



Cook with a Solar Oven

Can you cook using the Sun?

Description

Build a solar oven and use it to bake s'mores. You'll need a bright sunny day.

Age Level: 10 and up



Materials

- one large pizza box
- glue
- aluminum foil
- one sheet of black construction paper
- clear plastic wrap
- tape
- scissors
- ruler
- marker
- chocolate
- marshmallows
- graham crackers
- plate
- thermometer (optional)



Time

Preparation: 10 minutes
Activity: 30 + minutes baking time
Cleanup: 15 minutes

Safety

Do not look directly at the Sun! The inside of the oven can become very hot if left in sunlight for a long time. Use oven mitts or hot pads and be careful not to burn yourself when removing hot food from the solar oven.

Step 1

Line the inside of the pizza box with aluminum foil. Glue the aluminum foil to all inside surfaces except for the lid. This adds reflective surfaces to direct more of the Sun's rays onto the food.



Step 2

On the outside of the box lid, use a marker to draw a square with edges that are 2.5 cm inside the edges of the box.



Step 3

Cut along just the front and side lines of the square, leaving the line near the hinge of the box uncut. Fold open the flap, then glue aluminum foil to the inside of the lid.



Step 4

Tape the sheet of black construction paper to the inside bottom of the box.



Step 5

Stretch plastic wrap over the hole you cut in the lid of the box. Seal any air leaks around the edges of the hole with tape.



Step 6

Assemble your s'mores on the plate, and put it inside the solar oven. Position the flap of the oven so the Sun's rays are directed toward the s'mores. Tape a ruler along the side of the oven to keep the lid at the desired angle. Check the flap every few minutes, and adjust it so the Sun's rays are always directed toward the food.

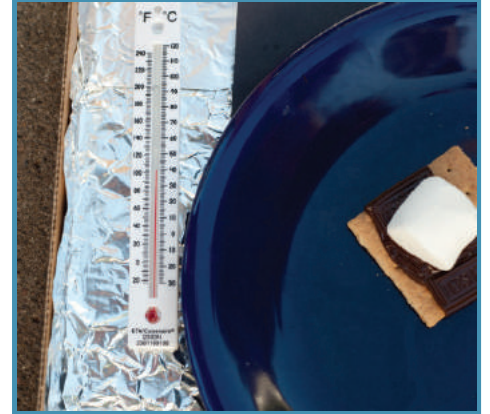
Tip

On a hot day, the oven can reach approximately 93° C (200° F). Check your s'mores for doneness after one hour.



Optional Step

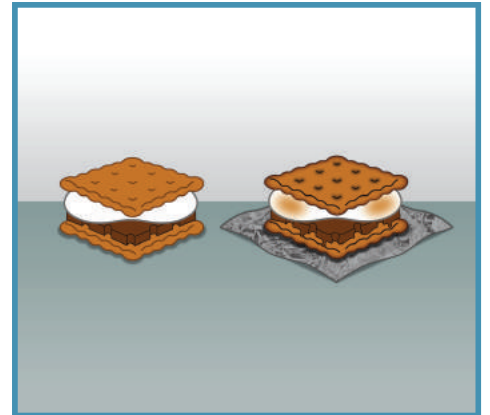
Place the thermometer inside the oven and challenge yourself to see what temperature the oven can reach! Experiment with different angles of the reflector flap, direction of the oven in relation to the Sun, tightness of the plastic wrap seal, and addition of more flaps to reflect more sunlight into the oven.



What's Going on?

The Sun emits a lot of energy. Solar energy that reaches Earth can be absorbed by the atoms and molecules in an object. This energy absorption makes the atoms and molecules move around faster, which makes the object hotter. You can make an object hotter when it's in sunlight—the more sunlight you reflect onto an object, the hotter it will get.

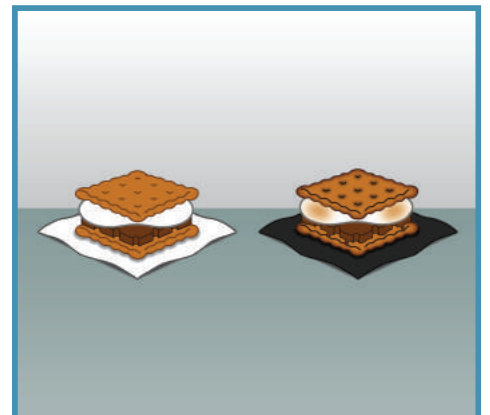
Sunlight shines on the s'mores in the solar oven, and you can get more sunlight to shine on the s'mores by reflecting the light from the lid of the pizza box onto the food.



Why black paper?

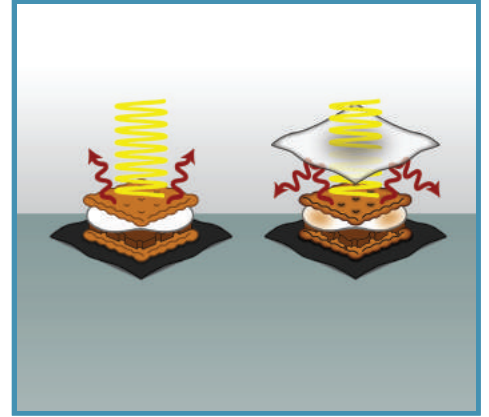
Objects of different colors absorb the Sun's energy in different ways. Dark objects absorb more energy in sunlight, and get hotter than white or lighter colored objects.

You placed black construction paper in the bottom of the solar oven so that the paper would absorb more solar energy and get hotter.

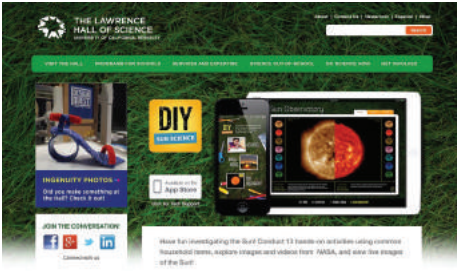


Why use plastic wrap?

When an object gets hot, it gives off its energy to other objects nearby, like the air around it. Instead of the hot air around the s'mores leaving the oven, we can trap it by insulating the pizza box with aluminum foil and placing the plastic wrap over the hole in the pizza box's lid. The plastic wrap lets the Sun's energy into the oven, but also acts like a blanket to keep the hot air from escaping.



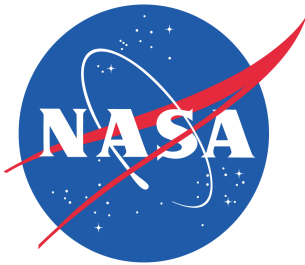
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Credits



This project was supported by NASA under award number NNX10AE05G. Any opinions, findings, conclusions or recommendations expressed in this program are those of the author and do not reflect the views of NASA.



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The DIY Sun Science app allows families and educators to investigate and learn about the Sun at home, at school, or anywhere you go! The app features thirteen hands-on investigations, as well as images and videos.

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