

# Solar Oven Challenge

## ❓ Question

How does the design of a solar oven affect the transformation of radiant energy to thermal energy?

## ☀️ Hypothesis

In your science notebook, write your hypothesis in an "If...then...because..." format.

## 📄 Materials Used in Teacher Sample

- 1 Small pizza box
  - Plastic wrap
  - Aluminum foil
  - 1 Wooden skewer (12"-18")
  - Marker
  - Scissors
  - Ruler
  - Masking tape
  - 1 Paper plate\*
  - Black construction paper
  - Oven thermometer
  - Food to cook
  - Various materials provided by your teacher
- \*NOTE:** Dark-colored paper plates work best, if available.

## ✓ Procedure

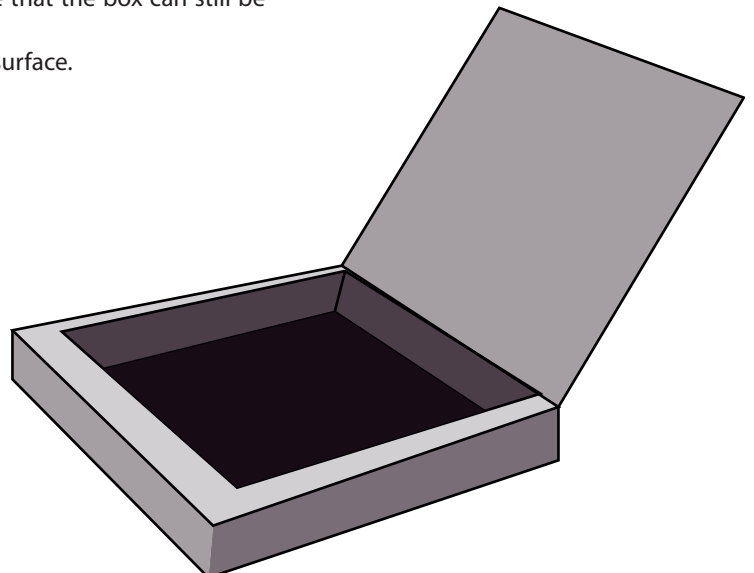
1. Read over the general solar oven directions below and look at the materials provided by your teacher.
2. List all of the possible variables you could change in your solar oven design.
3. In your science notebook, or using the next page, sketch possible designs. Discuss with your group all of your different ideas. Choose one solar oven design to build.
4. Gather the materials you need.
5. Build your solar oven and test its efficiency using the oven thermometer.
6. Make any needed design changes that will enable your solar oven to cook food efficiently.

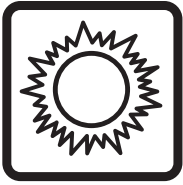
## General Directions to Build a Solar Oven

1. On the top of the pizza box, use your marker to draw a square with edges spaced 1" from all sides of the box.
2. Use scissors to cut along the sides and front edge of the lid, leaving the fourth side along the box's hinge uncut.
3. Tape aluminum foil to the inside surface of the new flap you just cut, shiny side visible. This is to reflect sunlight into the box. Smooth out any wrinkles that might occur.
4. Tape plastic wrap to the original box flap so that it covers the hole you cut into the flap. Seal all four of the edges with tape.
5. Tape black construction paper to the bottom inside of the box. This will help absorb the incoming sunlight.
6. Cover any air leaks around the box edges with tape, making sure that the box can still be opened to place food inside or remove it later.
7. Go outside in the sunlight and place the solar oven on a level flat surface.
8. Place food items on a paper plate and place it inside the oven. Put the oven thermometer inside the oven where you will be able to see it without moving the oven.
9. Tape one end of a wooden skewer to the reflector lid, attach the other end to the box to adjust reflector.
10. Let the food cook and periodically check the reflector angle to make sure sunlight is getting inside the oven.

## \* Conclusions

1. What factors contributed to the successful cooking of the food?
2. What effect did changing the variable(s) have on converting radiant energy to thermal energy? How could you improve your design?
3. What are the practical applications where solar ovens could be used?





# Solar Oven Challenge

A solar oven needs to let radiant energy in, convert that radiant energy to thermal energy, and keep the thermal energy inside to cook the food. Use this page to brainstorm solar oven design possibilities.

## Step One: Sketch

Brainstorm possible solar oven designs. Label the materials you will use and explain why.

## Step Two: Compare

Share your design with the other members of your group. What is similar? What is different?

## Step Three: Final Design

Choose one design that your group will use. Sketch the design here. Label the materials you will use and explain why you think this is the best design.