

Sun or Shade?

Summary:

Students will use a thermometer to measure the air temperature in several places around the school and then return to the classroom to graph the data. In addition, students will grow 3 plants in different sunlight and record the growth.

Main Curriculum Tie:

Science - 3rd Grade

[Standard 5 Objective 1](#)

Provide evidence showing that the sun is the source of heat and light for Earth.

Materials:

What jobs can the sun do?

- White construction paper
- Pencil
- Crayons
- Markers

Temperature Measurements

- Student thermometers
- String
- [Sun or Shade? handout](#) (pdf)
- [Temperatures in the Sun and Shade chart](#) (pdf)

Plant and Light Experiment

- 3 small tomato plants about the same size
- 3 large Styrofoam cups or clay pots
- Potting Soil
- Florescent light and sunlight if available
- [Plant Growth chart](#) (pdf)

Additional Resources

Book

- *Amazing Sun Fun Activities*, by Michael Daley (Learning Triangle Press); ISBN 0-07-015177-6

Attachments

- [sun_or_shade.pdf](#)
- [temp_sun_shade.pdf](#)
- [plant_growth.pdf](#)

Web Sites

- [Science NetLinks, "The Warmth of the Sun"](#)
- [Franklin Fact Archive, Official Temperatures in the Shade,"](#)
- [Solar Energy Experiment, by Beatrice Ortiz, Ann Parish Elem., NM](#)

Background For Teachers:

When a temperature is reported on the news it is an official reading taken at a weather observing station. At these stations, thermometers are shielded from sunshine inside specially constructed shelters that allow air in but not direct sunlight. This is necessary if you want to measure the temperature of air. If a thermometer sits out in the sun the thermometer itself, the glass, and the liquid inside will absorb sunlight and heat up. You wouldn't be measuring the temperature of the air anymore but rather the temperature of a heated thermometer. On a sunny day that could be about 30 degrees higher than the actual air temperature. So the next time you hear a temperature of 80 degrees and your backyard thermometer reads 110 you'll know the reason for the difference.

Students should receive instruction on reading and using thermometers as part of a math lesson before doing this activity.

The plant experiment shows differences in plant growth with differences in light. Plant size and the amount of water are variables that should be kept the same in this experiment. The two most important climatic factors for ecosystems are sunlight and water. Light from the sun gives plants the energy they need to grow.

Intended Learning Outcomes:

- 1: Use Science Process and Thinking Skills
- 3: Understand Science Concepts and Principles

Instructional Procedures:

Invitation to Learn

What jobs can the sun do?

What jobs does the sun do? Discuss this question with students. Divide class into groups of two or three and assign each group to make and illustrate a page for a class book of the sun's jobs. Following is an example of how pages may look.



Instructional Procedures

Temperature Measurements

Discuss: On a hot sunny day, we often go into the shade to get cool. Is the air really cooler in the shade? How could we find out?

1. Using the [Sun or Shade? handout](#), and working with a partner, go outside with your class and take measurements of the air temperature around the school in five different locations. Hang the thermometer in a sunny spot for five minutes. Record the temperature. Hang the thermometer in a shady spot for five minutes. Record the temperature. Try four other shady or sunny locations.
2. Compare the temperature in different locations. Why is there a difference in temperature? Is the air really warmer in the sun? Why does it feel like it is warmer in the sun? Is the sun's energy hitting your skin?
3. Complete a bar graph showing the temperatures you have recorded using the [Temperatures in the Sun and Shade chart](#) or computer graphing software.
4. Write a paragraph in your science journal explaining what you have learned.

Plant and Light Experiment

1. Plant three similar tomato plants in containers. (If you use Styrofoam cups, poke small holes in the bottom for water drainage.)
2. Number the plant containers 1, 2, and 3. Allow each plant to have the following amounts of sunlight per day: #1—no light, #2—six hours, #3—continuous light.
3. Measure and record the growth of each plant for ten days. Give the plants equal amounts of water regularly. (Keep the soil moist but not saturated.) Use the [Plant Growth chart](#)
4. Write a paragraph in your science journal summarizing what happened and why you think it happened.

Follow-up discussion questions: Which tomato plant grew the most? (The one receiving continuous light.) Which plant grew least? (The one receiving no light.) How does sunlight affect plant growth? Are there ways that a location on earth would receive less sunlight? (Volcanoes could blow dust high into the atmosphere, decreasing sunlight reaching the ground.) How would less sunlight affect an ecosystem? (Some plants may grow less if they need a lot of sunlight, some may grow more if they are shade tolerant; flowering patterns of plants may change; cooler air temperatures.)

Attachments

- [dry.gif](#)

Extensions:

- *Question:* Is a paper cup of water cooler when it is not left in sunlight? Place a thermometer in each paper cup filled with water. Put one cup in direct sunlight and the other in the shade. Record the temperatures, at the beginning and each hour for three hours. Tell students to feel the water in each cup. What happened? Is water hotter in the sun than in the shade?

Materials

- Two thermometers
- Two cups filled with water
- Art—Sun Pictures
Students observe that energy from heat and light can cause changes.
 1. Cut out several shapes (squares, triangles, free form, etc.) from lightweight cardboard.
 2. Secure the shapes to an 8 x 10 piece of construction paper with double faced tape. (The shapes will be removed later. The tape should keep the shapes from slipping during the experiment.)

3. Tape the construction paper to a window where the sun will shine on it.
4. After a week, take down the construction paper and remove the shapes.

Discuss: What happened? What caused the change?

- *Question:* Do plants grow toward the sun? Cut the top off of the box, turn it upside down, and cut a two inch square in one side of the box. Place the plants near a sunny window and put the box over the top of one plant. Adjust the box so that sunlight enters through the small hole. Do not uncover the boxed plant except to water it for about two weeks. Compare the growth of the two plants.

Materials

- Two small plants (beans)
 - Cardboard box to cover plants
 - Scissors
 - Masking tape
 - Sunny indoor place
- Study pet needs in different weather conditions. Why does your dog need shade in the summer? What kind of shelter is best for winter?

Family Connections

- Assign students to survey parent's feelings about, and use of, sunscreen in their families. As a group, discuss the value of sunscreen, problems with sunburn, etc.
- Survey students and assign them to survey their parents about UV sensitive T-shirt designs, thread, or nail polish. Share with the class.
- Assign students to check temperatures of different rooms in their homes. Are rooms with larger windows and more sunlight warmer? Do students have sun blocking materials added to their windows? Have students noticed furniture or drapes that have faded in the sun? Share finding with the class.

Assessment Plan:

- Check student's temperature charts, graphs and science journals after completing the sunny and shady temperature project.
- Check student's charts and science journals after completing the tomato plant activity.

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