Build a Pizza Box Solar Oven

OBJECTIVE

Students will use the engineering process to build a solar oven our of a pizza box.

PURPOSE OF ACTIVITY

Read or Listen, Identify Details, Apply Skills

21st CENTURY SKILLS

Critical Thinking, Collaboration

COGNITIVE LEVEL

Strategic Thinking, Extended Thinking, Skills and Concepts

CLASS TIME

1 hour

MATERIALS

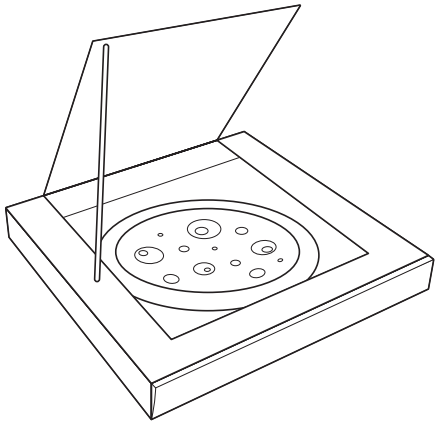
- One pizza box from a local pizza delivery store
- Newspapers
- Tape
- Scissors
- Black construction paper
- Clear plastic wrap
- Aluminum foil
- One piece of notebook paper
- One pencil or pen
- One ruler, wooden dowel or stick

Procedure

1. Make sure the cardboard is folded into its box shape and closed.
2. Place the piece of notebook paper in the center of the lid of the box and trace its outline on the lid. Put the piece of paper aside.
3. Carefully cut the two long edges and one of the short edges of the rectangle that you just traced on the lid of the box forming a flap of cardboard.
4. Gently fold the flap back along the uncut edge to form a crease.
5. Wrap the underside (inside) face of this flap with aluminum foil. Tape it on the other side so that the foil is held firmly. Try to keep the tape from showing on the foil side of the flap. The foil will help to reflect the sunlight into the box.
6. Open the box and place a piece of black construction paper so it fits the bottom of the box. This will help to absorb the sun's heat.
7. Close the box, roll up some newspaper and fit it around the inside edges of the box. This is the insulation that

helps hold in the sun's heat. It should be about 1 to 1 1/2 inches thick. Use tape to hold the newspaper in place, but only tape it to the bottom of the box, not the lid.

8. Cut two pieces of plastic wrap an inch larger than the flap opening on the box top. Open the box again and tape one piece of plastic wrap to the underside of the flap opening. After taping one side, BE SURE TO PULL THE PLASTIC WRAP TIGHT, and tape down all four sides so the plastic is sealed against the cardboard. Then close the box and tape the other piece of plastic wrap to the top of the flap opening. Again, be sure the plastic wrap is tight and tape down all four edges to form a seal. This creates a layer of air as insulation that helps keep the sun's heat in the box.
9. On a sunny day, pick a treat to warm up and carry it and the box outside to a sunny spot. If it's cold outside, put a towel or blanket under the box so the bottom doesn't get cold. Open the box, put the treat in the center and close the box. Now open the flap and turn the box so the foil is facing the sun. The shadow of the flap should go straight back from the back of the box. Move the flap up and down and note how it reflects the sunlight. Use a dowel, ruler or stick to prop up the flap so that it bounces the sunlight into the box.
10. Wait about thirty minutes for the box to warm up in the sun. Then enjoy your warmed-up treat!



CRITICAL THINKING QUESTIONS

How can we use solar power to generate electricity?

Two ways. One – solar panels can turn sunlight directly into electricity. Two – solar reflectors, like this oven, can be used to heat up molten salt. The molten salt can then be used to boil water to create steam which can spin a turbine and generate electricity.

What role did the insulation play in this oven?

The insulation prevented a heat transfer from the oven and helped keep it warm.

Adapted from: https://www.energy.gov/sites/default/files/2015/03/f20/PizzaBoxSolarOven.pdf