

Solar Oven Design Challenge Student Worksheet

Secondary (7-10)

YOUR CHALLENGE

Your challenge is to design and build a solar oven using passive solar design principles to warm up the oven as much as possible and sustain the temperature for as long as possible. The aim of the design is to cook and/or dehydrate food successfully and efficiently.

PROCESS

1. Research and draft your design

You need to research various solar passive design elements (including sustainable use of materials, insulation, orientation, shape, reflection, size) and create a diagram of your prototype.

2. Build and document your prototype

Your team needs to build your prototype. You need to document this process including any changes/improvements made to your design and why. You can use any/all of the materials provided to you and the materials you have sourced from *Repurposing* items from your home (cannot be new/bought products).

3. Test and evaluate

Your team needs to test your prototype and record your results and evaluation in the 'Analysis and Results' worksheet.

4. Present

Your team will present to the class on your design process, results, evaluation and recommendations.

THINGS TO KEEP IN MIND

- Sustainable use of materials and insulation
- Size of oven
- Orientation to sun (and its changes throughout the day)
- Reflection
- Colour
- Be creative!

DESIGN CONSTRAINTS

- Size must not exceed 1 square metre cubed
- Door size must be able to accommodate a thermometer. The thermometer is to be placed in the middle of the oven and be able to be read through a window with the door closed
- You can use any/all of the materials provided to you and those you have sourced from *Repurposing* items from your home (cannot be new/bought products)

Group Name:

	Beginning	Competent	Accomplished	Exemplary
Brainstorming	Brainstorming and research are not clearly shown	Brainstorming or research is limited, less than 3 ideas are presented	Brainstorming and research are present and at least 3 ideas are presented	Brainstorming and research are present with 5 or more ideas presented
Design	Hasn't clearly followed a design process, drawings are missing and prototype does not resemble design	Demonstrates following of a design process but limited examples of solar passive designs. Diagrams are attempted but not accurately labelled, or does not resemble prototype	Demonstrates the design process with various solar passive design elements included. Diagrams are mostly accurate and mostly labelled. Prototype resembles design	Demonstrates the design process with various solar passive design elements included. Diagrams are accurately and correctly labelled. Prototype closely resembles design
Create a prototype	No documentation or build, changes not noted	Documentation of build is attempted but limited, changes are not clearly noted	Documentation of build is good, but incomplete, changes are noted but incomplete	Documentation of build process is complete, all changes are thoroughly noted
Test and evaluate	There is no data collected or examples of recommendations	Limited data is collected and no documentation to accompany recommendations	Data has been collected and results analysed to include some recommendations	Data collection is complete with results thoroughly analysed and redesign recommendations clearly researched and presented
Presentation	Presentation is missing product and process not clear	Presentation only partially addresses either product and the process	Presentation addresses product and process	Presentation clearly demonstrates the product and process
Collaboration	All or some of the group members needed to be reminded to stay on task	Most group members participated in the design challenge	The majority of the group members participated fully in the challenge	All group members were fully engaged and participated in the design challenge

Analysis and Results

TESTING YOUR DESIGN

Place your solar oven outside in your chosen position and record the temperature as it increases in the table below. Include any notes/observations of what is happening to the food inside. You can stop the experiment once your food is cooked/dehydrated and ready to eat!

Group Name:

Date:

Temperature outside:

Time (minutes)	Temperature	Notes/Observations
0		
5		
10		
15		
20		
30		
40		
50		
60		

ANALYSIS

Plot your results on a graph (x axis = independent variable, y axis = dependent variable)

1. What did you notice about the rate at which your solar oven heated up?

2. At what temperature was your oven when your food was cooked/deydrated? How long did this take?

3. What did you observe during the experiment that may have affected your results positively/ negatively?

RECOMMENDATIONS

1. Compare your results with another group. What worked well in your design? What seemed to work well in other groups?

2. What changes or improvements would you make if you were to do it again?

PRESENTATION

Prepare a presentation of your design process for the class. You need to include your results, analysis and recommendations to the class.