OVERVIEW
LANDFORMS

GOALS

The **Landforms Module** consists of five investigations that introduce students to these fundamental concepts in earth science: change takes place when things interact; all things change over time; patterns of interaction and change are useful in explaining landforms. Students also learn about some of the tools and techniques used by cartographers and use them to depict landforms.

FOSS EXPECTS STUDENTS TO

- Gain experience with models and maps.
- Gain experience with the concepts of erosion and deposition.
- Observe the effect of water on surface features of the land, using stream tables.
- Plan and conduct stream-table investigations.
- Relate processes that they observe in the stream-table models to processes that created famous landforms.
- Become familiar with topographic maps and some of the techniques used to create them.
- Gain experience with the concepts of contour and elevation.
- Use measurement in the context of scientific investigations.
- Apply mathematics in the context of science.
- Acquire vocabulary associated with landforms and the processes that create landforms.
- Use scientific thinking processes to conduct investigations and build explanations: observing, communicating, comparing, organizing, and relating.

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LANDFORMS MODULE MATRIX

SYNOPSIS	SCIENCE CONTENT	THINKING PROCESSES
1. SCHOOLYARD MODELS Working in pairs, students create models of their school site, using a sand mixture and plastic cubes. They transfer the model to a plastic grid and draw a map on paper from the overlay. They observe and compare features on the models and corresponding maps.	• Models represent objects that are very large or processes that occur over long periods of time. • Models and maps are ways of representing landforms and human structures. • Maps can be made from models.	• Observe the schoolyard area and create a model of it. • Make a representation of the schoolyard using a grid system to transfer information to a smaller map. • Compare features on the models and the corresponding maps.
2. STREAM TABLES Students set up stream tables with earth material and run water through the system. They observe the processes of erosion and deposition and become familiar with the landforms created.	• Water is an important agent in shaping landforms. • The wearing away of earth is erosion; the settling of eroded material is deposition. • Landforms that result from running water include canyons, deltas, and alluvial fans.	• Observe and measure the effects of flowing water in the stream table. • Compare the features created in the stream tables. • Communicate the results of the investigations. • Relate the processes in the stream table to the processes of erosion and deposition.
3. GO WITH THE FLOW Students continue their stream-table investigations, studying variables that affect erosion and deposition—slope of the land and the rate of flow. They design further investigations, recording events and mapping the results.	• The slope of the land over which a river flows affects the processes of erosion and deposition. • During flooding, the rate of erosion and deposition increases. • Humans affect the processes of erosion and deposition.	• Observe and measure the results of stream-table investigations. • Experiment to find the effect of slope and floods on erosion and deposition. • Communicate the results of experiments in a conference. • Relate the stream-table results to natural processes.
4. BUILD A MOUNTAIN Students are introduced to the study of topography by building a model of a landform—a mountain. They use the foam model of Mt. Shasta to create a topographic map, and the map to produce a profile of the mountain.	• Topographic maps are two-dimensional representations of three-dimensional surfaces. • Topographic maps show contour lines, which represent points of equal elevation. • Topographic maps use symbols and color to represent landforms.	• Observe features on a foam mountain and compare them to a two-dimensional representation, a topographic map. • Organize information from a model to create a topographic map and profile of a mountain. • Relate topographic features to symbolic representations on maps.
5. BIRD'S-EYE VIEW Students learn to read USGS topographic maps and compare them to aerial photographs. They study Death Valley, Mt. Shasta, and Grand Canyon maps and photographs, and make landform maps from the aerial photographs.	• Cartographers use aerial photographs as one tool in constructing topographic maps. • Landform maps can be generated from aerial photographs.	• Observe and describe the types of information represented on a topographic map. • Compare the Mt. Shasta foam mountain to the topographic map. • Interpret aerial photographs. • Relate information on maps and aerial photographs to the actual landforms.

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INTERDISCIPLINARY EXTENSIONS	FOSS SCIENCE STORIES	TECHNOLOGY/HOME CONNECTION
Language Extensions • Discuss models. • Describe routes, including fire-escape routes. **Math Extensions** • Problem of the week. • Make proportional drawings. **Science and Social Studies Extensions** • Read other maps. • Create a permanent model. • Find school-site plans. • Plan the perfect school.	See the Science Stories folio. • *Maps and How They Are Made* • *Ancient Maps*	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 draw a map of all or part of their home and mark fire-escape routes.
Language Extensions • Describe the stream-table landforms. • Discuss landform expressions. **Math Extension** • Problem of the week. **Social Studies Extensions** • Where did the Grand Canyon filler go? • Research big rivers. **Science Extensions** • Go on a 15-minute field trip. • Research the local water system.	See the Science Stories folio. • *Real People in the Grand Canyon*	Home/School Connection: Students begin an inventory of landforms they observe in their community and during their other travels.
Language Extensions • Write a stream haiku. • Prepare a report for a scientific conference. **Math Extensions** • Problem of the week. • How much is a million? **Science Extensions** • Take stream-table photos. • Use overlay grid to map the stream table. • Plan a field trip. • Find a local erosion-control expert.	See the Science Stories folio. • *Rivers and Controlling the Flow* • *Shapes of the Earth*	Home/School Connection: Students collect information about landforms in the news.
Language Extension • Write for more maps. **Math Extension** • Problem of the week. **Art and Social Studies Extensions** • Draw people profiles. • Collect topographic maps from other places. **Science Extensions** • Find out what surveyors do. • Construct other profiles.	See the Science Stories folio. • *The Story of Mount Shasta* • *Topographic Maps*	Home/School Connection: Students identify landforms on a local highway map and plan a trip to a landform.
Language Extensions • Design a national-park tour package. • Write about climbing Mt. Shasta. **Math Extension** • Problem of the week. **Science and Social Studies Extensions** • Use an atlas; list maps and their uses. • Study a U.S. landforms orthophoto. • Create aerial photographs. • Draw a local landform map.	See the Science Stories folio. • *Aerial Photography* • *National Parks* • *The Eye of the Needle*	Home/School Connection: Students will need extra time at home to work on presenting their projects to the class.

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FOSS AND NATIONAL STANDARDS

The **Landforms Module** encourages students to develop the skills of investigation in order to build explanations based on knowledge and experience. This module supports the following National Science Education Standards.

SCIENCE AS INQUIRY

Develop students' abilities to do and understand scientific inquiry.

- Identify questions; design and conduct scientific investigations to answer those questions.
- Employ tools to gather, analyze, and interpret data.
- Use data to construct reasonable explanations.
- Develop and communicate investigations and evidence.
- Understand that scientists use different kinds of investigations and tools to develop explanations using evidence and knowledge.

CONTENT: EARTH SCIENCE

Develop students' understanding of the structure of the earth.

- Landforms are the result of a combination of destructive forces, such as erosion, and constructive forces, such as deposition of sediments.
- The surface of the earth changes. Some changes are due to slow processes and others are due to rapid processes.

SCIENCE AND TECHNOLOGY

Develop students' understandings about science and technology.

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

SCIENCE IN PERSONAL AND SOCIAL PERSPECTIVES

Develop students' understandings about natural hazards.

- Human activities can induce hazards through such actions as resource acquisition, urban growth, and land-use decisions. Such activities can accelerate many natural changes.

HISTORY OF SCIENCE

Develop an understanding of science as a human endeavor.

- Science and technology have been practiced by people for a long time.

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