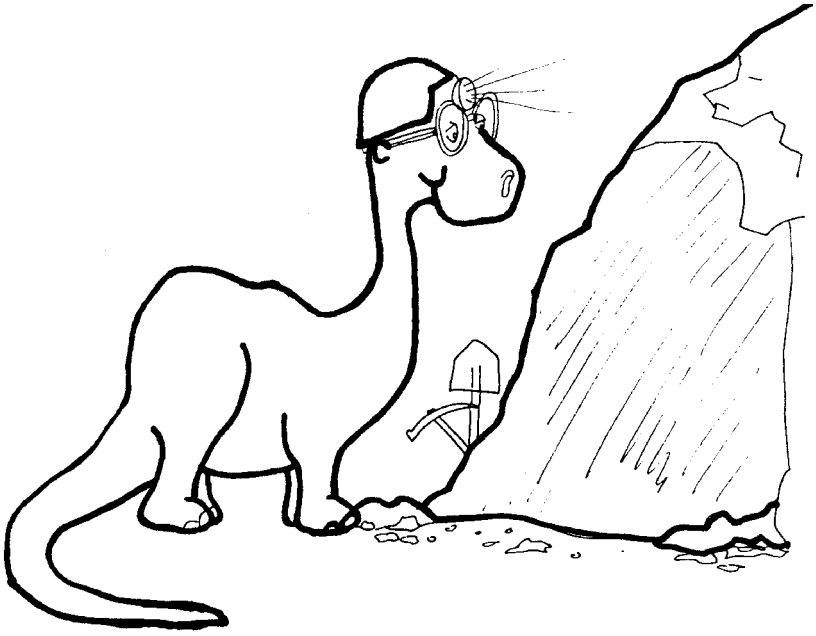
Rock Cycle

Understanding the Earth's Crust

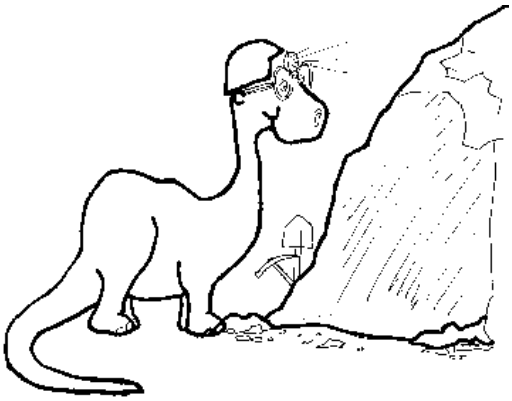
KINDERGARTEN

ROCKS



2 WEEKS
LESSON PLANS AND
ACTIVITIES

ROCK CYCLE
OVERVIEW OF KINDERGARTEN



CHEMISTRY

WEEK 1.
PRE: *Distinguishing the four types of matter.*
LAB: *Classifying heavy and light rocks.*
POST: *Exploring elements.*

MINERALS

WEEK 2.
PRE: *Discovering how minerals grow.*
LAB: *Distinguishing different colors of minerals.*
POST: *Exploring the various colors of quartz.*

ROCKS

WEEK 3.
PRE: *Exploring rocks derived from volcanoes.*
LAB: *Discovering two different types of igneous rocks.*
POST: *Exploring myths about rocks.*

WEEK 4.
PRE: *Exploring rocks created in or near water.*
LAB: *Discovering that sand can form different types of rocks.*
POST: *Observing and describing sand.*

PAST LIFE

WEEK 5.
PRE: *Defining "dinosaur."*
LAB: *Classifying extinct and living animals.*
POST: *Contrasting dinosaurs, prehistoric and living animals.*

WEEK 6.
PRE: *Comparing extinct and living animals.*
LAB: *Distinguishing dinosaurs that eat meat.*
POST: *Dramatizing life during the age of dinosaurs.*

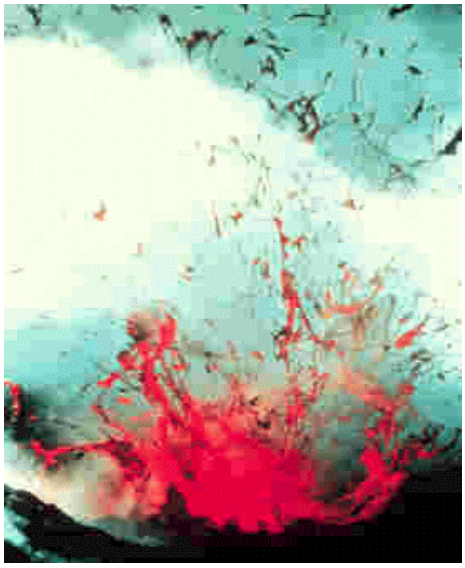
ROCK CYCLE - ROCKS (KA)

Students identify different states of matter in the classroom.

PRE LAB

OBJECTIVES:

1. Learning about rocks that are derived from volcanoes.
2. Distinguishing igneous rocks.



Hawaiian volcano

VOCABULARY:

ash
igneous
lava
rock
volcano

MATERIALS:

Rock Collecting by Roma Gans (or other appropriate book)

BACKGROUND:

Rocks are solid matter. Some feel heavy, some do not. Rocks are made of minerals, but many times the minerals are very small. You cannot see the minerals without a microscope.

Rocks are forming around the world all the time. Volcanoes bring new lava to the Earth's surface which will later cool to become rock. Mud will become hard and eventually become a rock. Sand grains will get cemented together and become sandstone with time. Even humans will mix cement, gravel, and sand and make a human rock, called concrete. Rocks are all around us. We live on rocks. Soil comes from rock, dirt comes from rock, and buildings (other than those made of wood) come from rocks. Rocks are more important to our everyday lives than we realize.

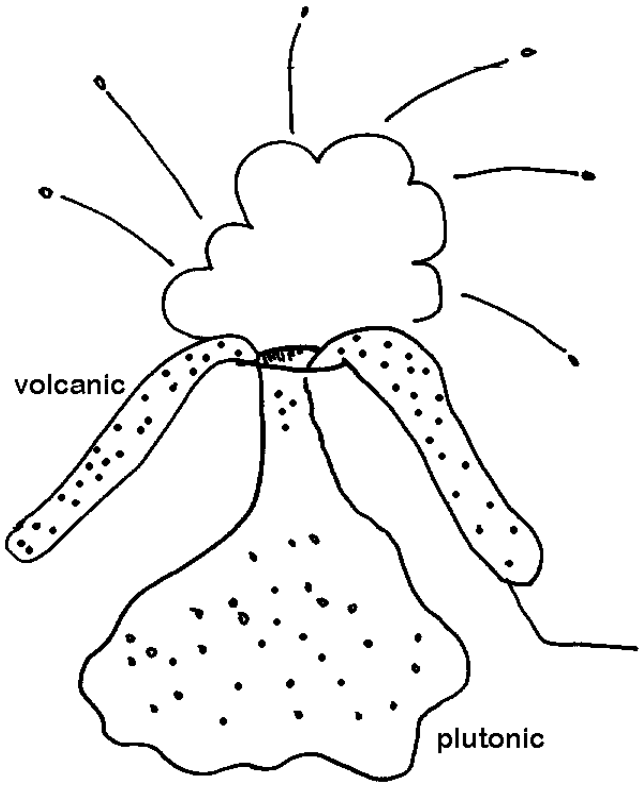
Igneous rocks are considered the “Mother” of all rocks. Molten material cools down and becomes either a volcanic or plutonic igneous rocks. The term volcanic and plutonic help to understand the origin of where the rock cooled down. For instance, if magma cooled inside the Earth it is called plutonic. If molten rock (lava) moved upwards in a volcano and cooled it is called a volcanic rock.

PROCEDURE:

1. Remind students that they examined rocks from volcanos when they studied

plate tectonics. Those rocks are called volcanic rocks because they cooled outside of the volcano. Magma inside the Earth can also cool inside of the Earth and create rocks called plutonic rocks. All rocks that are cooled from magma or lava are called igneous rocks. Both volcanic and plutonic rocks are igneous rocks. Repeat these words several times. It is not as important for the students to remember the words as it is to introduce the terms.

2. Have students bring in pictures of volcanoes from magazines or from the Internet. Draw the following picture on the board to reinforce the main concepts of the lab.



3. Read *Rock Collecting* to your students, which focuses on how rock collecting is easy and fun. However, in the book the author describes minerals as rocks. In children's books, this is a common error. It is better to acknowledge this error, because the children who do recognize it may be confused.

ROCK CYCLE - ROCKS (KA)

LAB

Students create a picture that shows that rocks are created from volcanoes.

OBJECTIVES:

1. Discovering the two different types of igneous rocks.
2. Making a display of plutonic and volcanic rocks.

VOCABULARY:

igneous
magma
plutonic
rock
volcanic
volcano

a gas flare of lava, black is cooled obsidian

MATERIALS:

sand with large particles
sand with small particles
rhyolite specimen
granite specimen
magnifiers

BACKGROUND:

There are two types of igneous rocks, based on rates of cooling. Volcanic rocks cool quickly, and form on the Earth's surface around volcanoes. These are sometimes referred to as "lava rocks." Lava refers to the molten rock, or magma, which cools to make volcanic rock. The second type of igneous rock is plutonic rock, which forms from the slow cooling of magma within the crust of the earth.

PROCEDURE:

1. In your kit you have samples of the volcanic rock rhyolite and the plutonic rock granite. Show the rocks to the children and have them describe them. Both rocks are light in color, but one of the rocks has large gray, white, and black minerals. This is granite. The other rock has very small minerals that cannot be seen with the naked eye; this is rhyolite. Under a microscope the children may be able to see very small minerals, but not as large as those in the granite.

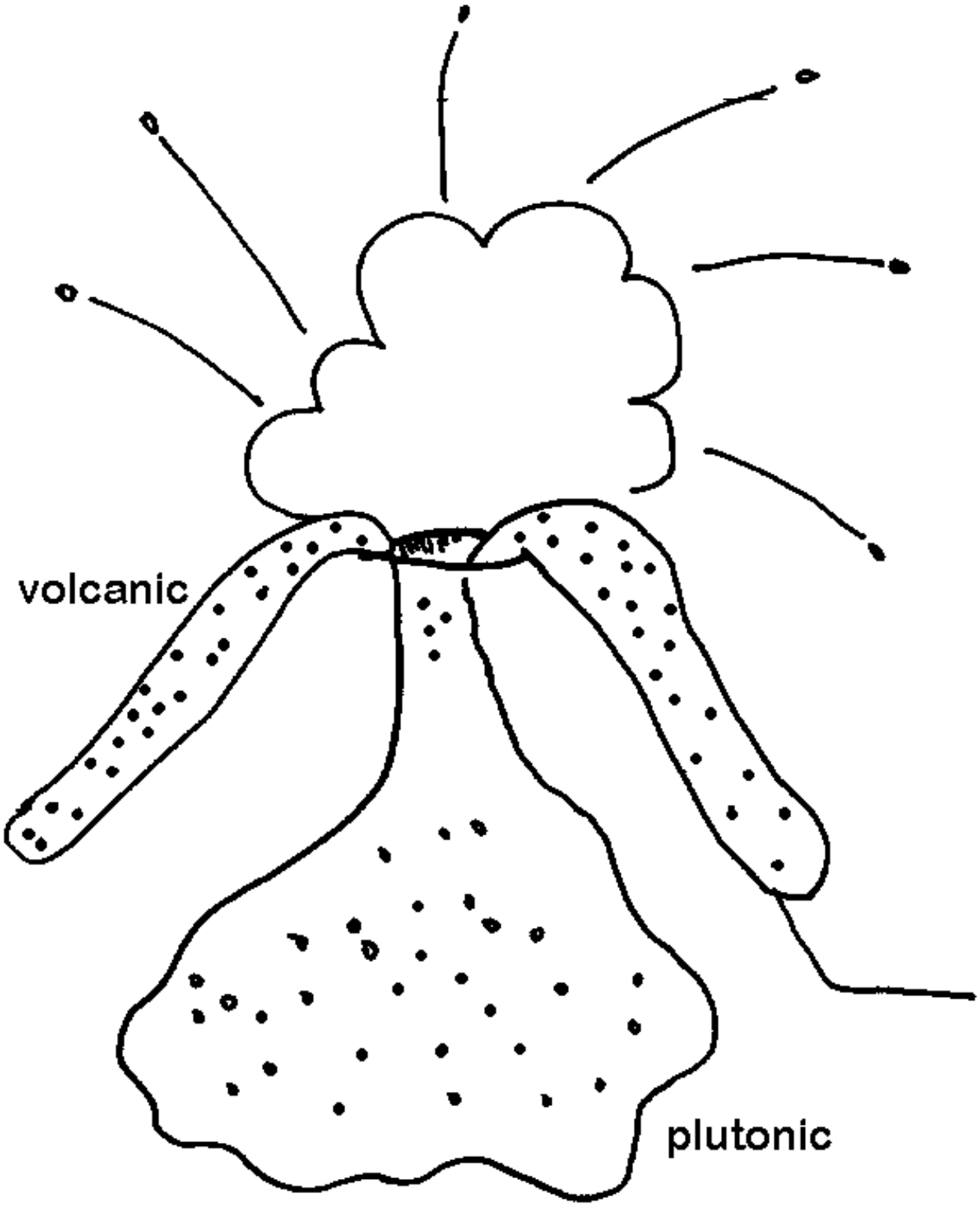
The reason that one rock has large minerals (granite) is that it cooled much slower

(by thousands of years) than the other (rhyolite). Volcanic rocks tend to be fine grained (minerals are small) and plutonic rocks tend to be coarse grained (large minerals). This is a generalization, but is basically correct.

2. Have students color the worksheet. Tell students that there are many igneous rocks being formed in currently erupting volcanoes.

3. If you have large grained sand, have students glue some in the plutonic area of the volcano they colored. The small grained sand should be glued in the volcanic area. If you do not have sand, just use confetti or similar art material, with two different sizes. The larger size should be glued in the plutonic area, the smaller should be glued in the volcanic area. This exercise emphasizes that plutonic rocks have large minerals and volcanic rocks have smaller crystals.

ROCK CYCLE - ROCKS (KA) LAB



ROCK CYCLE - ROCKS (KA)

POST LAB

Students are read a myth about how rocks are formed.

OBJECTIVES:

1. Exploring myths about rocks.
2. Telling stories about how rocks help form land.

VOCABULARY:

island
myth
rock
stone

MATERIALS:

The Turtle and the Island by Barbara Ker Wilson

BACKGROUND:

There are many myths and legends about the formation of the rocks of the Earth or about the rocks themselves, especially in the lore of early cultures. Rocks and minerals were very important to early people, because it helped them work with nature. Stones were the building blocks of most of their homes and roadways. Stones helped them to make weapons to find food and protect themselves. Stones were used to grind wheat and corn into a food that could be eaten. Stones were basically the first tools, which helped them create structures. It was even stones that were used to make fire.

The early people knew that rocks were important to their everyday life, so stones were used in many of the stories that they created. Remember the term "stone" was used to refer to both rocks and some minerals.

PROCEDURE:

1. The formation of islands has always been a particularly mysterious phenomenon. Read the recommended book, *The Turtle and the Island* (or any other appropriate book) which tells of a turtle who is tired of swimming and starts to build a pile of sand and rocks from the bottom of the ocean to form the island of New Guinea. It also relates how the turtle was involved in getting humans to live on the islands.

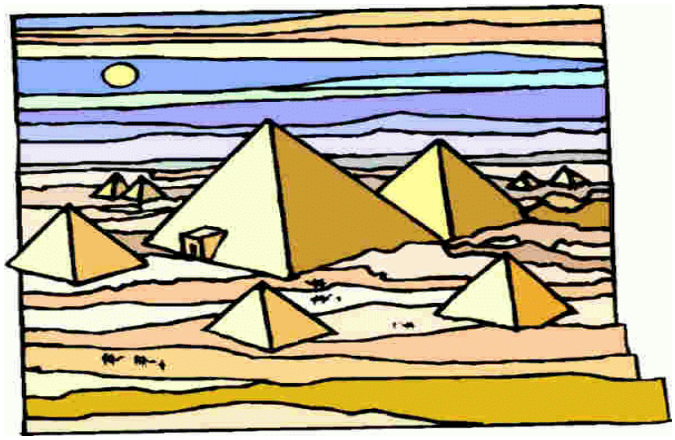
2. Many other myths have been created around how rocks are formed. Have

students sit in a circle and begin telling stories about rocks. Below are some stories, but you might want to add your own.

Pele, the Hawaiian Goddess of the Volcano, causes widespread lava flows when she is displeased. Hawaiians tell of strands of her hair being found after a violent eruption. This "hair" is actually long, thin strands of obsidian.

Stonehenge, a circular setting of large stones in England, was built around 1800-1400 BC. Legend has it that the stones (since they are so large) were magically transported from Ireland by the wizard Merlin. Modern legends include stories about aliens from other planets placing the stones in that particular order. Historians reveal that the Druids of England engineered the movement of the stones.

Easter Island, an extinct volcano in the Pacific, has large carved stone statutes (12 to 20 feet high) mounted on 6 foot high platforms. Each statue weighs about 50 tons. However, the statues are carved from volcanic ash quarried from inside the volcano. Many explorers that came across these large figures had strange tales of how the stones had been placed where they were. Most of the stories centered around some type of god. Historians feel that the natives probably engineered the movement, in similar ways as the Egyptians moved blocks to create the great pyramids.



The pyramids of Egypt were build using limestone, a rock that has the fossils of many small organisms. Many times the fossils would fall out, and the workers developed a myth that the gods would come out of the heaven at night and eat these "lentils." Lentils are pealike plants that were common food for the Egyptians. This was a sign that the pyramids were erected for the gods.

ROCK CYCLE - ROCKS (KB)

PRE LAB

Students touch and observe different sands.

OBJECTIVES:

1. Learning that rocks can be created in or near water.
2. Exploring the components of a beach.

VOCABULARY:

beach
erode
ocean
river
rock
sand
water

beach sand

MATERIALS:

Sand Display Kit
hand lens
crayons

BACKGROUND:

Sand is a natural component of oceans, rivers, or lakes because the rocks surrounding them have been eroded. Erosion occurs when wind, rain, and ice crash onto a rock and break it into smaller pieces. Within a certain size range, these little pieces of rock are called "sand." If the pieces are bigger than sand, you can call them gravel or pebbles.

Sand takes on the "look" of the rocks that it came. If the rock is granite, the sand will have white, yellow, and a small amount of dark minerals eroded from the granite. If the rock is gabbro, the sand would be very dark. In some cases only minerals will erode from the rock, especially the very resistant quartz and feldspar minerals. In other cases, small rocks will erode instead, because the minerals are too small to erode individually. Basalt is an example, usually forming a dark sand composed of very small pieces of basalt.

Students in the lower primary grade are usually amazed by sand, because it seems so flexible. The feel of sand is also very important to young children. It flows like water, yet it is not wet. The little pieces are colorful. It is no wonder that children like to play in sand boxes.

Sand is the basic building block for sandstone, a type of sedimentary rock. Sandstone forms when individual sand grains are squeezed together by pressure and cemented. Sand can thus be thought of as “baby rock.”

PROCEDURE:

1. Ask students where water can be found. Many students will respond with answers such as "fish tanks and bath tubs," but try to direct their comments toward rivers, ponds, lakes and beaches. Where your children live will obviously influence their responses.

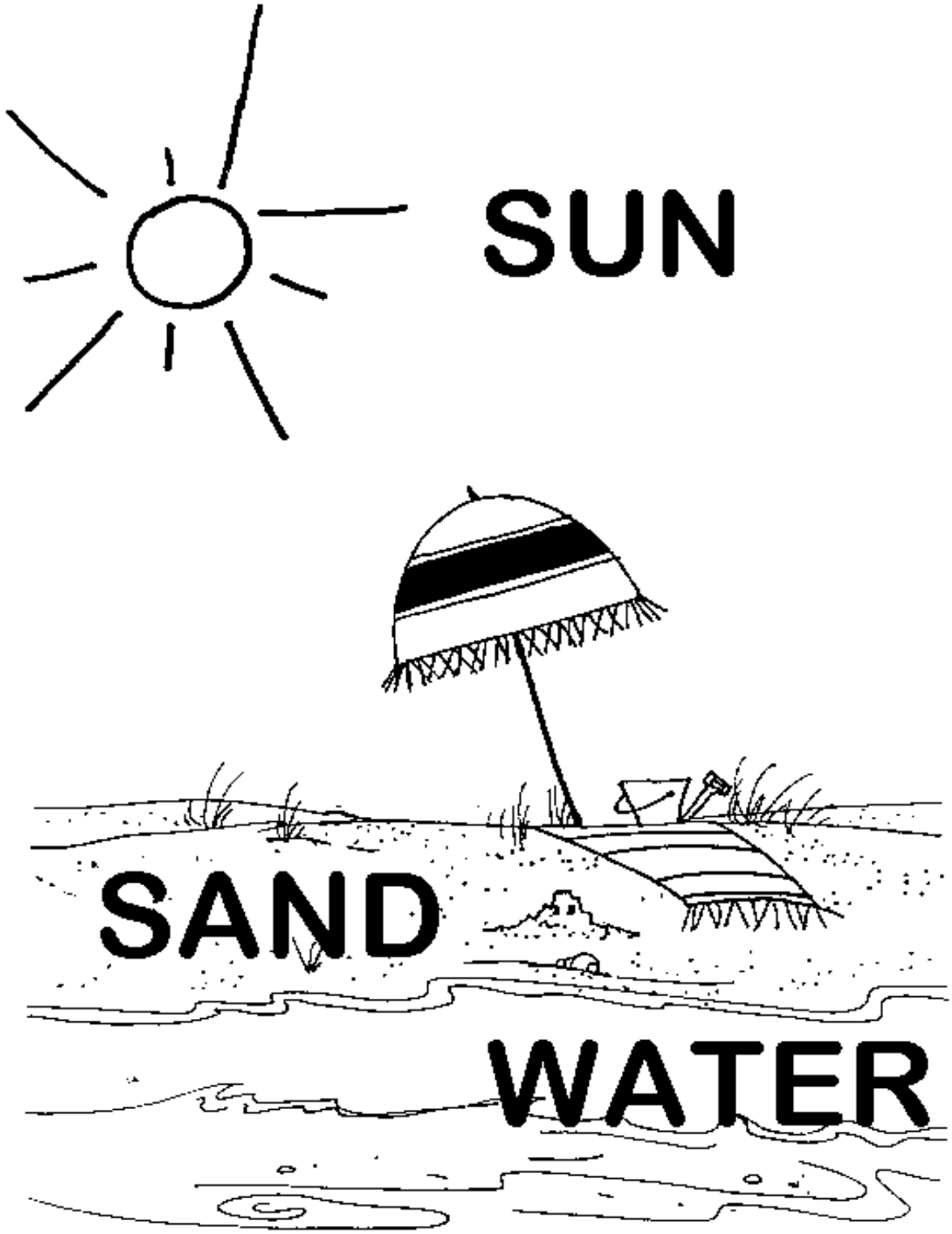
2. If any of your students have been to a beach or lake, have them describe to the rest of the class if they played in the sand or the water. You may also tell them that when you were a child, you played in the sand. Describe how the sand felt to you as a child. Ask the students what sand is composed of. Sand can be called "baby rocks." If the "baby rocks" were cemented together, they would form sedimentary rocks. Sedimentary rocks are commonly formed in or near water.

3. Use the Sand Display kit to show students all the different sands that have been collected from various beaches of California. You might supplement this exercise with samples of sand that you may have collected.

4. If you have a sand box you may want the students to explore the sand in the box with a hand lens.

5. Have the students color the worksheet. This exercise will guide them to think about the "baby rocks" that are formed along the beach. Ask the students to bring in baby food jars or jelly jars to class to be used for the lab.

ROCK CYCLE - ROCKS (KB) PRE LAB



ROCK CYCLE - ROCKS (KB)

LAB

Students make a sand machine to observe how particles of sand settle.

OBJECTIVES:

1. Discovering that sand can make different types of rocks.
2. Making a sand machine.

VOCABULARY:

large
rock
sedimentary
settle
small

MATERIALS:

jar (the taller the jar the better)
water
different types of sand
spoon

sand at the beach

BACKGROUND:

Sand has been used to describe many human qualities. A vagabond has been referred to as "driftless like ...sand". Endless time is "sand that drifts forever". We are all but a "grain of sand on the beach." Children can spend hours on the beach, creating sand castles, or digging to reach the other end of the world. Sand can cover you up, but not make you dirty...it is clean to play with. Children look at sand falling through an hour glass fascinated by every grain that falls and some paint with different color sands to create works of art. Sand is loved so much by children that adults have created sand boxes, so their children can play with it.

It's funny to think that sand can be associated with two very opposite climatic conditions. First, water moves sand at beaches by the ocean and in lakes or rivers. Second, in hot, dry areas like Death Valley and the Sahara Desert, the wind shifts sand. If you understand the process that creates sand, you can see that in both situations some kind of erosion of the surrounding rock is creating the sand, but different processes move it around.

Sand is the Earth in miniature. Every rock eventually succumbs to erosion and will become sand with time. Mighty mountains are slowly chipped away by natural forces like wind and rain. Over long periods of time, the mountains will become sand.

There are many different sizes of sand. Particles of sand are cemented together to become sedimentary rocks, which may have different appearances, depending on the size and composition of the sand particles.

PROCEDURE:

1. Tell students that some sand grains are heavier than others. Ask students which particles would "settle out" first - the heavy, big pieces of sand or the small, lighter pieces of sand. Hopefully, they will agree that the heavy pieces will settle first.

2. Tell students that they are going to make a similar "falling" sand machine." Have the students put about 3-5 tablespoons of the sand mixture from the module in a jar. (Note: the shorter the jar the less mixture you should put in). Fill the jars three quarters full of water. Have them put the top on securely and then shake the mixture. Have them watch the mixture as it settles.

3. Ask the students to describe what they have seen. After a few of their stories draw the following picture on the board, emphasizing that the heavy particles settled first and the lighter ones settled last. You can reuse the mixture, even if wet. If you are storing the mixture, dry it well.

ROCK CYCLE - ROCKS (KB)

POST LAB

Students describe different sands.

OBJECTIVES:

1. Observing and describing sand.
2. Distinguishing different grains of sand.

VOCABULARY:

magnifying glass
microscope
observe
rock
sand
sedimentary

MATERIALS:

Swift-GH Microscope
Tape (or round Avery Labels)
Sand or Sand Display Kit

BACKGROUND:

Understanding sedimentary rocks requires observational skills. The best way to look at sand is with a microscope. If you do not have microscopes use magnifying lenses. However, they will not make the sand look as spectacular.

Review with students that sand on the beaches may someday become rock if it becomes squeezed and cemented together. The sand on the beaches, lakes, or rivers reflects the source or "mother" rock. The mother rock erodes and creates "baby" rocks (sand). The baby rocks have similar characteristics of the mother rock. However, the river or ocean moves the baby rocks sometimes far from the source. Other times the sand reflects the rocks that are eroding nearby.

PROCEDURE:

1. Set up the microscopes before the students look at them. An easy way to observe sand is to get tape and put a small amount of sand on the sticky side, this will prevent the sand from spilling. You may also want to use "dot" stickers and put sand grains on the sticky side and then paste the other side to an index card.

2. On the microscope use the reflecting stage. Place the specimen under it and have the children look at the sand. You may want to use tape or a round Avery label to pick up sand on the sticky side. You can then glue it to an index card so it is easy to look at. Children are amazed at how large the sand looks under the microscope. You may want to make a game of this by setting up eight microscopes, making six samples of different sands with duplicates of two samples.

3. See if the children can find the sand samples that are the same. This way they will make close, careful observations. You can use sand from the Sand Kit if you select this option.

4. Point out that the individual grains of sand can be different colors. If two sand samples have the same colors (components) they probably came from the same mother rock. These sand particles may be "brother" and "sister."