



Half a day



Grades
6-8

Sun-Warmed Treats

Build a solar oven and warm up a treat.

Instructions

Each student group constructs a simple solar oven that gets hot enough to warm up cookies or other treats, like s'mores. Caution: Before starting this activity, check with the participants if they have allergies to any of the food ingredients used.

- 1** Make sure the pizza box is folded into its box shape and closed.
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- 2** Measure a 1 ½" border around the lid, on top of the box. Carefully cut three sides of the square that you just traced on the lid, forming a flap of cardboard. Leave the side along the box's hinge uncut.
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- 3** Fold the flap back; this flap will become your reflector panel.
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- 4** Wrap the underside (the side that was inside the box) of this flap with aluminum foil. Tape it on the other side so that the foil is held firmly. Keep the tape from showing on the foil side.
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- 5** Close the flap and open the box. Cover the inside bottom of the box with foil, and glue in place. Then glue black construction paper over this foil to absorb the sun's heat.

Materials

PER GROUP OF 3-4 STUDENTS:

- One cardboard pizza box
- Newspapers
- Tape and glue
- Scissors
- Marker



Instructions

- 6 Fit rolled-up newspaper around the inside edges of the box, about 1" to 1 ½" thick. Use tape or glue to hold the newspaper in place, but tape it only to the inside bottom of the box, not the lid.
- 7 Cut a piece of heavy-duty plastic wrap an inch larger than the flap opening on the box top. Tape this piece to the underside of the box lid and pull it tight over the opening in the box top. Be sure to tape down all four sides so that the plastic is sealed against the underside of the cardboard.
- 8 Close the box and pull the flap open. Push one thumbtack into the top of the flap on the back side (the side without the foil). Use a slipknot to tie one end of your string to this thumbtack.
- 9 Push the other thumbtack into the back side of the box. Wrap the other end of the string around this tack to adjust the angle of your reflector so that the sun is reflected down through the clear plastic and in to your oven.
- 10 Put the box outside in a sunny spot. (If it's cold out, put a towel or blanket under the box.)
- 11 Open the box, put your treat in the center, and close it.
- 12 Open the flap and turn the box so that the foil is facing the sun. The shadow of the flap should go straight back from the back of the box.
- 13 Move the flap up and down and note how it reflects the sunlight. Use tension on the string to prop up the flap so that it bounces the sunlight into the box.
- 14 Wait about 30 minutes for the treat to warm up, and then enjoy!

Materials

- Black construction paper
- Clear heavy-duty plastic wrap
- Aluminum foil
- A pencil or pen
- A ruler
- 2 thumbtacks
- A piece of string or yarn approx. 15" long
- A copy of the instructions for student use
- Treats for warming in the oven, such as already baked cookies, or ingredients to make s'mores
- A sunny day!



Engineering & Science Connections

 Solar energy—which is carried by light waves from the sun—is one type of alternative energy that can be used instead of oil, gas, or coal. Solar energy is renewable, meaning we do not deplete it by using it.

 Millions of people in developing countries still cook over a smoky fire. Either they walk for hours finding firewood or they use half their income on cooking fuel. In these places, solar ovens are a true engineering marvel.

 Using the same technique of reflecting the sun's rays and energy, a solar farm can create electricity. In the Mojave Desert the sun's rays are reflected by 170,000 mirrors to towers holding water. The heat produced by the reflected sun on the focal point changes the water to steam. The steam spins turbines that can generate enough electricity for 140,000 California homes.

Guiding Questions ?

Why do we put aluminum foil on the bottom of the cut flap? (It reflects sunlight into the box.)

What purpose does the rolled-up newspaper serve? (Insulation, to help hold in the sun's heat.)

What could you use for insulation besides the newspaper?

What purpose does the plastic wrap serve? (Creates a layer of air as insulation that helps keep the sun's heat in the box.)

How could you change this oven or activity to actually bake cookies?

This activity, courtesy of Tacoma Power, is from the DVD Discover Engineering.