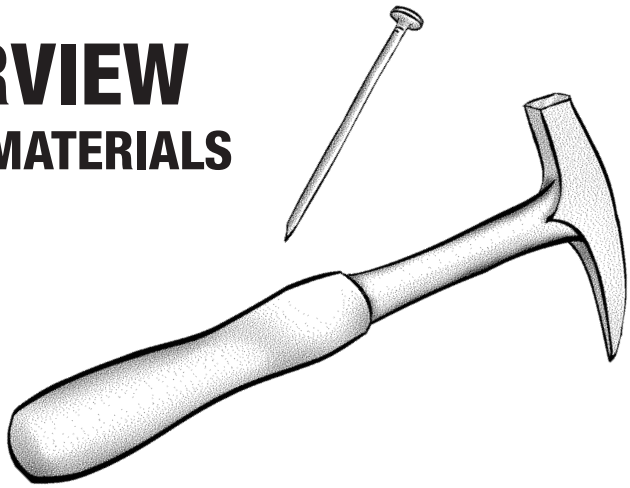
OVERVIEW
EARTH MATERIALS



GOALS

The **Earth Materials Module** consists of four sequential investigations dealing with observable characteristics of solid materials from the earth—rocks and minerals. The focus is on taking materials apart to find what they are made of and putting materials together to better understand their properties. The module introduces fundamental concepts in earth science and takes advantage of the students' intrinsic interest in the subject matter and in the physical world around them.

FOSS EXPECTS STUDENTS TO

- Develop an interest in earth materials.
- Gain experiences with rocks and minerals.
- Understand the process of taking apart and putting together to find out about materials.
- Use measuring tools to gather data about rocks.
- Collect and organize data about rocks.
- Observe, describe, and record properties of minerals.
- Organize minerals on the basis of the property of hardness.
- Investigate the effect of vinegar (acid) on a specific mineral, calcite.
- Use evaporation to investigate rock composition.
- Learn that rocks are composed of minerals and that minerals cannot be physically separated into other materials.
- Compare their activities to the work of a geologist.
- Acquire vocabulary used in earth science.
- Exercise language and math skills in the context of science.
- Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, and organizing.

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EARTH MATERIALS MODULE MATRIX

SYNOPSIS	SCIENCE CONTENT	THINKING PROCESSES
1. MOCK ROCKS		
Students are introduced to the concept of earth materials and the tools and techniques of the geologist by investigating the properties of a homemade mock rock. Students separate it into different ingredients by physically taking it apart, dissolving part of it in water, and using evaporation.	• Rocks can be separated into their components. • Rocks exhibit a variety of properties, including shape, size, color, and texture. • Water, settling, and evaporation can separate rocks into their components. • Crystals form from evaporation of a saltwater mixture. • Rocks are composed of earth materials called minerals that cannot be physically broken apart any further.	• Record and discuss observations about rock. • Compare observations. • Take apart a mixture by separating the ingredients. • Observe and describe how rock materials separate and settle in water. • Observe the results of evaporation.
2. SCRATCH TEST		
Students are introduced to minerals as the basic earth materials that make up rocks. They observe, describe, and record properties of four minerals and use the scratch test to determine the relative hardness.	• Rocks are composed of earth materials called minerals that cannot be physically broken apart any further. • The property of hardness can be used to seriate minerals. • Examples of minerals are quartz, fluorite, calcite, and gypsum.	• Observe the properties of a group of minerals. • Record properties of minerals. • Organize observations. • Seriate minerals based on hardness.
3. CALCITE QUEST		
Students observe the characteristic property of the mineral calcite—the mineral bubbles when placed in an acid such as vinegar. Using this test, students go on a quest to find calcite in four common rocks.	• Calcite is a mineral that fizzes when placed in an acid. • Minerals have different properties. • Rocks can easily be tested for the presence of calcite using an acid such as vinegar. • Examples of rocks are sandstone, limestone, marble, and granite.	• Observe directly and indirectly the special properties of a mineral. • Observe and record results of an investigation. • Compare results. • Identify one ingredient from a mixture.
4. TAKE IT FOR GRANITE		
Students conclude their exploration of earth materials by studying the rock granite. They use the properties of five minerals to find out which of the minerals are in granite.	• Rocks are made of minerals. • The rock granite is made up of the minerals mica, feldspar, quartz, and hornblende. • Some mineral properties are color and hardness. • Properties of minerals are used to find out which minerals make up a rock.	• Observe properties of a rock and several minerals. • Sort objects according to properties. • Record observations. • Compare observations of properties.

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INTERDISCIPLINARY EXTENSIONS	FOSS SCIENCE STORIES	TECHNOLOGY/HOME CONNECTION
Language Extension • Make rules for starting a class rock collection. **Math Extensions** • Problem of the week. • Find ranges of measurements. • Weigh mock rocks. **Science Extensions** • Describe properties of rocks. • Make a class rock collection. • Contact USGS for information. • Invite a geologist to class.	See the Science Stories folio. • *Written in Stone* • *Postcards from the Ledge*	www.fossweb.com Check the FOSS website for interactive simulations, to write questions to a scientist, for teaching tips, and to talk with other classes using FOSS. Home/School Connection: Students are asked to find some rocks and write descriptive riddles with other members of the family.
Language Extension • Research Mohs' scale. **Math Extensions** • Problem of the week. • Make a class bar graph of birthstones. • Seriate rocks. **Science Extension** • Use a tumbler to polish rocks.	See the Science Stories folio. • *Treasure Underfoot* • *X Marks the Spot* • *Digging It Up: Mining for Minerals* • *Birthstones: A Mineral for Each Month*	Home/School Connection: Students share birthstone information with their family. They include the data they collect on a class bar graph.
Language Extensions • Write legends about rocks. • Research questions on rocks and landforms. • List idioms and metaphors. **Math Extensions** • Problem of the week. • Group rock logic problems. **Science Extensions** • Reseach uses of Portland cement. • Find out how limestone is used in farming.	See the Science Stories folio. • *Rock Tales* • *Old Man and the Rock: A Native American Tale* • *The Two Boys: An Aborigine Story from Australia*	Home/School Connection: At home, students use vinegar to test rocks for calcite.
Language Extensions • Play word games using earth materials vocabulary. • Research use of stones as tools. **Math Extension** • Problem of the week. **Art Extensions** • Research use of earth materials for decoration. • Practice bon-seki, Japanese rock art.	See the Science Stories folio. • *Rock of Ages* • *Identifying Materials* • *Where Do Rocks Come From?*	Home/School Connection: Students go on a scavenger hunt at home. They list many everyday items they find that are made from earth materials.

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FOSS AND NATIONAL STANDARDS

The **Earth Materials Module** emphasizes the development of observation and description skills and building explanations based on experience. This module supports the following National Science Education Standards.

SCIENCE AS INQUIRY

Develop students' abilities to do and understand scientific inquiry.

- Ask and answer questions about objects and materials.
- Plan and conduct simple investigations.
- Employ tools to gather data.
- Use data to construct reasonable explanations.
- Communicate investigations and explanations.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

CONTENT: EARTH SCIENCE

Develop students' understanding of properties of earth materials.

- Solid rocks are earth materials, and they have different physical and chemical properties that make them useful in different ways, for example, as building materials. Earth materials provide many of the resources that humans use.

SCIENCE AND TECHNOLOGY

Develop students' understanding about science and technology.

- Scientists work collaboratively in teams and use tools and scientific techniques to make better observations.

Develop students' abilities to distinguish between natural objects and objects made by humans.

- Understand that objects occur in nature; others have been designed and made by people, sometimes using natural materials, to enhance the quality of life or to solve problems.

HISTORY OF SCIENCE

Develop an understanding of science as a human endeavor.

- Many people choose science as a career and devote their entire lives to studying it. Many people derive great pleasure from doing science.

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