

DIY Solar Oven

Suggested Age / Grade Level	Concepts Covered	Duration
9, 10, 11, 12	<ul style="list-style-type: none">• Solar Energy• Light• Heat	1 hr

Overview / Learning goals

This activity will allow students to explore the use of renewable resources. Additionally, students will learn about the scientific principles behind the use of solar energy.

What is a DIY solar oven?

A DIY solar oven is a box that traps some of the Sun's energy to make the air inside the box hotter than the air outside the box. The basic principles of the solar oven are similar to that of a greenhouse.



Part 1

Materials

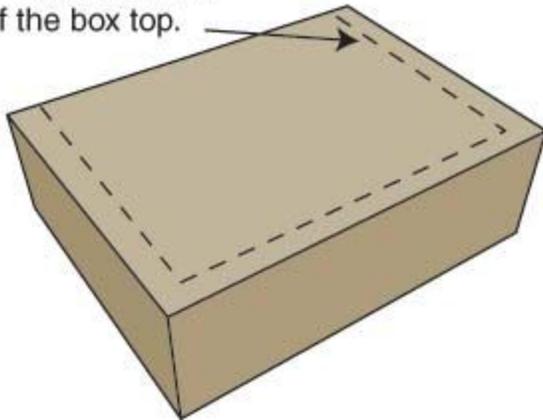
- Photo of the solar oven to make in this activity (see below).
- Cardboard box with attached lid. The lid should have flaps so that the box can be closed tightly. The box should be at least 3 inches deep and big enough to set a pie tin inside.
- Aluminum foil
- Clear plastic wrap
- Glue stick
- Tape (transparent tape, duct tape, masking tape, or whatever you have)
- Stick (about 1 foot long) to prop open reflector flap. (Use a skewer, knitting needle, ruler, or whatever you have.)
- Ruler or straight-edge
- Box cutter or Xacto knife (with adult help/ supervision, please!)

Procedure

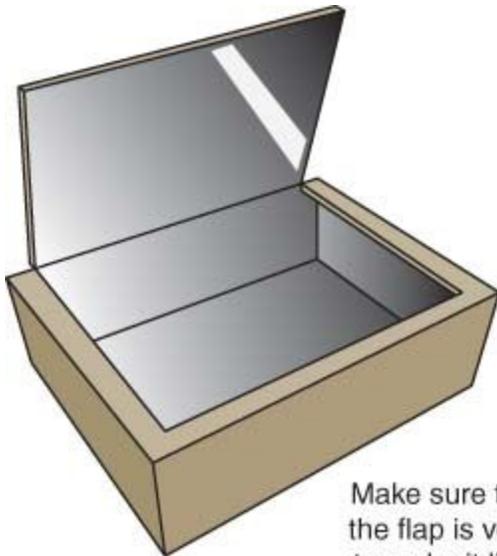
CAUTION: Please have an adult cut the box or do so with adult supervision.

1. Using the straight edge as a guide, cut a three-sided flap out of the top of the box, leaving at least a 1-inch border around the three sides.

Cut here, 1 inch from the edge of the box top.

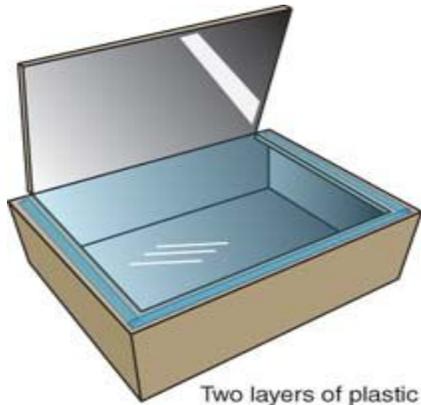


2. Cover the bottom (inside) of the flap with aluminum foil, spreading a coat of glue from the glue stick onto the cardboard first and making the foil as smooth as possible.
3. Line the inside of the box with aluminum foil, again gluing it down and making it as smooth as possible.



Make sure the foil inside the flap is very smooth, to make it like a mirror.

4. Tape two layers of plastic wrap across the opening you cut in the lid—one layer on the top and one layer on the bottom side of the lid.



Two layers of plastic wrap over the opening will help keep heat in, while still letting all the light shine through.

5. Test the stick you will use to prop the lid up. You may have to use tape or figure another way to make the stick stay put.

Using the solar oven

Set the oven in the direct Sun on a sunny day when the outdoor temperature is at least 30 degrees Celsius. Prop the flap open to reflect the light into the box. You will probably have to tape the prop in place. Preheat the oven for at least 30 minutes.

Part 2- Fun times

Smore Recipe

Ingredients:

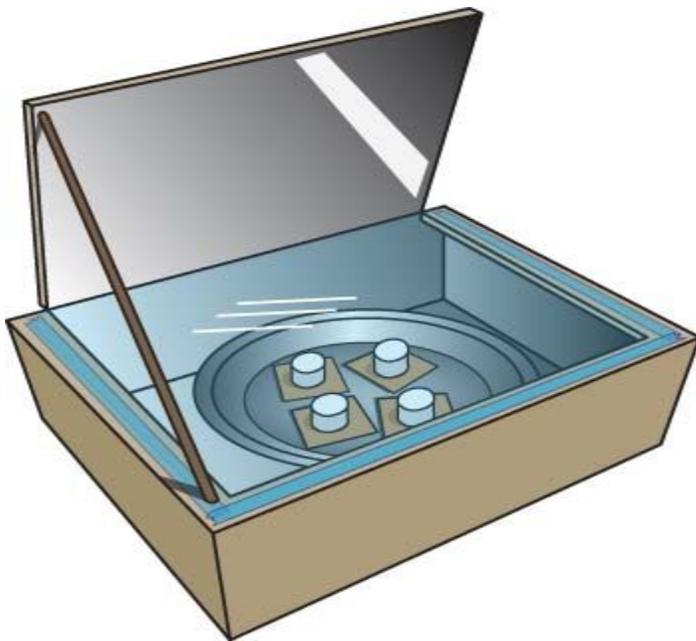
- Graham crackers
- Large marshmallows
- Plain chocolate bars (thin)
- Aluminum pie pan
- Napkins

Method

- Break graham crackers in half to make squares. Place four squares in the pie pan. Place a marshmallow on each.

IMPORTANT! Note that unlike most recipes, this smores recipe have the marshmallow **UNDER** the chocolate. That's because, in the solar oven, it takes the marshmallow longer to melt than the chocolate.

1. Place the pan in the preheated solar oven.
2. Close the oven lid (the part with the plastic wrap on it) tightly and prop up the flap to reflect the sunlight into the box.
3. Depending on how hot the day is, and how directly the sunlight shines on the oven, the marshmallows will take 30 to 60 minutes to get squishy when you poke them.
4. Then, open the oven lid and place a piece of chocolate (about half the size of the graham cracker square) on top of each marshmallow. Place another graham cracker square on top of the chocolate and press down gently to squash the marshmallow.
5. Close the lid of the solar oven and let the Sun heat it up for a few minutes more, just to melt the chocolate a bit.



References

1. NASA Climate Kids (2020). Make S'Mores With a Solar Oven.
<https://climatekids.nasa.gov/smores/>

Activity and method adapted from NASA Climate Kids (<https://climatekids.nasa.gov/smores/>)

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