Unit 1—Life Science

Unit 2—Physical Science

Unit 3—Earth Science

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To the Teacher

To peak their interest, science questions can be posed to students as mysteries that need to be solved. In reality, scientists actually see the problems they want to solve as mystery questions. In a sense, scientists are detectives who are always looking for clues and planning a strategy for finding their answers. Oftentimes, both scientists and detectives begin their search with very little information. However, by thinking through problems, working with other people, and listening to new ideas, they can reach their goals.

Each activity in *Science Super Sleuths* presents students with a Science Sleuth Question, a mystery for them to solve. To help them get started, students are provided with Background Information that tells them all they need to know to devise a plan for solving their mystery. Pre-Lab Questions, which follow the background information, check students' reading comprehension.

Working in groups of two or three, students can develop and record their experimental plan, select and list the equipment they need, write their procedure, and conduct their experiment with little or no teacher intervention. They are encouraged to create Data Tables and graphs to organize their findings. Conclusion Questions help the teacher find out whether or not students understand their experimental results.

All of the labs use safe and inexpensive materials. In each lab, we suggest that the teacher make two kinds of materials available to students: those which the students must have to complete the lab and some extraneous materials that are unrelated to the lab. This arrangement forces students to make some decisions about their plan before they can get started.

A generic Suggested Evaluation Rubric is provided below to help grade student work. This rubric may need slight modifications for some of the labs, but can generally be used as is.

On the Teacher Information page of each activity, Suggested Experimental Setup is provided. This information saves teachers planning time: teachers can check the Suggested Experimental Setup and compare it to what students have developed. Any suggested Experimental Setup can also be used as a prescribed procedure, if desired.

Suggested Evaluation Rubric

Criteria	Points Possible	Points Earned
Pre-Lab Questions answered	15	_____
Summary of Experimental Plan	15	_____
Materials listed	15	_____
Procedure described	10	_____
Data Table complete	15	_____
Experiment conducted	15	_____
Conclusion Questions answered	15	_____
Total	100	_____

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Ice Sculpture

Objective: Students will assess the effects of ice moving over a mound of soil on a slope.

Time Required
Day 1: 55 minutes
Day 2: 30 minutes

Teaching Strategies

In this partial inquiry, students are provided with Background Information that guides them as they develop an idea for observing glacial effects on soil. Have students read the entire lab before they begin so that they will anticipate the kind of information they are expected to gather.

Students can use a variety of materials in this lab. Provide them with soil samples (sand, loam, clay, etc.) and something to place them in, such as metal pie plates, cookie sheets, or strips of cardboard. (You can extend this lab by comparing glacial effects on different kinds of soil. For this lab, sand may be the best soil to use.) Other lab materials can include ice cubes, chips of ice, rulers, blocks of wood, and an assortment of equipment unrelated to the lab.

Suggested Experimental Setup

Cut a piece of cardboard that is about 60 cm long and 20-25 cm wide. Place 100 ml (by volume) of sand on one end of the cardboard. Elevate this same end by propping it on a book or a block of wood.

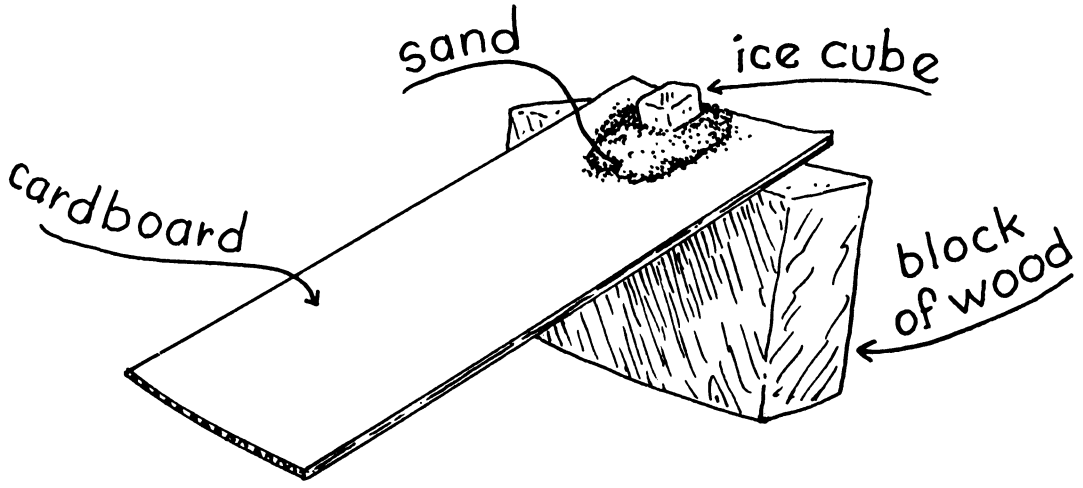

Figure 1. Place 100 ml of sand on one end of a piece of cardboard. Elevate that end of cardboard by placing a book or block of wood under it.

Place an ice cube on the soil and observe how it affects the soil for 20 minutes, recording information about changes in soil position every 10 minutes. Leave the soil-ice-cardboard setup in place until the next day. Again, record any changes in the position of the soil.

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Background Information

Ice Sculpture

? ? ? ? ? Science Sleuth Question ? ? ? ? ?

Can a glacier change the appearance of the land?

Most of us have never seen a glacier. Glaciers are only found in the coldest regions of the earth, such as the north and south poles, and very high up in the mountains. Glaciers are gigantic masses of ice that flow slowly across the land. They can be several kilometers long and 100 to 3,000 meters thick.

Glaciers begin to form when more snow falls in the winter than melts in the summer. Over time, this excess snow builds up into thick layers. The snow crystals on the very bottom of these layers are crushed together by the weight above them. Eventually, the snow flakes and ice crystals are compressed into a solid sheet of glacial ice. The ice becomes so thick that it moves under the pressure of its own weight.

Gravity affects glaciers as it does everything else and causes them to flow down a slope. The movement of a glacier along its path is extremely slow, usually less than a foot each day. Even though the surface of a glacier is rigid, ice crystals on the underside shift and slide over one another as the frozen mass moves. The friction of this movement warms and melts some of the ice along the base, sending frigid water into the soil where it refreezes.

Figure 1. The parts of a glacier