



6. MAKE SUN S'MORES!



A Bit of History

For more than 2000 years, people have converted sunlight into different or more concentrated forms to stay warm and to cook. Many ancient cultures built their houses to have the most energy efficient sun exposures, facing their buildings towards the southern sky to get the most sun. Ancient Egyptians lined pools with black tiles that absorbed the sun's energy during the day. The warmed pool water was then piped into palaces as a heating source. In this activity, you will build a solar oven that collects the sun's rays to cook food.

Materials: (you provide)

- Oven thermometer
- Cardboard pizza box (or similar box with an attached lid that has flaps so that the box can be closed tightly. Box should be about 3 inches deep.)
- Box knife or scissors (with adult help, please!)
- Aluminum foil
- Tape
- Glue stick
- Plastic wrap
- Ruler or straight edge
- Stick or ruler—about 1 foot long to prop the lid

S'Mores Supplies: (you provide)

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

Space Science Tie-In:

NASA uses solar energy to provide power for spacecraft in the solar system. Solar cells on Earth orbiting and deep space flyby missions, orbiters, and landers power spacecraft and their instruments. The most distant spacecraft to use solar cells is the JUNO mission, now orbiting Jupiter.



Completed solar oven in action

To Do:

HAVE AN ADULT CUT THE BOX!

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

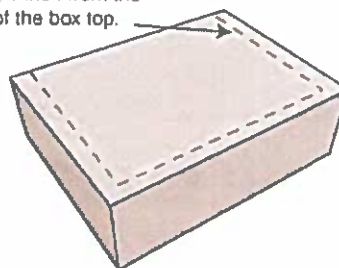
#2 — Cover the inside of the flap with aluminum foil, spreading a coat of glue from the glue stick onto the cardboard first and making the foil as smooth as possible. Line the inside of the box with aluminum foil, again gluing it down and making it as smooth as possible.

#3 — 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 opening in the lid.

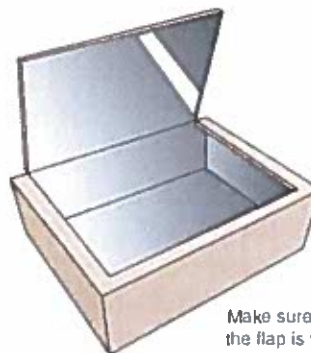
Test the stick you will use to prop the lid up. You may have to use tape or figure another way to make the stick stay put.

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

#1

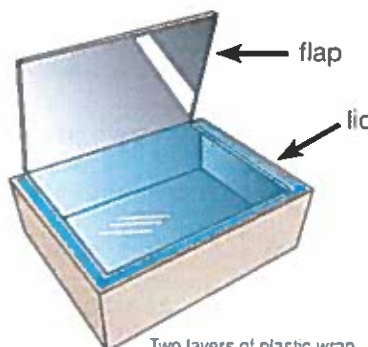


#2



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

#3



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

Make Sun S'mores in Your Solar Oven

Set the oven in the direct sunlight with oven thermometer inside in view. Close the oven lid (the part with the plastic wrap on it) tightly, and prop up the flap to reflect sunlight into the box. You may need to tape the prop in place.

Preheat the oven for at least 30 minutes and check the thermometer. It should be at least 125°.

Break graham crackers into squares. Place four squares in the pie pan with a marshmallow on each. Place the pan in the preheated solar oven.

IMPORTANT! Unlike most recipes, our s'mores have the marshmallow **UNDER** the chocolate. That's because it takes the marshmallow longer to melt than the chocolate in the solar oven.

Depending on how hot the day is, and how directly sunlight shines on the oven, the marshmallows will take 30 to 60 minutes to get soft.

Once the marshmallows are soft, 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.

Close the lid of the solar oven and let the sun heat it up for a few minutes to melt the chocolate.

ENJOY!

*Credit including illustrations NASA Climate Kids
<http://climatekids.nasa.gov>*