

Time Frame:	Standards:
Two 30 minute classes	6.S.1.6.1 Write and analyze questions that can be answered by conducting scientific experiments. 6.S.1.6.2 Conduct scientific investigations using a control and variables. Repeat same experiment using alternate variables. 6.S.1.6.3 Select and use appropriate tools and techniques to gather and display data. 6.S.1.6.4 Use evidence to analyze data in order to develop descriptions, explanations, predictions, and models. 6.S.1.6.5 Test a hypothesis based on observations. 6.S.1.6.6 Communicate scientific procedures and explanations. 6.S.1.2.2 Use observations to make inferences.
Objectives:	
Students will use the scientific method to test variables associated with blocking the sun's harmful ultraviolet light. Students will work collaborative to conduct an experiment with one variable.	
Background Information:	
<p>What are solar beads? Solar beads are small pony beads with a chemical substance embedded in their plastic containing a pigment that changes color when exposed to ultraviolet (UV) radiation. The beads are not affected by visible light, such as the light from a light bulb, and remain white, or pale, indoors as long as they are kept away from windows or doors through which UV light can enter a room.</p> <p>UV radiation in sunlight reacts with the chemicals in the beads to cause the change in color. Each bead will change color about 50,000 times before the pigment no longer responds to the UV light.</p> <p>What is UV light? Solar beads allow us to detect wavelengths of radiant energy called UV light. The energy in the ultraviolet region of the light spectrum is not visible to the naked eye.</p> <p>Ultraviolet light is made of long and short waves. Long wave UV light (300 to 400 nanometers) is often called "black light." This is the light that makes objects appear to glow in the dark. Long UV light passes easily through plastic and glass.</p> <p>Short wave UV light (100 to 300 nanometers) is used to kill bacteria, speed chemical</p>	

reactions, and identify fluorescent minerals. Short wave UV light can't pass through most plastics or glass. The shortest UV wavelengths in the air are absorbed by oxygen molecules and convert the oxygen into ozone.

UV Radiation Can Damage Eyes and Skin

When bare skin is exposed to sunlight for a long time, it can burn or tan. UV radiation wavelengths are short enough to break chemical bonds in skin tissue. Over a long period of time, and with repeated exposure to UV radiation, skin cells can be damaged; skin may wrinkle or skin cancer may develop.

Materials:

Assorted sunglasses
Assorted brands of sun screen
Fluorescent lights
Black lights
Assorted plastic containers
Package of Solar Beads

Procedure:

1. Review Scientific Method whole class.
2. Use science text or Discovery Streaming to introduce students to electromagnetic spectrum and the visible spectrum.
3. Discuss possible problems associated with solar radiation.
4. Brainstorm and discuss ways to protect ourselves from the harmful UV rays and how we can use the solar beads to test effectiveness of different ideas of protection.
Suggested ideas: different sunglasses, different brands of sun screen, light sources, weather conditions (cloudy), different times of day, assorted different plastic containers.
5. From the generated list, group select one test idea to try on their solar beads.
6. Groups set up experiment using Scientific method. Be sure to have students test only one variable at a time. Make sure each group has a purpose, materials, hypothesis, procedure, data collector, etc.
7. Groups conduct experiments and record results.
8. Share findings with whole class.

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Assessment:

Collect individual lab reports and assess for Scientific Method steps
Rubric for collaborative group effort.
Write a one paragraph summary of information learned.

References:

Solar energy beads available: www.teachersources.com
For more information, visit the Florida Solar Energy Center's website at www.fsec.ucf.edu.
Lesson adapted *courtesy of the National Energy Education Development (NEED) Project*.
Online rubric creator: [Rubistar](#)

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RubiStar Rubric Made Using:
RubiStar (<http://rubistar.4teachers.org>)

Collaborative Work Skills: Science Experiment

Teacher Name: **Mrs. Bush**

Student Name: _____

CATEGORY	4	3	2	1
Contributions	Routinely provides useful ideas when participating in the group and in classroom discussion. A definite leader who contributes a lot of effort.	Usually provides useful ideas when participating in the group and in classroom discussion. A strong group member who tries hard!	Sometimes provides useful ideas when participating in the group and in classroom discussion. A satisfactory group member who does what is required.	Rarely provides useful ideas when participating in the group and in classroom discussion. May refuse to participate.
Focus on the task	Consistently stays focused on the task and what needs to be done. Very self-directed.	Focuses on the task and what needs to be done most of the time. Other group members can count on this person.	Focuses on the task and what needs to be done some of the time. Other group members must sometimes nag, prod, and remind to keep this person on-task.	Rarely focuses on the task and what needs to be done. Lets others do the work.
Preparedness	Brings needed materials to class and is always ready to work.	Almost always brings needed materials to class and is ready to work.	Almost always brings needed materials but sometimes needs to settle down and get to work.	Often forgets needed materials or is rarely ready to get to work.
Working with Others	Almost always listens to, shares with, and supports the efforts of others. Tries to keep people working well together.	Usually listens to, shares, with, and supports the efforts of others. Does not cause "waves" in the group.	Often listens to, shares with, and supports the efforts of others, but sometimes is not a good team member.	Rarely listens to, shares with, and supports the efforts of others. Often is not a good team player.



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