

Solar Oven Challenge

Student Data Sheet

Team Name: _____

Team Members: _____

Context

One of the biggest challenges in establishing a lunar base is to supply it with adequate power. Although various power sources have been proposed and are under consideration, solar power will definitely play a significant role.

Challenge

Construct a solar oven that will cook a food item in the shortest time. All teams will be provided with instructions and materials to build a basic solar oven. All teams are encouraged to modify and expand upon the basic design to construct the most efficient oven possible.

Technical Design Steps

The design process can be broken down into the following steps:

1. Identify appropriate problems for technological design.
2. Design a solution or product.
3. Implement the proposed design.
4. Evaluate completed technological designs or products.
5. Communicate the process of technological design.

Procedure

1. Using scissors and leaving the mouth of the container intact, cut away the side of the milk container with the handle.
2. Line the inside of the milk container with aluminum foil. Try to keep the foil as smooth as possible and avoid wrinkles.
3. Untwist the coat hanger and cut a section approximately 30.48 cm in length.
4. Push one end of the wire through the bottom of the milk container using the scissors to cut a hole if necessary.
5. Skewer the food item with the wire and pass the wire through the mouth of the container.
6. Cover the open part of the oven with plastic wrap.
7. Steps 1-6 are general directions for a solar oven. You are free to alter and expand on these plans to make the most efficient solar oven possible.
8. You will have a predetermined time to work on your oven. Use your time wisely.
9. After construction is complete, bring your oven to the area designated by your teacher. You may use books and other objects to prop the oven at an angle that allows it to receive direct sunlight.
10. You may adjust your oven during cooking.

11. The instructor will determine when the food items are completely cooked. The team whose oven completely cooks the food item in the shortest time wins. Depending on the weather, where you live and the time of year, cooking times may range from 10 minutes to 30 minutes. Obviously, this activity works better on hot, sunny days.
12. Points will be awarded as follows:
 - a. Food cooked in shortest time = 5 points.
 - b. Food cooked in next shortest time = 4 points.
 - c. Food cooked in next shortest time = 3 points.
 - d. Food cooked in next shortest time = 2 points.
 - e. Food cooked in next shortest time = 1 point.
13. Discuss the results as a class.

Questions

1. What role did the aluminum foil play in the solar oven?

2. What modifications from the basic design increased the efficiency of the oven?

3. What modifications did not prove effective?

4. How would you redesign your oven based on the lessons you have learned?

Design Evaluation

1. What was the problem for your team to solve? What was your product designed to do?

2. Describe the job responsibilities of the project engineer, test engineer, facilities engineer and the developmental engineer.

3. Draw a sketch of your design and label all key elements.

4. How did your team decide what your solar oven would look like?

5. Did you change your solar oven after designing? After building? If so, what revisions did your team make?

6. How did your team work together to solve problems?

7. How did you approach someone on your team who had a different idea about the product?

8. Describe how you coped with constraints such as using only the supplied materials, time and other trade-offs when designing your product?

9. Rate how well your team did in planning, organizing materials, working together and using appropriate techniques in building your product.

1	2	3	4	5
Poor				Exceptional

10. What happened when you tested your team's design?

11. How successful was your product?

a. Scoring values:

- 1. Food cooked in shortest time = 5 points
- 2. Food cooked in next shortest time = 4 points
- 3. Food cooked in next shortest time = 3 points
- 4. Food cooked in next shortest time = 2 points
- 5. Food cooked in next shortest time = 1 point

