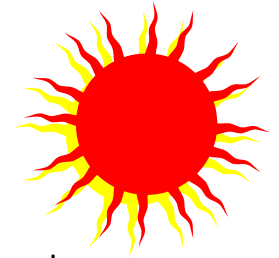


Solar Cooking



Background: The sun gives us energy. It provides the earth with heat and light. It helps grow food, makes weather, and keeps living things alive. We can use the sun's energy in many ways. When we burn wood in our fireplaces, we are releasing the sun's energy. The wood stores the energy from the sun and releases it as heat. We can use the sun's energy to cook food.

Design Challenge: Make a solar cooker that will heat a piece of hot dog. Be prepared to show your solar cooker to your class.

Criteria:

Your cooker must

- cook without being held
- be big enough to hold a 2" piece of hot dog
- hold a classroom thermometer.

Materials: You may select from the items below.

- tape
- glue
- cardboard
- skewers
- plastic lids
- toothpicks
- scissors
- thermometers (class set)
- milk cartons
- hot dogs*
- plastic cartons
- foil
- craft sticks
- straws
- string

* Children should not eat the hot dog since it is not cooked in sanitary conditions.

Targeted Standard of Learning: Science 1.6
Supporting Standards of Learning: Science 1.1, 1.8
English 1.1, 1.2, 1.3, 1.12
Mathematics 1.18, 1.19

Targeted Standards for Technological Literacy: 5, 16
Supporting Standards for Technological Literacy: 2, 3, 6, 7, 8, 11

Solar Cooking



Targeted Standard of Learning: Science 1.6

- The student will investigate and understand the basic relationships between the sun and the Earth.

Targeted Standards for Technological Literacy: Standard 5, Standard 16

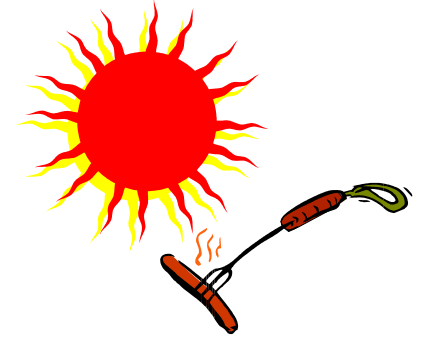
- Students will develop an understanding of the effects of technology on the environment.
- Students will develop an understanding of and be able to select and use energy and power technologies.

Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Time Management
<ul style="list-style-type: none"> • Dark objects absorb heat better. • Sunlight (heat) can be focused through reflective materials. • The sun is the earth's energy. • Nonstandard measuring skills 	<ul style="list-style-type: none"> • Check Design Brief for recommended materials. • Teacher may substitute materials. 	<ul style="list-style-type: none"> • Use of sharp tools to poke holes in plastic containers 	<ul style="list-style-type: none"> • Groups of three or four 	<ul style="list-style-type: none"> • Design Brief • Guided Portfolio • Rubric Assessment 	<ul style="list-style-type: none"> • Session 1: Introducing Design Brief (20 min.) • Session 2: Building (45 min.) • Session 3: Cooking the hotdog/using the thermometer (45 min.) • Session 4: Sharing and evaluating (40 min.)

Guided Portfolio—1

Name _____

Solar Cooking



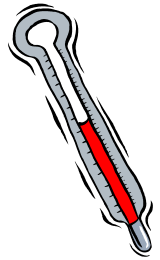
Group Members: _____

1. What is the problem? State the problem in *your own words*.

Targeted Standard of Learning: Science 1.6
Supporting Standards of Learning: Science 1.1, 1.8
English 1.1, 1.2, 1.3, 1.12
Mathematics 1.18, 1.19

Targeted Standards for Technological Literacy: 5, 16
Supporting Standards for Technological Literacy: 2, 3, 6, 7, 8, 11

Name _____



2. Brainstorm solutions.

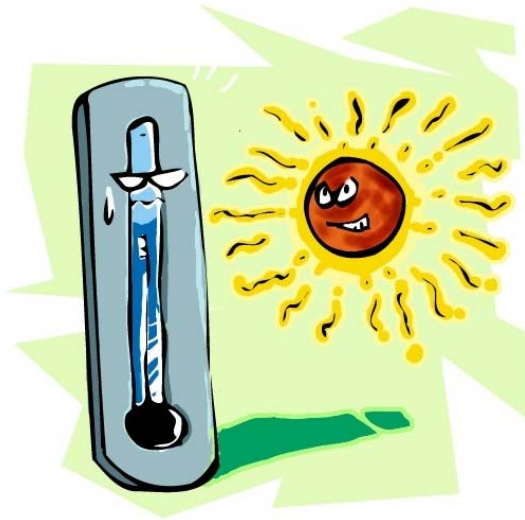
Draw or describe some possible solutions.

Name _____



4. Test your solution.

- Does your solar cooker stand without holding it? YES NO
- Does your solar cooker make the hot dog warm to the touch? YES NO
- What temperature does the thermometer read in your solar cooker? _____



Name _____



5. Evaluate your solution.

Was it the best solution? Would one of your other ideas have been better? Why or why not?

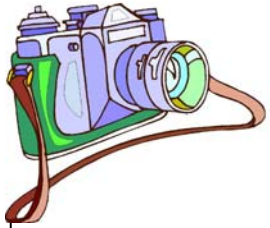
What would you have done differently?

Could you add to it to make it better? What would you add to it?

Guided Portfolio—6

Name _____

Attach a photograph of your final project here. If you do not have a photograph, draw a picture of your final project.



How would you make your project better? Draw a picture showing how it would look after you have made changes to it.



Rubric for *Solar Cooking*

Name _____

Date _____

Student Evaluation	no evidence 0	limited understanding 1	some understanding with room for improvement 2	good understanding with room for improvement 3	substantial understanding 4
Oral Presentation: The student <ul style="list-style-type: none"> used complete sentences used descriptive words. 					
Guided Portfolio: The student <ul style="list-style-type: none"> restated the problem brainstormed solutions created a solution tested the solution evaluated the solution. 					
Team Skills: The student <ul style="list-style-type: none"> used appropriate voice encouraged team members listened to team members was involved in all aspects of the project respected team members. 					

Tested Criteria		
The cooker stood on its own.	Yes	No
The cooker held a 2" hotdog.	Yes	No
The cooker held a small thermometer.	Yes	No



Standards of Learning

English (2002)

Oral Language

- 1.1 The student will continue to demonstrate growth in the use of oral language.
 - a) Listen and respond to a variety of media, including books, audiotapes, videos, and other age-appropriate materials.
 - b) Tell and retell stories and events in logical order.
 - c) Participate in a variety of oral language activities, including choral speaking and reciting short poems, rhymes, songs, and stories with repeated patterns.
 - d) Express ideas orally in complete sentences.
- 1.2 The student will continue to expand and use listening and speaking vocabularies.
 - a) Increase oral descriptive vocabulary.
 - b) Begin to ask for clarification and explanation of words and ideas.
 - c) Follow simple two-step oral directions.
 - d) Give simple two-step oral directions.
 - e) Use singular and plural nouns.
- 1.3 The student will adapt or change oral language to fit the situation.
 - a) Initiate conversation with peers and adults.
 - b) Follow rules for conversation.
 - c) Use appropriate voice level in small-group settings.
 - d) Ask and respond to questions in small-group settings.

Writing

- 1.12 The student will write to communicate ideas.
 - a) Generate ideas.
 - b) Focus on one topic.
 - c) Use descriptive words when writing about people, places, things, and events.
 - d) Use complete sentences in final copies.
 - e) Begin each sentence with a capital letter and use ending punctuation in final copies.
 - f) Use correct spelling for high-frequency sight words and phonetically regular words in final copies.
 - g) Share writing with others.
 - h) Use available technology.

Science (2003)

Scientific Investigation, Reasoning, and Logic

- 1.1 The student will conduct investigations in which
- differences in physical properties are observed using the senses;
 - simple tools are used to enhance observations;
 - objects or events are classified and arranged according to attributes or properties;
 - observations and data are communicated orally and with simple graphs, pictures, written statements, and numbers;
 - length, mass, and volume are measured using standard and nonstandard units;
 - predictions are based on patterns of observation rather than random guesses;
 - simple experiments are conducted to answer questions;
 - inferences are made and conclusions are drawn about familiar objects and events.

Interrelationships in Earth/Space Systems

- 1.6 The student will investigate and understand the basic relationships between the sun and the Earth. Key concepts include
- the sun is the source of heat and light that warms the land, air, and water; and
 - night and day are caused by the rotation of the Earth.

Resources

- 1.8 The student will investigate and understand that natural resources are limited. Key concepts include
- identification of natural resources (plants and animals, water, air, land, minerals, forests, and soil);
 - factors that affect air and water quality; and
 - recycling, reusing, and reducing consumption of natural resources.

Mathematics (2001)

Probability and Statistics

- 1.18 The student will investigate, identify, and describe various forms of data collection in his/her world (e.g., recording daily temperature, lunch count, attendance, and favorite ice cream), using tables, picture graphs, and object graphs.
- 1.19 The student will interpret information displayed in a picture or object graph, using the vocabulary *more*, *less*, *fewer*, *greater than*, *less than*, and *equal to*.

Standards for Technological Literacy

- Standard 2: Students will develop an understanding of the core concepts of technology.
- Standard 3: Students will develop an understanding of the relationships among technologies and the connections between technology and other fields of study.
- Standard 5: Students will develop an understanding of the effects of technology on the environment.
- Standard 6: Students will develop an understanding of the role of society in the development and use of technology.
- Standard 7: Students will develop an understanding of the influence of technology on history.
- Standard 8: Students will develop an understanding of the attributes of design.
- Standard 11: Students will develop the abilities to apply the design process.
- Standard 16: Students will develop an understanding of and be able to select and use energy and power technologies.