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	·plastic cartons	skewers· (bamboo preferred)
· glue	· foil	scissors
· cardboard	·craft sticks	thermometers (class set)
plastic lids	· straws	rulers
· toothpicks	· string	Hole punch
· milk cartons	· hot dogs*	Push Pin Drill

* 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 1.14, 1.9

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

Solar Cooking

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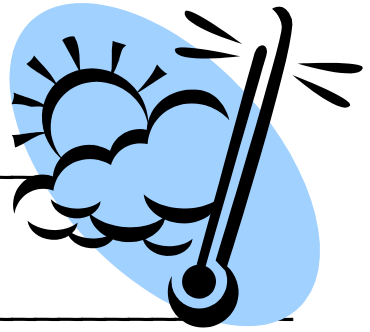
Prior Knowledge & Skill	Materials & Preparation	Safety Issues	Class Management	Materials Provided	Design Process
• Dark objects absorb heat better. • Sunlight (heat) can be focused through reflective materials. • The sun is the earth's energy. • Nonstandard measuring skills	• Check Design Brief for recommended materials. • Teacher may substitute materials	• Use of sharp tools to poke holes in plastic containers * Children should not eat the hot dog since it is not cooked in sanitary conditions.	• Groups of three or four • 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.)	• Design Brief • Guided Portfolio • Rubric Assessment	• Follow the Design Process: • Restate the problem. • Brainstorm solutions. • Create the best solution. • Test the solution. • Evaluate the solution.

Extension Ideas: Cook a marshmallow. Why does it expand?

Guided Portfolio



Name _____

Group Members_____

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

_____

_____

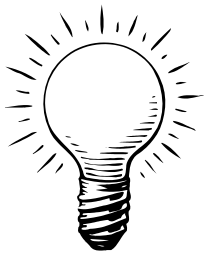
_____

_____

_____

_____

Name



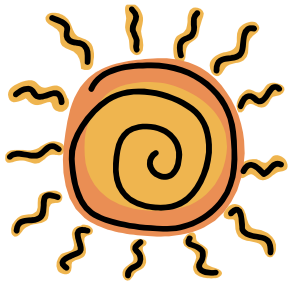
2. Brainstorm solutions. Sketch and/or describe some possible solutions.

Name _____

3. Create the solution you think is best.

Keep notes about your problems and how you solve them. Make sketches if they help.

Name _____



4. Test your solution.

Did you create a solar cooker?	YES	NO
Did your cooker cook without being held?	YES	NO
Was your cooker big enough to hold a 2 inch piece of hotdog?	YES	NO
Did your cooker hold a classroom thermometer?	YES	NO
Did you brainstorm solutions about the problem?	YES	NO
Did you create the solution you thought was best?	YES	NO

Name

_____

5. Evaluate your solution.

Was it the best solution? Why or why not?

What would you have done differently? Why?

Rubric for Solar Cooker

Name _____Date _____

0—no evidence; 1—limited understanding; 2—some understanding with room for improvement; 3—good understanding with room for improvement; 4—substantial understanding

Student Evaluation	**0**	**1**	**2**	**3**	**4**
Oral Presentation: The student					
• used complete sentences					
• used descriptive words.					
Guided Portfolio: The student participated in					
• restating the problem					
• brainstorming solutions					
• creating a solution					
• testing the solution					
• evaluating the solution.					
Team Skills: The student					
• used appropriate voice					
• encouraged team members					
• listened to team members					
• was involved in all aspects of the project					
• respected team members.					

Tested Criteria	YES	NO
The project cooks without being held .		
The project .holds the hotdog for cooking		
The project holds a thermometer .		

Standards of Learning

Targeted Standard of Learning:

Science 1.6: The student will investigate and understand the basic relationships between the sun and Earth. Key concepts include

a) the sun is the source of energy and light that warms the land, air, and water; and

b) the sun's relative position in the morning is east and in the late afternoon is west.

Supporting Standards of Learning:

Science 1.1: The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations

1.8: The student will investigate and understand that natural resources are limited. Key concepts include

a) identification of natural resources

English 1.1 : The student will continue to demonstrate growth in the use of oral language.

a) Listen and respond to a variety of electronic media 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) Participate in creative dramatics.

e) Express ideas orally in complete sentences.

1.2 : The student will expand understanding and use of word meanings.

a) Increase listening and speaking vocabularies.

b) Begin to ask for clarification and explanation of words and ideas.

c) Use common singular and plural nouns.

d) Use vocabulary from other content areas.

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 using appropriate voice level in small-group settings.
c) Ask and respond to questions.
d) Follow simple two-step oral directions.
e) Give simple two-step oral directions.

1.12: The student will print legibly.

a) Form letters accurately.
b) Space words within sentences.
c) Use the alphabetic code to write unknown words phonetically.

Mathematics

1.14: The student will investigate, identify, and describe various forms of data collection (e.g., recording daily temperature, using tables, picture graphs, and object graphs.

1.9: The student will use nonstandard units to measure length, weight/mass, and volume.

Targeted Standards for Technological Literacy:

Standard 5• Students will develop an understanding of the effects of technology on the environment.

Standard 16• Students will develop an understanding of and be able to select and use energy and power technologies