



Gold Seal:

Copernicus Education Gateway

Author(s): Michael Lucky Voiselle			Lesson Title: MAPPING THE SUN			
Grade Span			ICLE Application Model			
K-4	5-8 XX	9-12	A	B	C	D XX

Instructional Focus:

Writing

Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

Basic Concepts and Knowledge

Students develop an understanding of scientific concepts using facts, theories, principles, and models.

Science as Inquiry

Students demonstrate knowledge and skills necessary to perform scientific inquiry.

Science in Personal and Social Perspectives

Students apply scientific principles to personal and social issues.

Performance Task

When you stand in an open space and look upward, you are in the center of a hemispherical shaped sky surrounding you. Your task is to map the sun's path across this sky around you. You may work in groups of 4 and use any resources available to you to answer questions or research to better understand the concepts.

To map the sun's path across the sky you will need a clear plastic dome or a fine mesh kitchen strainer to represent the hemispherical sky (see Mapping the Sun Chart). Put the dome on a sheet of heavy cardboard and mark the outline of its base with a pencil. Remove the dome and mark an x at the center of the circle you have drawn. The x represents your position at the center of the celestial hemisphere. Put the dome back in its original position and tape it to the cardboard. Use a compass to locate and mark North, South, East, and West on the cardboard and on the base of the globe to help align the model at the same position each time you go into the school yard to mark the globe.

To mark the sun's path, find a spot in your schoolyard or home that you can return to at appropriate times on sunny days. Place the tip of a marking pen on the dome so the shadow of the tip falls on the x mark at the center of the circle. Mark this point on the plastic dome. If you use a strainer, colored round-headed pins can be used to cast shadows on the x. Leave the pins in the strainer. They will provide a colorful map of the sun's path. To make a permanent record of the path, run a piece of colored yarn through the pin positions as you remove them. The marks on the dome or the pins in the strainer represent the position of the sun in the sky because it is directly in line with the real sun and the x that represents you. Make marks like this at half-hour intervals throughout the day. By sunset you will have a map of the sun's path across the sky that day.

Repeat this experiment at different times of the year. Pay attention to the 20th of September, December, March, and June. These dates give excellent markings for the beginning of each season. The map of June and December will give you the sun's maximum and minimum midday altitudes respectively.

You are required to do some research to answer the following questions. You are to summarize your experimental procedure and include the research in a conclusion write-up. This conclusion must be well written, in your best handwriting, and free from spelling and grammatical errors. You may use any resources available to you including encyclopedias, the Internet, textbooks, an interview with an astronomer, and your globe showing the sun's paths. You will need to make diagrams to enhance the answers to these questions.

1. What month is the sun closest to the earth? How does this affect the weather of that season?
2. Look at your plotted paths. Does this make sense to you?
3. What month is the sun farthest away from the earth? How does this affect the weather of that season?
4. Look at your plotted paths. Does this make sense to you?
5. When does the sun rise in the direction due east and set in the direction due west?
6. How does this information aid in designing solar energy efficient homes?

7. Where would you place windows and solar collectors in such a home?
8. Draw diagrams showing the position of the sun and earth during each half-hour of the day for one of the paths.
9. Is the earth moving, the sun moving or both moving to cause the path to change?
10. Do some research on Stonehenge, located in England, and describe how some scientists believe that this was a huge astronomical calendar and observatory. A diagram or poster of Stonehenge is required showing at least 3 of the sun-earth positions for various seasons.

ICLE Essential Skills

Understand how and why the rotation and revolution of the earth around the sun affects the length of night and day, the changing of seasons, and weather patterns. (s1)
Make observations using senses and instruments. Inferences and interpretations are arrived at based on observations. Classify observable properties and organize observations in a meaningful and logical way. (s5)
Understand that because of the tilt of the earth's axis, sunlight and heat are more intense on one part of the earth during its one-year revolution around the sun; the change in the amount of heat produces the seasons. (s27)
Know and apply the principles of scientific inquiry. (<i>Implicit in this statement are the processes of prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.</i>) (Not Ranked s114)
Plan and apply real or hypothetical models and constructions to facilitate investigation and learning and the solution to practical problems. (Not Ranked s115)
Apply in writing the rules and conventions of grammar, usage, punctuation, paragraphing and spelling. (ela1)
Gather information from a variety of sources, including electronic sources, and summarize, analyze, and evaluate its use for a report. (ela 3)
Present information in well-organized fashion that will be clear to the target audience. (ela 11)

Scoring Guide:

RATE CRITERIA: 3=Excellent, 2=Satisfactory, 1=Unsatisfactory, 0=Does not attempt or does not understand

CRITERIA	SCORE
Group work and experimental procedures	_____
Summary addresses all questions	_____
Summary well written, in their best handwriting, and free from spelling and grammatical errors	_____
Diagrams were well organized and drawn neatly	_____
Summary reflected much research and organization	_____
Student demonstrated an understanding for the sun's positions and relationship to the seasons of the year	_____
A colorful and neatly done poster or diagram of Stonehenge was included	_____

Keywords

English Language Arts	Mathematics	Science
Reading Comprehension Research	Algebra	Earth Science Sun Earth Models/Construction Scientific Inquiry Environment
Writing Grammar Spelling Technical Writing	Geometry	Life Science
Communications	Statistics	Chemistry
Literature	Calculus	Physics

Chart

Mapping the Sun

