



Pacifica's Mobile Nature & Horticulture Center

Rock 'n' Roots: Rocks, Minerals, Soil, and Roots Second and Third Grade Program Outline

Introduction: Our lives depend on oxygen, water, and the soil and sun to grow plants. As a quarter of that equation, soil (and its antecedent rocks) is not only a fascinating subject, but a vital one.

NATURE CENTER STATION OBJECTIVES:

1. To define the earth's layers.
2. To identify the three types of rocks by their characteristics.
3. To examine fossil characteristics.
4. To make a fossil.

ACTIVITIES:

YELLOW:

1. Students will be given a tray of mixed geological material. They will use a key to aid in sorting rocks, minerals, and fossils into category types.

BLUE:

2. Students will make their own "fossil", using sand and Plaster-of-Paris.

HORTICULTURE CENTER STATION OBJECTIVES:

1. To identify different soil types.
2. To explore how soil affects plant growth.
3. To examine materials that makes up soil.
4. To set up an experiment to compare the growth of plants in different soils.

ACTIVITIES:

RED:

1. Students will compare clay, sand, and humus type soils.
2. Students will learn how to test soil to see whether it is "clay soil" or "sandy soil".

* Note: Students will test their own soils in the classroom, because of the time constraints with the mobile classroom.

GREEN:

1. Students will set up an experiment to test how long a soil takes to dry out.
2. Students will examine how roots grow in different soil types (i.e. clay or sand).

*Note: Use of the planting station in the mobile classroom will be used for these experiments.

Connections to the Certificate of Initial Mastery (CIM) Standards:
Nature Center Objectives –

Physical Science: Understand structures and properties of matter and changes that occur in the physical world.

Common Curriculum Goal: MATTER -- Understanding structure and properties of matter.
Content Standards: Identify structures and properties of matter.
Leads or meets Benchmark at Grade 3:

1. Student will be able to describe objects according to their physical properties.

Horticulture Center Objectives –

Earth and Space Science: Understand physical properties of the Earth, how those properties change, and the Earth's relationship to other celestial bodies.

Common Curriculum Goal: THE DYNAMIC EARTH -- Understand the properties and limited availability of the materials which make up the Earth.

Content Standard: Identify the structure of the earth system and changes that can occur in its physical properties.

Leads or meets Benchmark at Grade 3:

1. Identify materials that make up the earth.

These benchmark standards can be used for both the Nature Center and Horticulture Center Objectives.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Formulate and express scientific questions and hypotheses to be investigated.

Content Standards: Formulate and express scientific questions and hypotheses to be investigated.

Leads to or meets Benchmark at Grade 3:

1. Ask questions about objects, organisms, and events that are based on observations and can be explored through simple investigations.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Design scientific investigations to address and explain questions and hypotheses.

Content Standards: Design scientific investigations to address and explain questions and hypotheses.

Leads to or meets Benchmark at Grade 3:

1. Plan a simple investigation.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Conduct procedures to collect, organize, and display scientific data.

Content Standards: Conduct procedures to collect, organize, and display scientific data.

Leads to or meets Benchmark at Grade 3:

1. Collect data from an investigation.

Scientific Inquiry: Use interrelated processes to pose questions and investigate the physical and living world.

Common Curriculum Goal: Analyze scientific information to develop and present conclusions.

Content Standards: Analyze scientific information to develop and present conclusions.

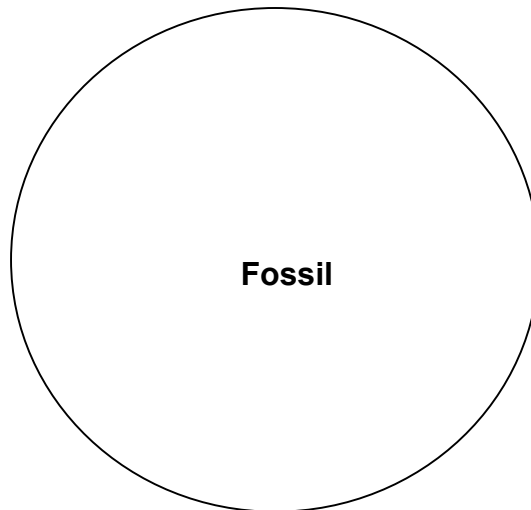
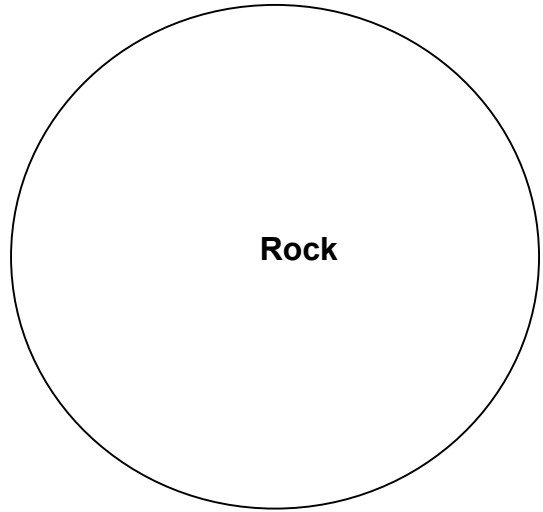
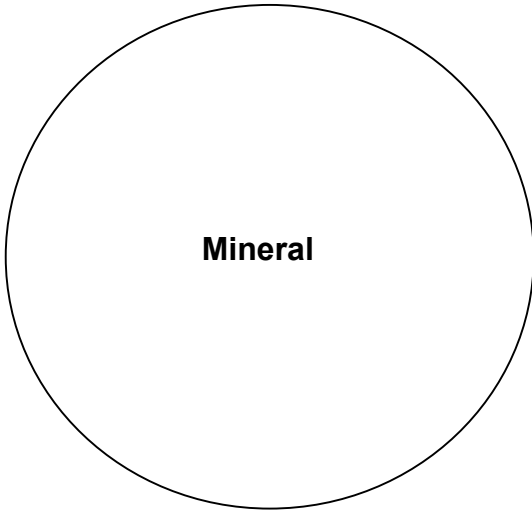
Leads to or meets Benchmark at Grade 3:

1. Use the data collected from an investigation to explain the results.

Rock Activity

BE A ROCK DETECTIVE

Instructions: Using the key, look carefully in your activity box and put each item in the correct circle below. Are they mineral, rock, or fossil?



STATION YELLOW ACTIVITY SHEET

Rock Activity

Rock Detective Key

<p>Minerals: They are inorganic (not living) building blocks for rocks. People know you by your blue eyes and brown hair. You can tell who minerals are by their:</p> <ul style="list-style-type: none">HARDNESSCOLORSTREAKLUSTER	<p>Rocks: They can be made of different combinations of minerals and organic (once living) material. Rocks can be made in three different ways:</p> <p>IGNEOUS: from volcano. METAMORPHIC: rocks changed by great pressure and/or heat. SEDIMENTARY: Rocks weathered to "sand" and held together in layers.</p>	<p>Fossils: Plants and animals which have died and left their "prints" in the rock.</p>
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STATION YELLOW ACTIVITY SHEET

Fossil Activity

Make a fossil of your own

Instructions: Using the materials provided for you, construct a “fossil” of your own.

- 1. Wrap the newspaper into a cup as shown. Tape the bottom and write your name on it for identification.**
- 2. Put a layer of sand at the bottom of the cup.**
- 3. Put on the gloves, and cover the object you want to make into a fossil with petroleum jelly and place it on the sand.**
- 4. Pour the sand Plaster-of-Paris mixture over the top of the container.**
- 5. Let dry until Plaster is solid.**
- 6. When the plaster is dry, remove the newspaper pot with its layer of sand and the object you buried.**
- 7. What you have left over is the fossilized remains of your object. Just like the dinosaurs left their tracks!**

STATION BLUE ACTIVITY SHEET

Soil Activity

OUR SOIL

Instructions: Soil is made from ground up rocks and organic (once living) things, such as, old leaves. Look at some soil with a magnifying glass. It is made up of tiny particles of 3 main kinds:

1. HUMUS:

a. How does it feel? _____

b. What does it look like? _____

2. CLAY:

a. How does it feel? _____

b. What does it look like? _____

3. SAND:

a. How does it feel? _____

b. What does it look like? _____

Which particle is smallest? _____ Which is largest? _____

Testing Soil

Sandy vs. Clay

Observe: When you shake up soil in a jar of water, sand sinks to the bottom ... can you think why? Silt will make the second layer and clay is the third layer. Organic matter will float to the top.

Try this at home or school:

1. Put a half cup of soil in a jar with a lid.
2. Fill the jar with 2/3 full of water.
3. Put the lid on tightly and shake it well.
4. Then let it settle overnight.
5. The next day observe the layers in the jar:
 - a. If the sand layer is bigger than the clay layer, you have sandy soil.
 - b. If the clay layer is bigger, you have clay soil.

STATION GREEN ACTIVITY SHEET

Soil Activity

Drying Soil Experiment

Instructions: Consider which soil type (clay or sand) will dry out faster than the other and write it down next to my hypothesis. Then write down the reason for why you think this way. Then set up your experiment with the two types of soils and record your data for the next five days.

Question: Which soil dries out sooner and needs water more often?

My Hypothesis: I think _____.
Reason: Why I think this _____.

MY DATA	SANDY SOIL	CLAY SOIL
DAY 1		
DAY 2		
DAY 3		
DAY 4		
My Conclusions:		

Question: With enough water which type of soil will grow the best roots?

My Hypothesis: I think _____.
Reason: Why I think this _____.

MY DATA	SANDY SOIL	CLAY SOIL
DAY 1		
DAY 2		
DAY 3		
DAY 4		
My Conclusions:		

Appendix A

Post Activities

These activities are suggested to complete the visit of the mobile greenhouse and nature center – “The Caterpillar” to your school

1. Finish the soil experiment for which is drier and can grow roots.
2. Do the soil testing experiment by having students bring in their own jar and lid and a collection of the soil from their yard to test.
3. Let the “fossils” dry and then discuss them.
4. Additional activities are included in the back of the folder to pursue as time and interest permits.

Appendix B

Resources

Background Material:

1. There is additional information on geology, rock identification, and soil types included in the front pocket of your grade level folder.

Additional Resources:

Books:

1. Introduction to Minerals and Rocks: Joseph Cepeda; Prentice-Hall, 1993. ISBN: 023204524.
2. Essentials of Physical Geography: R. Gabler, R. Sager, and D. Wise; Harcourt, 1997. ISBN: 003022909X.
3. Modern Physical Geology – 92nd Ed.; G. R. Thompson and J. Turk; Saunders College Publishing, 1993. ISBN: 0030969107.
4. Geology: An Introduction to Familiar Rocks, Minerals, Gemstones, and Fossils; J. Kavanaugh and R. Leung.; Waterford Press LTD, 2001.

Websites:

1. U.S. Geological Survey Minerals Resource: www.minerals.er.usgs.gov
2. U.S. Geological Survey Fossils Resource: www.geology.er.usgs.gov
3. Museum of Paleontology, Univ. of California at Berkeley: www.ucmp.Berkeley.edu
4. Mineral and Gemstone Kingdom: www.minerals.net
5. University of British Columbia: www.science.ubc.ca/~geol202/petrology/rock.htm

Local Area:

1. Rogue Gem and Geology Club
2. Crater Rock Museum

Appendix C

Glossary

Earth's Layers:

Inner Core: an iron ball at the heart of the earth. It has a diameter that is approximately 870 miles. The core temperature is approximately 11,000 ° F.

Outer Core: Primarily made up of liquid iron, and has a diameter approximately of 1240 miles.

Mantle: A layer of rock approximately 1800 miles thick. A thick hot soup of solid rock and molten rock.

Crust: A thin layer of rock on the surface of the earth. It is approximately 4 miles thick under the ocean and 40 + miles thick under the continents.

Rock Cycle:

Igneous rock which is made from metamorphic rock heated to magma. This rock erupts from volcanic rocks and weathered by climate. The weathered rock turns to a "sand" mixture with mineral deposits and plant/animal remains to form layers. These layers are called **Sedimentary Rock Layer**. **Sedimentary Rock Layer** is caused by the water and climatic pressures.

Igneous rocks and/or sedimentary rocks "changed" under great heat (magma) or pressure (the earth's plate shifting) to form **Metamorphic Rock**.

Fossil: A plant or animal which has died and left its "print" in a rock.

Mineral: A basic inorganic building block from which rocks are made; their properties remain standard rocks. They can be made of different combinations of minerals and organic (once living) material.

Rocks can be made in three different ways:

1. **Igneous:** erupted from a volcano.
2. **Metamorphic:** Igneous or sedimentary rock changed under great pressure and/or heat.
3. **Sedimentary:** Rocks weathered to sand, minerals and organic material held together in layers.

Soil Particles:

1. **Clay:** The finest particle; will settle above silt, below organic matter.
2. **Silt:** Finer than sand, coarser than clay; will settle to a layer above sand but below clay.

3. **Sand: The coarsest particle; will sink to the bottom layer when shaken in water.**
4. **Humus: Organic matter.**