Gold Seal Lesson:

Copernicus Education Gateway

Author(s): ***Michael Lucky Voiselle***			***Lesson Title:*** ***COLOR AND SOLAR ENERGY***			
Grade Span			***ICLE Application Model***			
K-4	***5-8*** ***XX***	***9-12***	***A***	***B***	***C***	***D*** ***XX***

Instructional Focus:

Basic Concepts and Knowledge Students develop an understanding of scientific concepts using facts, theories, principles, and models.
Unifying Concepts and Processes Students recognize patterns and processes, making connections in terms of systems and subsystems that explain the interrelationships of the natural and designed world.
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.
Writing Students write for a variety of purposes and audiences with sophistication and complexity appropriate to the grade level.

Performance Task

Your task is to find out what effect color has upon absorbing heat from sunlight. You may work in groups of 2-3 or as a class project.

Obtain 5 Celsius thermometers and 5 different colors of construction paper cut to a 5cm x 10cm rectangle. Wrap the paper around each thermometer and secure it with a piece of tape in such a manner that the paper can be slid up and down to read the temperature on the thermometers. The paper needs to cover the bulb when resting in the sun.

Construct a well-organized data table to record the following information. Read the temperature of the thermometer before placing in the sunlight and record. Cover the bulbs and place the 5 thermometers side by side on a piece of cardboard and place in a bright, sunny place. Record the temperature within each colored sheet every minute for 15 minutes. Make a bar graph or a line graph of your results and answer the following questions. You may brainstorm with your group or use any resources available to you to help answer some of these questions.

1. Which color seems to be best suited for converting solar energy to heat energy?
2. Which color seems to be the best reflector of light thus absorbing less light energy to convert to heat?
3. What does your experiment suggest about the color clothes to wear outdoors in the summer months?
4. What does your experiment suggest about the color clothes to wear outdoors in the winter months?
5. Brainstorm with your group members recording everyone's suggestions on this thought experiment. Suppose you had two pieces of metal identical in every way except color. One was painted navy blue and the other painted white. Let us place these metal pieces on the surface of some snow during the winter. How can you determine which piece of metal is converting the most sunlight to heat and why?

You are to prepare a conclusion summary of this experiment including experimental procedure, interpretations from the graph and answers to all 5 questions. The summary is to be in your best handwriting, well-written and free from spelling and grammatical errors.

ICLE Essential Skills

Apply in writing the rules and conventions of grammar, usage, punctuation, paragraphing and spelling. (ela1)
Use brainstorming, role playing, and standard problem solving strategies to define a problem and suggest solutions. (ela19)
Present information in well-organized fashion that will be clear to the target audience. (ela11)
Understand the best procedures for statistical ***data collection, organization, and display*** including making estimates and predictions and drawing inferences**.** (m5)
Know and apply the principles of scientific inquiry*. (Implicit in this statement are the processes of prediction, estimation, developing hypotheses, drawing conclusions, evaluation, and following ethical principles and professional procedures.) (Not Ranked* s114)
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)
Know the properties of electromagnetic energy (energy radiated from all objects not at a temperature of absolute zero), solar energy (energy from the sun), and earth energy (energy released from the decay of radioactive matter). Understand that weather and climate involve energy transfer in and out of the atmosphere by means of conduction, convection, and radiation. (s25)

Scoring Guide:

4. Student worked well and contributed to group work. Data table was well organized and labeled correctly. Graph was neat in appearance, correctly labeled and independently done. Summary addressed all questions, was well written in their best handwriting and free from spelling and grammatical errors. Student demonstrated an understanding for the effect of color on absorbing solar heat.

3. Student worked well and contributed to group work. Student needed help organizing data table and constructing the graph. Summary addressed all questions, was well written in their best handwriting and free from spelling and grammatical errors. Student demonstrated an acceptable understanding for the effect of color on absorbing solar heat.

2. Student worked well and contributed to group work. Student needed help organizing data table and constructing the graph. Summary addressed all questions and in their best handwriting, but was not well written and contained a couple of spelling and grammatical errors. Student demonstrated only a partial understanding for the effect of color on absorbing solar heat.

1. Student did not work well with their group. Data table and graph were haphazardly done. Summary did not address all questions, was not well written, and not in their best handwriting. Student did not demonstrate an understanding for the effect of color on absorbing solar heat.

Keywords

English Language Arts	Mathematics	Science
Reading	**Algebra** **Graphs**	**Earth Science** **Energy** **Heat** **Sun** **Scientific Inquiry** **Environment**
Writing **Grammar** **Spelling** **Expository**	**Geometry**	**Life Science**
Communications-Listening	**Statistics**	**Chemistry**
Literature	**Calculus**	**Physics**
Other	**Trigonometry**	**Other**
	Other	