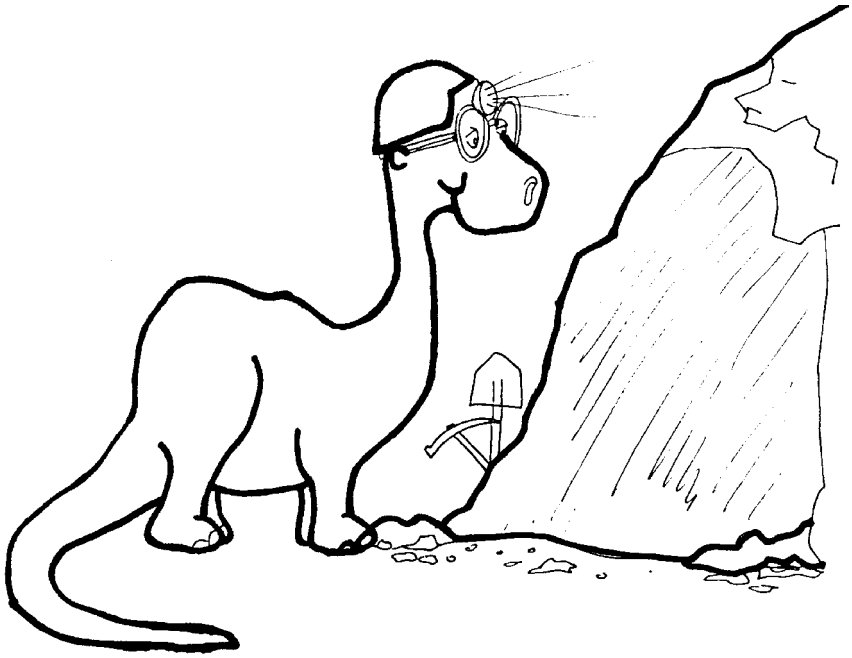
Rock Cycle

Understanding the Earth's Crust

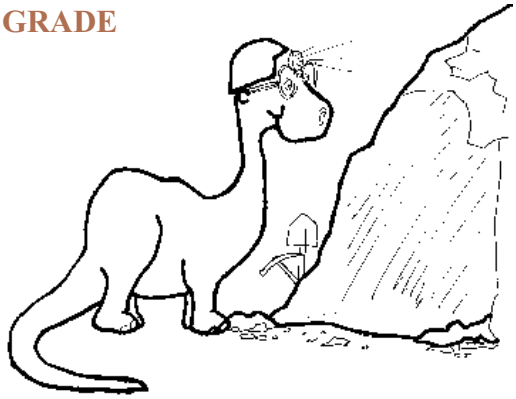
FIRST GRADE

ROCKS



2 WEEKS
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 - ROCKS (1A)

PRE LAB

Students list the difference between rocks and minerals.

OBJECTIVES:

1. Learning that minerals are different from rocks.
2. Comparing minerals and rocks.

VOCABULARY:

mineral
pure
rock

MATERIALS:

worksheet

BACKGROUND:

The Rock Cycle is a very important concept for children to understand. It is a model which explains how one type of rock can become another type of rock if the environment where the rock "lives" changes. For example, rocks at the Earth's surface can be pulled into the crust, where they experience high pressures and temperature conditions. This environmental change may cause the rocks to melt, eventually forming a new rock.

In the first grade, it is difficult for the students to understand all the processes of the Rock Cycle, but an explanation of the environments where rocks can form will help students to understand how rocks are "recycled."

Minerals make up rocks. Rocks and minerals are related but they have different characteristics. A person, for example, has organs like a liver or a stomach, but when the parts are put together they form a person. A liver by itself does not provide any information about the kind of a person it came from, and although we know there is a heart inside each person, we cannot see it from the outside. The same problem arises with rocks. We know that minerals make up the rocks, but we cannot always see them.

Rocks are usually ugly to the eyes of a child. They are usually gray or brown, unless they live in areas where rocks are spectacular like the Sierra Nevada exposures of granites , the sandstones of Colorado and Utah, or the basalt flows in Hawaii.

PROCEDURE:

1. The connection between minerals and rocks can be illustrated by getting several balls of different color clay. A red ball of clay is a “pure” red mineral. A blue ball of clay is a “pure” blue mineral. A yellow ball of clay is a “pure” yellow mineral. Take a piece of the blue, red, or yellow and make another ball. This mixed mineral ball would represent a rock. If you keep mixing the “rock” all the colors of the clay will mix and you will get a grayish brown color. You know the red, blue, and yellow are there, but you just can’t see them. Minerals make up rocks.

2. Review the characteristics of rocks and minerals, using the chart below. As you review each characteristic, explain its meaning carefully. Be aware that these distinctions are generalizations. Many exceptions occur, due to the wide variety of mineral and rock compositions. The students will find identification becomes easier with practice.

CHARACTERISTICS OF MINERALS AND ROCKS	
MINERALS	ROCKS
pure (made of same substance)	more than one mineral
some have crystals	not single crystals
usually pretty	not usually as pretty
usually have a shape	no definite shape
color is usually the same	color is not the same
no fossils	some have fossils

3. As you discuss the differences on the chart, have the students copy down the information (it is also present on the worksheet). Make sure students are aware that some of the differences are hard to distinguish. When they are finished, have them draw a picture of a mineral and of a rock.

CHARACTERISTICS OF MINERALS AND ROCKS

A MINERAL IS:

A PURE SUBSTANCE
MAY BE CRYSTALLINE
USUALLY PRETTY
USUALLY HAS SHAPE
COLOR IS SAME
NO FOSSILS

DRAW A PICTURE OF A MINERAL

A ROCK IS

MORE THAN ONE MINERAL
NOT CRYSTALLINE
NOT PRETTY
NO DEFINITE SHAPE
COLOR NOT SAME
CAN HAVE FOSSILS

DRAW A PICTURE OF A ROCK

ROCK CYCLE - ROCKS (1A)

LAB

Students sort rocks and minerals.

OBJECTIVES:

1. Recognizing the differences between minerals and rocks.
2. Distinguishing minerals from rocks.

VOCABULARY:

crystal
mineral
pure
rock

MATERIALS:

Rock Cycle - Rocks (1A)
hand lens

Miners exploring rocks in search of gold.

BACKGROUND:

The Rock Cycle explains the evolution of igneous, sedimentary, and metamorphic rocks that make up the Earth's crust. Many processes, such as volcanic activity, movement of the crust, and erosion and redeposition of rocks on the surface, create many different environments where different types of minerals and rocks form.

Minerals and rocks are important to our society. Many products made of minerals and rocks are a vital part of our everyday life. For example, concrete is a building material made of cement (calcite and clay) plus sand and gravel. In addition, gypsum is used for sheet rock or wall board in houses, gold for jewelry, and copper for wire.

It is difficult to distinguish minerals from rocks. Continuously doing exercises with the same minerals and rocks will allow students to internalize the difference.

PROCEDURE:

1. Review the differences of rocks and minerals.

2. Give each group of students a bag of minerals and rocks. Instruct students to group the specimens into the following 3 piles:

ROCKS - specimens that have the characteristics of rocks discussed in Pre Lab
MINERALS - specimens that have the characteristics of minerals, discussed in Pre Lab

DON'T KNOW - specimens that students cannot tell classify

3. Give the students as much time as they need to examine the specimens. Encourage them to use a microscope or a hand lens. Go around the room and ask them if the specimens fit the characteristics of rocks or minerals. Make sure they are aware of the difficulties in the classification. Repeat the meaning of the characteristics many times, as they are hard for the students to understand and remember.

4. If you are using the Rock Cycle - Rocks (1A) kit, you have the following minerals in each of the bags.

QUARTZ - (clear) fits the "crystal" definition of *MINERAL*.
HEMATITE - (shiny gray) fits the "pretty" definition of *MINERAL.*
DOLOMITE - (solid white) fits the "pure color" definition of *MINERAL.*

The remaining specimens in the bag are rocks. The students do not need to identify the rocks by name at this point.

5. Encourage your students that they should classify the specimens in the “DON'T KNOW” group into either the mineral or rock groups. If they cannot classify some of them, leave them in the “DON’T KNOW” pile. Sometimes even geologists cannot identify a rock without using a microscope.

ROCK CYCLE - ROCKS (1A)

POST LAB

Students color a worksheet on the three types of rocks.

OBJECTIVES:

1. Discovering where rocks form.
2. Comparing environments where rocks are created.

VOCABULARY:

igneous
metamorphic
sedimentary

MATERIALS:

none

BACKGROUND:

There are many different types of igneous rocks. However, they all were once melted and have since cooled down. Igneous rocks look different because of two factors: (1) they are cooled at different rates and (2) the "Mother" Magma (original melted rock)was different. These two factors create many different types of igneous rocks.

Sedimentary rocks are formed in 2 major ways: (1) clastic material (pieces of other rocks or fragments of skeletons) cemented together, and (2) chemical means (usually precipitation). Usually sedimentary rocks are associated with water (erosion, settling, and cemented together). However, other sedimentary environments include wind erosion, and glacial movement.

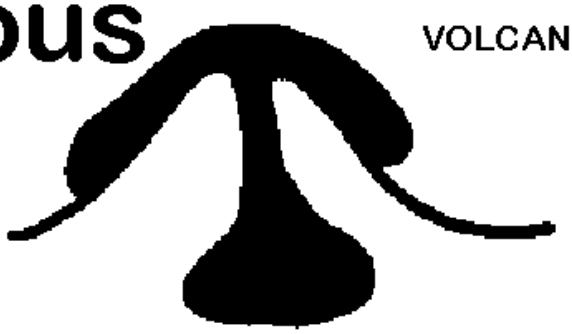
Metamorphic rocks were either igneous, sedimentary, or other metamorphic rocks that were changed. They were changed by great pressures and temperatures inside the earth. The temperatures were not enough to melt the rock, otherwise it would be igneous. The pressures were not enough to break the rock, otherwise it would be sedimentary. The conditions were just enough to change the chemical make up of the rock by forcing the elements to "exchange partners".

PROCEDURE:

Introduce the terms igneous rocks, sedimentary rocks, and metamorphic rocks.. Concentrate especially on the environments of each type of rock. Explain that igneous rocks are “hot” rocks; sedimentary rocks are “cool or wet” rocks; and metamorphic rocks are “changed” rocks.

ROCK TYPES

Igneous



Sedimentary

Metamorphic

ROCK CYCLE - ROCKS (1B)

PRE LAB

Students make a list of some characteristics of rocks.

OBJECTIVES:

1. Describing characteristics of the three different types of rocks.
2. Exploring vocabulary words.

VOCABULARY:

flat
glassy
holes
layers
mineral

MATERIALS:

2 sheets of paper
crayons

BACKGROUND:

Rocks are made of minerals. When the minerals are visible, they can be used to identify the rocks. However, many times you cannot distinguish minerals easily. There are other clues that you can use to help identify them.

For instance, obsidian or volcanic glass, is one of the few rocks that looks like glass. Obsidian is usually, but not always, a deep black. Sedimentary rocks sometimes are “gritty” or feel like sand. So students should being to feel rocks to get a sense of their texture. Metamorphic rocks tend to be “shiny” like a rock that has many rhinestones.

PROCEDURE:

1. Review the vocabulary words and other words that might be helpful to distinguish the rocks and minerals in your collection.

2. For each student (or group of students) print two copies of the chart on the following page.

3. Instruct each student to write the following terms in each of the blank spaces. Define each of the words and emphasize the meaning of definitions with respect to rocks.

black, glassy	red with holes	large with minerals
white, flat, light	pebbles, glued together	sand, glued together
flat, layers	shiny	gray and white, fizzes

On the other sheet have them write the following:

granite	scoria	obsidian
sandstone	conglomerate	shale
marble	schist	gneiss

4. Have students paste the two sides together and they will have the descriptive terms on one side and the rock type of the other. If students glue them together "granite" should match "with large minerals," "marble" should match "with gray and white, fizzes," etc. They will use these in lab.

5. During lab, the children will need to use the sheets that they will be making. You can actually have the students divide the paper into the 9 squares by slowly going through drawing the lines. If students have not learned how to use a ruler this is a great time to teach them. Otherwise, give them 2 sheets with boxes already drawn.

ROCK CYCLE - ROCKS (1B)

ROCK CYCLE - ROCKS (1B)

LAB

Students determine the names of different rocks.

OBJECTIVES:

1. Recognizing rock characteristics.
2. Classifying different rock types.

VOCABULARY:

conglomerate
gneiss
granite
marble
obsidian
sandstone
schist
scoria
shale

an outcrop of sediment - loose gravel and sand

MATERIALS:

Identification sheets from Pre Lab 1B
Rock Cycle - Rocks (1B)
10% HCL solution (Optional)

BACKGROUND:

Rocks record the Earth's history when those rocks where formed. When students get a piece of rock in lab they need to associate different environments with that rock. In the first grade, students need to begin grouping these rocks into basic environments of sedimentary, igneous, and metamorphic. Although sedimentary is the most common rock found on the surface of the Earth, students can find most of the groups very easily. It is very common for buildings to be made of rocks. In cities, you can walk along buildings and see the different types of rocks, even if they did not form in that city.

Discuss with the students that rocks have key characteristics, just like minerals, but that identifying rocks is much more difficult. In this lab they will become familiar with the key characteristics of a small group of igneous, sedimentary, and metamorphic rocks.

PROCEDURE:

1. If you have the students work in groups of 4, you will need 8 samples of each

rock. You can have each group use one identification sheet that was made by students in the Pre Lab.

2. Review the terms on the pre lab identification sheets. You may want to go over some of the characteristics described below.

BLACK, GLASSY - black-the color; glassy - have students imagine broken glass
RED, HOLES - red-the color; holes, - like Swiss cheese
LARGE MINERALS - visible, obvious minerals
WHITE, FLAT, LIGHT - white-the color; flat - as a pancake; - like a balloon
PEBBLES, GLUED - sand size; sand grains look like they are pasted together
FLAT, LAYERS - pancakes stacked on top of each other
SHINY - like a new car
WHITE AND GRAY MINERALS - the minerals are large enough to see and are white and gray; fizz - if you have dilute HCL (can be bought in a hardware store as Muriatic Acid - Cement Cleaner) pour just a drop on a specimen so students can see it fizz (DO NOT LET CHILDREN PLAY WITH HCl).

3. Have the students match the rocks in their packets with the characteristics on the identification sheet. Frequently check on their process. as they decide which rock belongs where.

4. The rocks belong to the following groups:

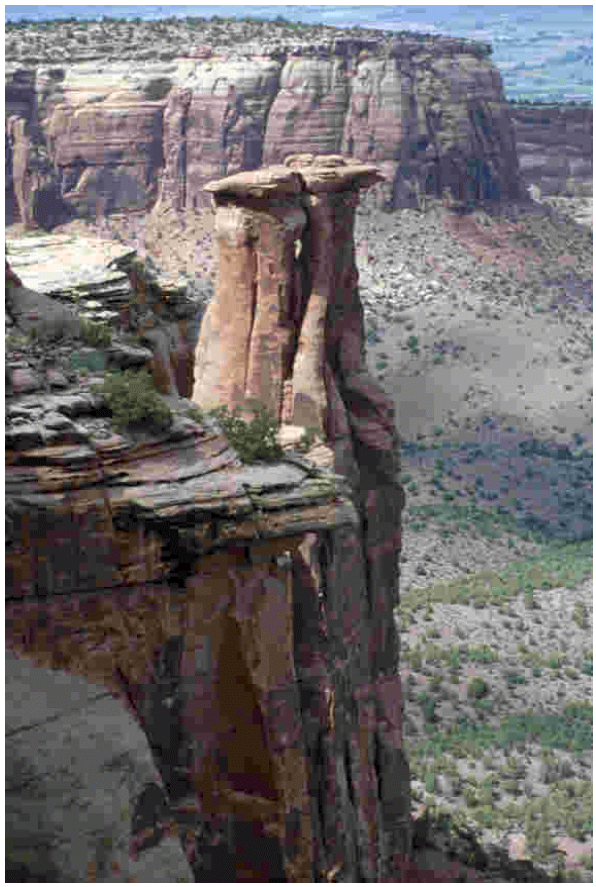
IGNEOUS - granite, scoria, obsidian
SEDIMENTARY - sandstone, conglomerate, shale
METAMORPHIC - marble, schist, gneiss

ROCK CYCLE - ROCKS (1B)

POST LAB

Students draw pictures of where rocks form.

1. Comparing rocks.
2. Contrasting the three types of rocks.



VOCABULARY:

igneous
metamorphic
sedimentary

MATERIALS:

rock samples
Mineral and Rock Display Kit

BACKGROUND:

It is important for children to realize that rocks with the same name may look different. One piece of the igneous rock granite may look different from a piece of granite from another location. Some granites are pink and orange, while others are mainly white with a few dark minerals. Rocks are named because of their mineral composition, and that is sometimes very hard to identify, even for a geologist!

The mystery of identifying rocks can easily be solved if students learn the building blocks of how they were formed. In the lower grades, the constant exposure to different types of rocks is important so students don't just get one picture of that rock. You will find that students will bring in many rocks for you to identify. The information below with the guidance of the Mineral and Rock Kit will help you identify many of their "treasures."

PROCEDURE:

1. Before lab, prepare display specimens of rocks for students to examine.

2. Review the specimens that you used during the lab. Make sure you describe the environments where each rock was created.

IGNEOUS - granite, scoria, obsidian

SEDIMENTARY - sandstone, conglomerate, shale
METAMORPHIC - marble, schist, gneiss

3. Show students different examples of the rocks that they saw during the lab. Use the Mineral and Rock Display Kit or other specimens. Emphasize that two rocks with the same name may look different.

4. If students bring in rocks and minerals for you to identify, have the students look at the minerals and rocks in the kit. Have the students try and reason if their rock looks like one of the specimens. You may want to leave the Mineral and Rock kit out, so students can bring in specimens to identify. Remember, it is “OK” to say you don’t know.

5. Have the students draw their own favorite rock environments, using the worksheet as a guide.

ROCK CYCLE - ROCKS (1B) POST LAB

MY FAVORITE TYPE OF ROCK

Sedimentary rocks can form in the oceans, lakes, or rivers. Igneous rocks can form in volcanoes. Metamorphic rocks can be formed inside the Earth by pressure and temperature. Draw a silly picture to try and remember one of these types of rocks.