



Author(s): <i>Michael Lucky Voiselle</i>			Lesson Title: <i>HOW LARGE IS THE SUN</i>			
Grade Span			ICLE Application Model			
<i>K-4</i>	<i>5-8</i> <i>X</i>	<i>9-12</i> <i>XX</i>	<i>A</i>	<i>B</i>	<i>C</i> <i>XX</i>	<i>D</i>

Instructional Focus:

Algebraic Concepts and Relationships

Students use algebraic methods to investigate, model, and interpret patterns and functions involving numbers, shapes, data, and graphs in a problem-solving situation. Students evaluate and communicate the reasoning used in solving these problems.

Science as Inquiry

Students demonstrate knowledge and skills necessary to perform scientific inquiry.

Habits of Mind

Students develop habits of mind including curiosity, open-mindedness and persistence.

Performance Task

Your task is to experimentally find the diameter of our sun in metric units. Form groups of 2 or 3 students and consult the included diagram.

Poke a large pin hole in an index card or a 10cm x 10cm piece of manila folder. You are to place the index card between the sun and a larger piece of manila folder to function as an image collector. Move the large image collector back and forth until the image becomes clear. Use a pencil to mark the diameter of your image to be measured in centimeters. You may tape the pin hole card on a meter stick before sliding the image collector back and forth. This will make measuring the distance from the pin hole to the image easier. Due to properties of intersecting lines, a proportion can be set up between the diameters of the sun and the projected image. Record your data in a journal.

Place all data in a neatly organized chart. All calculations of numbers and units and algebraic manipulations are to be clearly demonstrated below your chart. Keep in mind that measurements need to be converted to the same units before solving the equation.

Repeat the same experiment using a light bulb as the sun. Record those measurements in another neatly organized data table.

Find the true diameter of the sun in an encyclopedia, and the diameter of a light bulb using a set of calipers. Compute a relative error for the sun and the light bulb by subtracting the true measurement from the one found experimentally. Divide that small subtraction by the true measurement and multiply by 100 to get the answer in percent.

Your conclusion write-up must be free from spelling and grammatical errors. It must include any problems your group faced and how you solved them. You must also address the following in your conclusion. Did you notice that you had to plug the light bulb into an outlet but you did not have to plug the sun into anything? Research how the sun sustains its illumination and has for millions of years. Did you notice that the image on the index card was upside down? Research how a pin hole camera works to answer why the image was inverted.

ICLE Essential Skills

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. ELA3
Understand <i>basic algebraic properties</i> (i.e., commutative: $ab = ba$; associative: $ab(c) = a(bc)$; and distributive: $a(b+c) = (ab)+(ac)$). M3
Understand the <i>properties of circles</i> (e.g., radius, arc, diameter, chord, secant, tangent, etc.). M10
Know the metric system and the units of metric measure and convert metric units to English units. S4
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
Exhibit good data management skills by collecting, organizing, and graphing data. S19

Scoring Guide:

RATE THE CRITERIA: 3=Excellent, 2=Satisfactory, 1=Unsatisfactory, 0=does not attempt or does not understand	
CRITERIA	SCORE
Experimental procedure and group interaction	_____
Data chart neatness	_____
Calculations with numbers and units shown and computations correct	_____
Accuracy of results, 5% error=3, 7% error=2, 8% error=1, 0>8% error	_____
Inverted image question addressed	_____
Self illumination of the sun addressed	_____
Write-up is neatly organized and free from spelling and grammatical errors	_____

Keywords

English Language Arts	Mathematics	Science
Reading-Independent Reading	Algebra-Algebraic Operations	Earth Science-Scientific Inquiry, Models, Sun
Writing-Technical Writing	Geometry	Life Science
Communications	Statistics	Chemistry
Literature	Calculus	Physics-Nuclear Reactions
Other	Trigonometry	Other
	Other	