

Solar Oven Design Brief

Updated on 11.28.16

Name _____

Essential Question: How are we energized?

Grade 3

Title: Solar Oven Design Brief

Background: Our sun is a constant source of energy. All over planet Earth, sun is by far the most important form of energy for all living things. It provides both heat, light, and ultraviolet radiation. Each day the sun bathes the Earth in unimaginable amounts of sunlight. Without it, Earth would be lifeless.

Design Challenge: You and your teammates are going to harness the ultraviolet energy of the sun (heat lamp.) Your challenge is to design, build, and test a working solar oven that can make a s'more.

Criteria: Your solar oven must be able to:

- ❖ stand freely and have something to protect your s'more from the elements
- ❖ hold the ingredients to make a s'more
- ❖ use the ultraviolet energy from the sun or light to make a s'more
- ❖ increase in temperature over time (15 minute intervals)
- ❖ you must record the perimeter and area of your oven

Resources:

construction paper	yarn or string	foil
glue	boxes	cellophane
Scissors	cardboard	thermometers
tape	straws	science journals

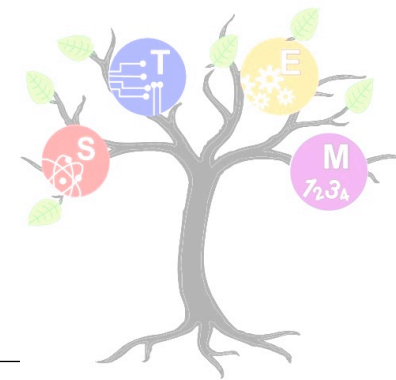
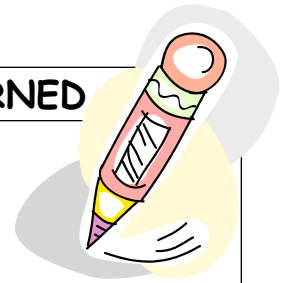
PCSD STEM "Innovating Me"

Grade 3: Me and My Future

List 5 under each column

KWL: {Solar Energy}

What we <u>KNOW</u> .	What we <u>WANT</u> to know.	What we <u>LEARNED</u>



How does this project match our essential question?
How are we energized?

A large, empty rounded rectangular box with a black border, intended for a student to write their response to the questions above.

What research did you complete on solar ovens before you began this project? What did you learn?

A large, empty rounded rectangular box with a black border, intended for a student to write their response to the question above.

Guided Portfolio—1

Group Members: _____



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

Begin with the End in Mind

Create a slide for your presentation that includes a picture of your group and the title of your design challenge.



Solar Oven Design Brief

Think Win-Win

Seek First to Understand, then to be Understood

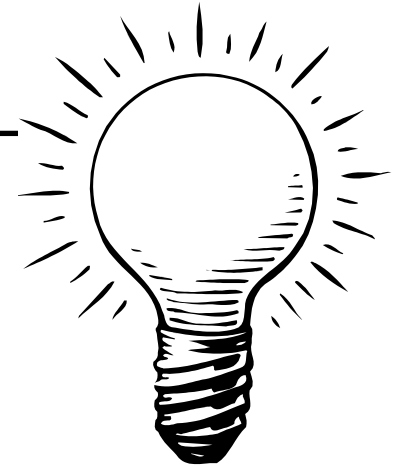
Synergize

2. Brainstorm solutions. Share your individual solutions.



Scamper them to create a group solution. Make sure that you label materials and measurements on the blueprint. Draw a blueprint of your group solution.

A large, empty rounded rectangular box with a black border, intended for drawing a blueprint of a group solution.



Supply List

Material	Number	Length	Width	Area

Please show all of your work on a separate sheet of graph paper provided by your Coach!



Portfolio—3

Be Proactive

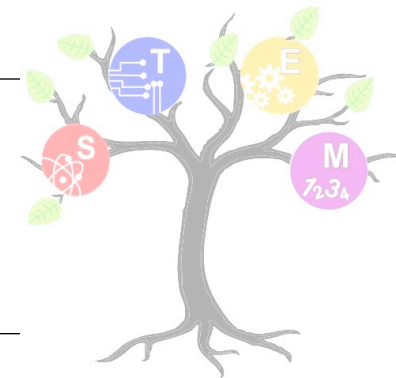
Think Win-Win

Synergize

3. **Create the solution you think is best.**

Keep notes in the chart about problems that you faced or new decisions you had to make as you built and tested your first plan. Include how your team worked together to solve these problems.

Problem Faced	Solution or Decision Made



Before you begin make **3** scientific observations and measurements of your s'more:

Cracker:

Chocolate:

Marshmallow:



Start Time	End Time	Start Temperature	End Temperature	Observations

Take pictures of the s'more and the thermometer at each checkpoint.



4. Test your solution.

- | | | |
|---|-----|----|
| 1. Does your oven stand freely? | YES | NO |
| 2. Did you build your oven using the three scientific principles? | YES | NO |
| 3. Does your oven hold the ingredients to make a s'more? | YES | NO |
| 4. Does your oven use the ultraviolet energy from the sun to make a s'more? | YES | NO |
| 5. Does your oven increase in temperature over time? | YES | NO |
| 6. Does your oven cook the s'more? | YES | NO |
| 7. Did you record the perimeter and area of your oven? | YES | NO |

Perimeter - distance around (add up all the sides)

Area - space inside (multiply the length times width)

Take a picture of your group performing the tests to include in your presentation.



5. Brainstorm solutions. Draw blueprints of any changes that your group makes during the build and revisions after testing. Include any ways that your group can improve your design.



6. Evaluate your solution.

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

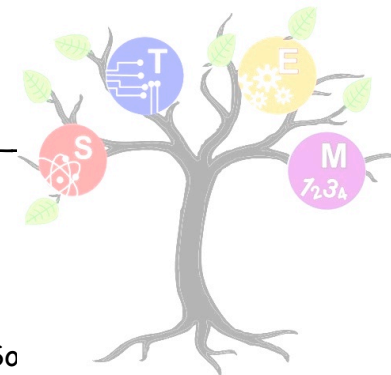
What would you have done differently?

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





7. Discuss with your team the effectiveness of your solar oven. Did your solar oven work? If so, what indicators do you have that prove that your oven is a success? If not, why do you think that your oven did not work? What factors influenced the effectiveness of your oven? Write this reflection in paragraph form. Remember to indent.



Presentation: (See notes on each page for what to take pictures of or what to include on slides.)

Plan a presentation for your solar oven.

Make sure that you include the following things:

- How did you decide to engineer your oven?
- How did you incorporate the three scientific principals? (Reflection, Attraction, and Insulation)
- How did you decide the size that your oven should be? (Explain measurements and formulas)
- What observations did you make from your data chart?
- Were there any inconsistencies in the data that you recorded?
- Did your solar oven work and how do you know if it worked?
- What would you do to improve your oven if you were able to redesign it?
- Do you think that your oven would be able to cook other food items?

Rubric for Presentation of Solar Oven Design Brief

Name _____

Date _____

<p style="text-align: center;">Oral Communication Rubric</p>	<p style="text-align: center;">Mastery 4</p>	<p style="text-align: center;">Skilled 3</p>	<p style="text-align: center;">Developing 2</p>	<p style="text-align: center;">Beginning 1</p>	
<p>3.1 The learner will use effective communication skills in group activities.</p> <p>a) Listen attentively by making eye contact, facing the speaker, asking questions, and summarizing what is said.</p> <p>b) Ask and respond to questions from teachers and other group members.</p> <p>c) Explain what has been learned.</p>					
<p>3.1 The learner will present brief oral reports.</p> <p>a) Speak clearly.</p> <p>b) Use appropriate volume and pitch.</p> <p>c) Speak at an understandable rate.</p> <p>d) Organize ideas sequentially or around major points of information.</p> <p>e) Use grammatically correct language and specific vocabulary to communicate ideas.</p>					