *Exploring dinosaurs in books.*

WEEK 6.
PRE: *Analyzing footprints.*
LAB: *Modeling dinosaur tracks.*
POST: *Comparing how dinosaurs moved.*

ROCK CYCLE - MINERALS (1)

PRE LAB

Students look at a piece of quartz and silicon.

OBJECTIVES:

1. Learning that minerals are made of elements.
2. Discovering that silicon and oxygen make up quartz.

VOCABULARY:

compound
element
mineral

quartz crystals

MATERIALS:

quartz crystal
Periodic Table placemats
sample of silicon

BACKGROUND:

Children are fascinated by minerals because they are pretty and uncommon in everyday life. Children like to hold them, as if they were magical. You can pick up a mineral and it feels cold, but if you keep it in your hand, it gets warm. Many minerals also have shapes that delight children's visual perception.

Minerals are composed of one or more elements. Since there are many elements, many combinations are possible. There are thousands of different minerals. Minerals are important in a number of ways. Minerals are the building blocks of rocks. They are important to the world's economy. Minerals such as gold and silver can determine the wealth of a nation. Other minerals are admired because of their beauty, such as rubies and emeralds. Finally, minerals are very useful in everyday objects such as watches and clocks (quartz) and plaster (gypsum).

PROCEDURE:

1. In this lesson students will learn that minerals are made up of different combinations of elements, which they will learn are called compounds. Tell the children that minerals are an example of solid state matter. They are not liquids or gases. They have definite shapes. Matter is made up of elements. One or more elements make up minerals.

2. Introduce the word “COMPOUND,” as a substance composed of one or more elements.

Write on the boards ELEMENT + ELEMENT(S) = COMPOUND. Use a quartz crystal as an example of a compound. Explain to the students that the crystal grew naturally in the earth. The elements silicon (Si) and oxygen (O) joined together [silicon + oxygen] to make QUARTZ (SiO_2). Pass the crystal around so the students can see how it looks and feels. Write down their impressions of this mineral on the board.

3. Retrieve quartz crystal from the class and pass out the Periodic Table Place mats. Ask the students if they remember which elements make up the compound quartz. Have the students locate the elements “silicon” and “oxygen” on the place mats.

4. Silicon by itself is a shiny, gray substance. Show students the piece of silicon. This is an element that was created in a laboratory. It does not occur naturally. Compare silicon with quartz. It doesn’t have the same appearance. Ask the students to show you oxygen. Hopefully they will point to the air. Oxygen is a clear gas. Together these very different elements combine to form quartz. A solid and a gas form a solid.

Children may have heard the word “silicon” in association with the computer industry. (Computer chips are presently made largely of silicon). Pure silicon is not a naturally occurring element. Silicon occurs in nature only in combination with other elements, mainly oxygen. Pure silicon is manufactured commercially by heating sand in the presence of carbon.

5. Use the periodic table placemat to examine different elements. Ask the students to find elements, like calcium, carbon, or boron. You may want the students to write down the symbols. You may wish to play a “chemical game,” having the students find an element that goes with the alphabet like, Arsenic for A, Boron for B, Carbon for C, etc. Students love to find the elements on the chart.

ROCK CYCLE - MINERALS (1)

LAB

Students feel and observe different minerals.

OBJECTIVES:

1. Discovering that minerals are made of elements.
2. Exploring the nature of minerals.

microcline

VOCABULARY:

compound
element
mineral

MATERIALS:

Rock Cycle - Minerals (1) or minerals
signs of minerals (see text below)
periodic table placemat

BACKGROUND:

Chemical compounds are substances composed of two or more elements united chemically in definite proportions by mass. Water is a compound composed of two atoms of hydrogen, a gas, and oxygen, another gas. Together they form a liquid with characteristics different from either element. This is the reason for studying elements and compounds separately. Elements and compounds have their own characteristics that a student must learn to identify.

Minerals are made of elements, and most minerals are compounds. At each station in this lab, the students will examine different minerals, and write down the elements that compose them. (Depending on your students' abilities, you might ask them to copy only the symbols.) The stations should be set up so the children can see and touch the mineral specimens.

PROCEDURE:

1. Before the lab prepare index cards listing the minerals your students will examine and their constituent elements. You will need one card per mineral, for each student group. If you are using the minerals from the prepared kit [Rock Cycle - Minerals(1)] you can make 2 groups of 9 minerals. You will thus need 18 cards.

Save the index cards and reuse them in subsequent years.

QUARTZ = SILICON (Si) + OXYGEN (O)
PYRITE = IRON (Fe) + SULFUR (S)
GALENA = LEAD (Pb) + SULFUR (S)
ULEXITE = SODIUM (Na) + CALCITE (Ca) + BORON (B) + OXYGEN (O)
GYPSUM = CALCIUM (Ca) + SULFUR (S) + OXYGEN (O)
MICA = ALUMINUM (Al) + SILICON (Si)+OXYGEN (O)
FLUORITE = FLUORINE (F) + CALCIUM (Ca)
HEMATITE = IRON (Fe) + OXYGEN (O)
CALCITE = CALCIUM (Ca) + CARBON (C) + OXYGEN (O)

2. Prepare stations for each mineral. Each station will consist of a mineral, and its corresponding index card. For some of the minerals you may want to add a magnifying glass so that students can take a closer look at the mineral. Place a periodic table placemat at each station so that the students can find the elements in the minerals. If you are using two groups, one on each side of the room works well.

3. Discuss some of the characteristics of the minerals. Place a picture under the ulexite and notice that the picture rises. Put a dot under the calcite, and notice the double image. Mica can break easily into sheets. Pyrite is called fool's gold; galena is called fool's silver. Gypsum is used in making the inside walls of houses (it is a component of sheet rock or wall board). Fluorite can be broken into diamond-shaped crystals. Hematite will make a red “streak” if it scratches a porcelain plate (not the glazed side).

4. During the lab, review the names of the minerals one by one before the students go to the stations. Divide the class and tell them where they will be working. Be sure to tell them that all the groups have the same minerals. If you have your own set of minerals, use the Internet to find out the chemical combination. Just search the name of the mineral.

5. Have the students complete the worksheet. Explain to them that they need to fill in which elements make up the mineral they are examining, and that they can find this information on the index card. Make sure you give students enough time to copy the words. Note that the information given to the students includes just the elements that are part of that mineral, not the correct chemical formulas. In later grades, the students will become familiar with the full formulas.

You may want the students to “trace” the mineral under the “draw” column. This is just so students look at the mineral carefully.

6. After the students have finished, go through the answers with them. Allow them to make any corrections needed.

ROCK CYCLE - MINERALS (1) LAB

	WRITE THE SYMBOLS	DRAW THE MINERAL
QUARTZ		
PYRITE		
GALENA		
ULEXITE		
GYPSUM		
MICA		
FLUORITE		
HEMATITE		
CALCITE		

ROCK CYCLE - MINERALS (1)

POST LAB

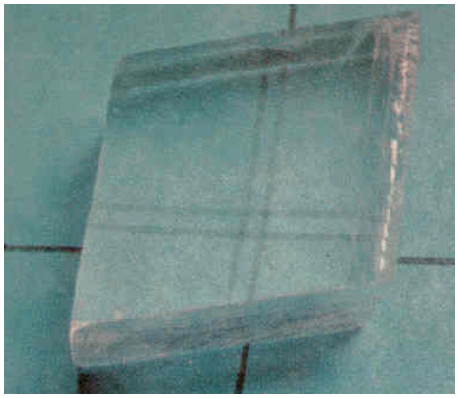
Students write down key characteristics of minerals.

OBJECTIVES:

1. Learning some characteristics of minerals.
2. Comparing characteristics of minerals.

VOCABULARY:

crystal
dense
flat
hard
light
soft



optical calcite

MATERIALS:

paper
Rock Cycle - Minerals (1)

BACKGROUND:

Minerals are pure substances. In this sense, pure means that they are always composed of the same element or groups of elements (compounds). Pure can be explained to the students is several ways:

1) all of the same substance;
2) no matter which way you cut something it always looks the same;
3) composed of the same molecules; or
4) unmixed with any other matter.

Salt water, for example is not pure because it is made up of salts and water. If you took the salt out, then you would have a pure water.

Minerals are the ingredients of rocks. They are like building blocks. Rocks are not pure substances, unless they are composed of the same mineral.

PROCEDURE:

1. A good way to illustrate this is to get three balls of different colored clays. Each color by itself is “pure,” like a mineral. Red ball of clay is equivalent to a red mineral. A blue ball of clay is equivalent to a blue mineral. No matter which way you “cut” the ball of clay, it will be that pure color. If you put a little of the blue and red minerals together, you have created a rock. Minerals make up rocks.

2. One way scientists observe things by looking for “KEY CHARACTERISTICS,” which are the fundamental, unchanging properties of whatever is under study. Explain “KEY CHARACTERISTICS” to the students by using the following or other examples:

When you go home today will your mom or dad recognize you? Yes, but how will she/he recognize you?

If you take a friend home, will your mom know you from your friend? What is the difference between you and your friend? The difference can be called "characteristics." What about 20 years from now, will you look the same? No, but kind of yes? What characteristics about you will never change? These would be key characteristics.

3. In this writing exercise, the students will begin to describe minerals using a new set of vocabulary words. Have them write down the vocabulary words as you put them on the board, and discuss what they mean using the mineral specimens. Use the following specimens from the kit to explain each word in the vocabulary list. If you have better specimens, use them instead.

QUARTZ, FLUORITE, PYRITE - These minerals are *crystals*.

GYPSUM - This mineral is so *soft* that you can scratch it with your fingernail.

QUARTZ, FLUORITE, PYRITE, GALENA, HEMATITE - These minerals are *hard*, you cannot scratch them with your fingernail or a penny.

GALENA, PYRITE, HEMATITE - These minerals are very *dense*. They are heavy.

ULEXITE, CALCITE, GYPSUM - These minerals are *not very dense*. They are light.

MICA - This mineral is very *flat*.

ULEXITE, CALCITE - These minerals make the picture that is under the mineral, do funny things. This is an *optical property*. Ulexite brings the picture up toward you, like a television. Calcite makes two images.