Progression of Life

Grades K-2
Fossil Hunt

Summary: Students will extend the “hands-on” fossil dig activity that was introduced in the Idea Place. Students will create an original fossil similar to those which might be found in an archeological dig.

NCTM Standards: Standard 9—Geometry and Spatial Sense

National Science Standards: Earth/Space Science
Properties of earth materials

Objectives:
To formulate a fossil model.
To construct a fossil model.
To infer by examination of fossil remains which object produced the image.

Materials:
1/2 pint milk carton  sand  petroleum jelly
hand lens  rocks  water
powdered clay  shells  leaves

Procedures:
1. Just before using, mix the powdered clay and water. Keep it in a sealed container to prevent it from drying out.
2. Cover the bottom of the milk carton with sand and rocks.
3. Mix additional sand and rocks into 1 cup of clay. Pat 1/2 of the mixture into the carton on top of the sand and rocks.
4. Coat a shell, rock, or leaf with petroleum jelly and press it gently into the clay.
5. Cover the item with the other 1/2 of the clay mixture.
6. Wait for the clay to harden.
7. Tear open the carton and observe the layers.
8. Break apart the layers and find the hidden fossil
9. Have students observe their fossil using a hand lens. Students may expect their fossil to look exactly like the shell. Explain that scientists often find fossils or fossil imprints that are not recognizable.
10. Have the class compare all of the fossils and discuss their attributes.
Background Information:  
Fossils are the remains or traces of ancient life. They tell paleontologists how organisms lived and grew. There are several types of fossils: petrifications, molds, casts, and trace fossils. Trace fossils consist of tracks, trails, burrows, and borings. Petrifications, molds, and casts include preservation of soft and hard parts of ancient organisms.

Assessment: Teacher observation of students.


Submitted by C. Massey, A. Rachal, A. Nalitt, & K. Sims
Making Fossils

Summary: Students will extend the Fossil Dig activity that was introduced in the IDEA Place. They will identify what fossils are and how they are formed.

NCTM Standards: Standard 4–Mathematical Connections

National Science Standards: Earth/Space Science
Properties of earth materials

Objectives:
To demonstrate the formation of a fossil model and cast.

Materials:
modeling clay
paper plate
seashell (may be purchased at a craft store)
petroleum jelly
7 oz (210-ml) paper cup
plastic spoon
plastic spoon
plaster of paris
tap water

Procedures:
1. Take a piece of clay twice the size of the shell and squeeze it with your hands until the clay is soft and pliable.
2. Place the clay on the paper plate.
3. Coat one side of the seashell with petroleum jelly.
4. Press the lubricated side of the shell into the clay.
5. Carefully remove the shell from the clay.
6. Observe the imprint of the shell in the clay. Compare the imprint in the clay with the shape and texture of the outside of the shell.
7. In the paper cup, mix together 4 spoonfuls of plaster of paris with 2 spoonfuls of water.
8. Pour the plaster mixture into the shell imprint in the clay.
9. Allow the plaster to harden (about 20 minutes).
10. Gently separate the clay from the plaster.
11. Compare the shape and texture of the outside of the shell with the shape and texture of the outside of the plaster cast.

Submitted by Dorothy Watson
Background Information:
Fossils are the remains or traces of ancient life. They tell paleontologists how organisms lived and grew. There are several types of fossils including: petrifications, molds, casts, and trace fossils. In this lab students are making a cast. A cast is a mold that has been filled illustrating the original form of the organism. A mold is an imprint of the surface features of the original organism that are opposite to those on the organism itself.

Assessment: Teacher observation of students. Completion of fossil mold and cast.


Submitted by Dorothy Watson
Making Fossil Layers

Summary: Students will extend the “hands-on” fossil dig activity that was introduced in the IDEA Place. In this exhibit, students participated in an Archeological Dig.

NCTM Standards: Standard 3 — Mathematics as Reasoning

National Science Standards: Unifying Concepts and Processes
Evidence, models, and explanation.

Objectives:
To construct fossil layers.
To demonstrate and observe that fossils found in the bottom layers of rock are the oldest.

Materials: For each group—
4 colors of play dough
beans
pasta

rice
plastic knife

Procedures:
1. Pat each ball of play dough into a flat shape.
2. Press the rice into one piece of the dough. Put another color of dough on top.
3. Press beans into that piece of the dough then put another piece of the dough on top.
4. Press the pasta into the top layer of the dough then put the remaining layer of dough on top. Press the layers together firmly.
5. With the plastic knife, cut through the layers.
6. Draw the different layers on a sheet of paper.
7. When the students’ fossil layers are complete, bring the class together and discuss the results. Have the students to describe the layers that are shown and identify which layer is the oldest.
Background Information:
Fossils are the remains or traces of ancient life. They tell paleontologists how organisms lived and grew. There are several types of fossils: petrifications, molds, casts, and trace fossils. Trace fossils consist of tracks, trails, burrows, and borings. Petrifications, molds, and casts include preservation of soft and hard parts of ancient organisms.

Assessment: Teacher observation of students. The teacher will also interact with students as they work and encourage them to verbalize their thinking.


Submitted by Angela Nalitt
Dinosaur Fossils

**Summary:** Students will extend the Fossil Dig activity introduced at the IDEA Place. Students will make their own dinosaur fossils.

**NCTM Standards:** Standard 1—Problem Solving

**National Science Standards:** Unifying Concepts and Processes
Evidence, models, and explanation

**Objectives:**
To make a model of a dinosaur fossil.

**Materials:**
- plastic dinosaurs (or any small plastic toys)
- plaster
- petroleum jelly
- 1/2 gallon paper milk carton
- hammer
- chisel

**Procedures:**
1. Pour 2" of plaster into the milk carton. Let partially set.
2. Cover the dinosaur (or toy) with a layer of petroleum jelly.
3. Press the dinosaur gently into the plaster and let set until dry.
4. Cover exposed side of dinosaur with petroleum jelly.
5. Pour two more inches of plaster on top of the bottom layer and the dinosaur.
6. Let this set (dry) completely.
7. Remove mold from milk carton.
8. Use a chisel and hammer to gently tap on the seam.
9. When the mold breaks, there will be a fossil of the dinosaur.

**Background Information:** Fossils are the remains or traces of ancient life. One of the most widely talked about animals studied by using fossils is the dinosaur. It is definitely the most fascinating reptile that ever lived. Dinosaurs existed from the Triassic to the Cretaceous period. In this lab, students are making a mold of a dinosaur. A mold of a dinosaur is a type of fossil in which the surface features of an organism are preserved. In this case, the surface features of the dinosaur are left in the plaster.

**Assessment:** Teacher observation of students.


Submitted by Marie Bryant
Pasta-saurus

**Summary:** After visiting the Progression of Life exhibit, the students will be able to create their own dinosaur out of pasta. This activity resembles a dinosaur puzzle.

**NCTM Standards:** Standard 9—Geometry

**National Science Standards:** Unifying Concepts and Processes Evidence, models, and explanation

**Objectives:**
To show that fossils provide information about how dinosaurs looked and lived.

**Materials:**
pasta “bones” (Spirals, rigatoni, shells, elbow macaroni)
cardboard
glue

**Procedures:**
1. Students should be grouped in fours.
2. Each group might work together at a mini-fossil site (a shoebox containing pasta bones buried in sand) to dig up the pasta bones.
4. Decide where each bone could go. Look at pictures of dinosaurs or animal skeletons to get ideas.
5. Glue the “bones” to the cardboard to show the dinosaur skeleton.
6. Share the skeleton with the class.
7. Variation: This could be changed so the pasta is pushed into playdough.
**Background Information:**

Dinosaurs are the most interesting reptiles that ever lived. They were first noticed in the Triassic period and continued to be prominent until the end of the Cretaceous period when they went extinct. The remains, fossils, are all paleontologists have to study these ancient animals. Trace fossils, casts, molds, and petrifications have all been found of dinosaurs. In this lab, students dig up "petrified bones" (pasta) and learn about the magnificent dinosaur.

**Assessment:** Finished product


Submitted by Alida Rachal
Sizing Up Dinosaurs

Summary: This lesson provides an extension for the "Dinosaur Puzzles" IDEA Place activity. It helps the students understand just how big dinosaurs were.

NCTM Standards: Standard 10—Measurement

National Science Standards: Life Science
Characteristics of organisms

Objectives:
To recognize dinosaurs as large creatures.
To use measuring skills, estimation and computation of numbers.

Materials:
newspaper
glue
dinosaur cards
standard measure

Procedures:
1. Cut a large supply of 1" x 13" newspaper strips.
2. Divide students into six groups and give each group two dinosaur cards (with size information on the back) and a supply of newspaper strips.
3. Each group will glue the strips together end-to-end to create the actual length of their two dinosaurs.
4. Measure the glued strips.

Background Information:
Dinosaurs lived about 245 million years ago in the Mesozoic Era. There were many different kinds of dinosaurs present on Earth. These varieties also differed in behavior, physiology, and ecology. One of the major differences noticed by individuals is the animals size. They ranged from 2-3 meters long(Camptosaurus) to 35 meters long(Seismosaurus).

Assessment: Teacher observation

Resources: Primary Mailbox, Aug./Sept. 1995

Submitted by Tracy Moncrief
Grow Your Own Crystals

Summary: Students will extend the Geoscope activity that was introduced in the IDEA Place. They will grow crystals and examine them.

NCTM Standards: Standard 3—Mathematics as Reasoning

National Science Standards: Physical Science
Properties of objects and materials

Objectives:
To grow crystals.
To describe crystals.

Materials:
two oven proof jars
washing soda crystals (sodium carbonate)
a paper clip
a pencil
hot water
a long-handled spoon
a length of string
magnifying lenses

Procedures:
1. Fill one of the jars with very hot water. Add a spoonful of washing soda to the water, and stir it with the spoon.
2. Fill the bowl with very hot water, and set the jar in the bowl. Continue to add washing soda to the jar and mix it with the spoon until the water is saturated and the soda will no longer dissolve in the water.
3. Allow the solution to cool. Then pour it into the second jar.
4. Tie a paper clip to one end of a length of string. Tie the other end of the string around a pencil. Place the pencil across the top of the jar so that the paper clip is suspended in the solution.
5. After several days, crystals will form on the paper clip. Carefully remove the paper clip and the crystals. Let students examine the crystals with magnifying lenses.
6. Allow students to draw pictures to describe the crystals.

Background Information: Crystals have a smooth, flat surface. This is a result of the arrangement of particles in a definite pattern. When this definite pattern repeats itself again and again, a crystalline solid is formed. In this lab, students will observe the individual crystals in the washing soda. The hot water will cause the crystalline solid to break down and once the solution cools, the crystal reform on the paper clip.
Background Information: Crystals have a smooth, flat surface. This is a result of the arrangement of particles in a definite pattern. When this definite pattern repeats itself again and again, a crystalline solid is formed. In this lab, students will observe the individual crystals in the washing soda. The hot water will cause the crystalline solid to break down and once the solution cools, the crystal reform on the paper clip.

Assessment: Teacher observation of students and pictures drawn by students.


Submitted by Marie Bryant
Minerals in the Soil

Summary: Students will extend the Geoscope activity from the IDEA Place. Students will isolate and observe minerals in soil.

NCTM Standards: Standard 11—Statistics and Probability

National Science Standards: Physical Science
Properties of objects and materials

Objectives:
To isolate and observe minerals in the soil.

Materials:
small jar with lid
distilled water
soil
cheesecloth
shallow dish

Procedures:
1. Fill half a small jar with soil.
2. Fill the rest of the jar with distilled water, which has no minerals.
3. Screw the lid on the jar and shake well.
4. The next day, place cheesecloth over a shallow dish. (Use four thicknesses of cheesecloth.)
5. Pour the water from the jar onto the cheesecloth. The water will go on through the cloth and into the dish. The tiny bits of soil will stay on the cheesecloth. Remove cloth with soil and discard.
7. Observe what is remaining in the dish. These are the minerals.
**Background Information:** A mineral is a naturally occurring element or compound formed by inorganic processes that has a definite chemical composition or range of compositions as well as distinctive properties that reflect its internal atomic structure. More than 3000 minerals have been discovered. Only a few of these are regularly encountered. Silicate minerals, feldspars, clay minerals, and non-silicate minerals are among the most prominent in the earth's crust. Students will see different types of these minerals.

**Assessment:** Teacher observation of students. Students will verbally describe findings.


Submitted by Carol B. Massey
Land of Rocks

Summary: Students will extend the "hands-on" Progression of Life activities introduced in the IDEA Place. Students will construct "rocks" and demonstrate how rocks are useful.

NCTM Standards: Standard 9—Geometry and Spatial Sense

National Science Standards: Unifying Concepts and Processes
Evidence, models, and explanation

Objectives:
To make rocks for construction.
To realize how limited construction once was.
To provide opportunities for using and stretching imaginations.
To identify differences in size, shape and weight.

Materials:
different sized boxes
yarn
newspapers
brown paper bags

Procedures:
1. Have students crumple newspapers and stuff paper bags to make "rocks."
2. Allow students to talk about their "rocks," (size, shape) and how their rocks are different from real ones.
3. Ask students to imagine that they are in a land of rocks. Encourage students to construct needed shelter and furnishings using the boxes and their "rocks."
**Background Information:** Rocks can be divided into three types: igneous, sedimentary, and metamorphic. A rock is identified by its size, shape, arrangement of minerals, and mineral composition. In this lab, students will look at different sizes and shapes.

**Assessment:** Teacher will interact with students as they work on the rocks and verbalize their uses. Students or groups will share and demonstrate rock houses and furnishings. Lead students to discover advantages and disadvantages of using only rocks for building materials.


Submitted by Edith Hawkins
My Rock

Summary: Students will extend the geoscope activity that was introduced in the IDEA Place. They will explore and classify the physical properties of various rocks.

NCTM Standards: Standard 11 — Statistics and Probability

National Science Standards: Earth and Space Science
Properties of earth materials

Objectives
To collect rocks.
To classify the physical properties of rocks.
To organize, describe and interpret the data.

Materials:
rocks
yarn/hula hoops
activity sheets

Procedures:
1. Students will collect rocks.
2. Each student will draw and describe their rock while completing the activity page.
3. Students will classify rocks according to light-dark, rough-smooth, and/or colors into Venn diagrams. (Yarn or hula hoops could be used in the center of the floor.)
4. Students will construct a class graph using the rocks' physical characteristics.

Background Information:
Rocks are divided into three families: igneous, metamorphic, and sedimentary. Rocks are identified by description. The size, shape, arrangement of minerals, and mineral composition are used for identification. In this activity, students will learn how to differentiate between different families of rocks by using physical properties.

Assessment:
Teacher observation and “My Rock” Activity Sheet.

Resources: AIMS Newsletter, AIMS Education Foundation, Volume II, No. 4; Volume II, No. 4; Volume IV, No. 2.

Submitted by M. Bryant, E. Hawkins, D. Hill, J. Hodge, S. Thomas, D. Watson & G. White
My Rock

This is a picture of my rock.

My rock’s name is _______________________.

Circle the word that describes your rock.

My rock is light dark.

My rock is rough smooth.

The colors in my rock are _________________. 
Hide the Beans

Summary: Students will extend the exploration of plants introduced in the Life Changes exhibit. They will experiment with lima bean seeds to see how living seeds react to change.

NCTM Standards: Standard 9—Geometry and Spatial Sense

National Science Standards: Life Science
Organisms and environments

Objectives:
To infer how a living plant (seed) reacts to change.
To observe the changes in the experiment when environment is changed.

Materials:
tall clear plastic jar with lid
black construction paper
cotton balls
3 lima beans
water
tape

Procedures:
1. Fill the plastic jar with cotton balls. Slide three lima bean seeds between one side of the jar and the cotton so that the seeds are visible from the outside of the jar.
2. Soak the cotton with water. Wrap black construction paper around the jar and tape it closed so that no light can come through.
3. After three days, unwrap the jar. Have students observe which way the roots are growing. (Note: Hormones cause plant growth in response to environmental stimuli such as light and water. The response of plants to the stimulus of gravity is called gravitropism. Plant stems grow away from the pull of gravity, while its roots grow toward the pull.)
4. Water the cotton again.
5. When roots reach the bottom of the jar, cover it again with the black paper. Turn jar upside down.
6. After three more days, look at the beans. Have students observe the change in the roots and discuss this change.
7. Older students may record their findings throughout the experiment. Students should observe the roots of the bean seeds always grow downward to the pull of gravity.

Assessment: Teacher observation of student recordings. The teacher will lead the discussions of the findings of the experiment and interact with students as they observe and infer how the living bean seed reacts to changes in the environment.


Submitted by Kathy Conville Sims
Creepy Crawlies!!

Summary: Students will extend the exploration of life introduced in the Life Changes exhibit. Students will observe the life cycle of a frog or toad from egg to mature adult.

NCTM Standards: Standard 5—Estimation

National Science Standards: Life Science
Life cycles of organisms

Objectives:
To observe the life cycle of a frog or a toad.
To develop descriptive skills that enhance language expression.
To measure specimens during the life cycle to document growth.

Materials:
frog or toad eggs
magnifying glass
rulers (inch and metric)
glass container (small aquarium)
pond water

Procedures:
1. Begin with as many frog/toad eggs as possible. These may be purchased at biological supply houses. It is better and easier to encourage the students to bring them in. As eggs are hatching, children are often able to find fifteen to thirty or more in a pond. Instruct them to bring in as much pond water as possible from the same area as animals will be accustomed to the water and it will contain no toxins.
2. Each student should carefully study the eggs or hatching tadpoles with a magnifying glass. A glass aquarium is excellent for this experiment.
3. Using both metric and inch rulers, instruct students to measure the specimens. This real-life application of measurement skills tends to fix the concepts much more firmly in the child's mind than does book study.
4. Encourage students to list as many words as possible describing the specimens. Use a discussion period to develop the oral language of your student through the sharing of words and phrases.
5. You could have the students describe how the tail propels the tadpole through the water for a journal writing activity.
6. There should be many questions and you will want your students to offer their own hypothesis. The following questions may be answered through this research:

   How long is your tadpole?
   How does it move?
   Can you see through the tail?
   Is the animal wet or dry?
   Is the animal smooth or rough?
   Is the animal slippery or warty?

7. Have students make a list of words that describe the tadpoles/frogs. Have them include color, size, shape, speed, etc. This could be an addition to journal writing.

**Assessment:** Teacher observation of student recordings, journal writing, and discussions will be informally assessed as students are monitored daily.

**Resources:** Critters in the Classroom, MCMLXXXVII Instructional Fair, Inc.; pp. 52-53. Creepy Crawlies for Curious Kids, Teacher Created Materials, Inc.; (#217), pp. 33-40.

Submitted by Kathy Conville Sims
Ocean in a Bottle

Summary: Students will extend the Progression of Life activities introduced in the IDEA Place. The students will observe how the ocean moves.

NCTM Standards: Standard 4—Mathematical Connections

National Science Standards: Physical Science
Position and motion of objects

Objectives:
To observe a simulation of how the ocean moves.

Materials:
quart jar with a lid
baby oil or mineral oil
blue food coloring
water

Procedures:
1. Fill the jar 1/4 full of water.
2. Add a few drops of food coloring and stir.
3. Add turpentine, leaving about 2" space from the top.
4. Seal the jar tightly.
5. Move the jar and watch the ocean waves!

Background Information:
Water waves are a visible type of wave. In this lab, students will observe the way an ocean moves. Waves in the oceans and lakes are energy traveling through water. In nature, waves get energy from the wind.

Assessment: Teacher observation of students. Students will verbally describe findings.

Resources: Laura Chestnut

Submitted by Laura Chestnut