



SOLAR OVEN

Grade Level

4-8

Length of Lesson

45 minutes

Objective

By the end of this lesson, students will better understand the power of the sun's energy and how humans can use that power.

Materials Needed

- Cardboard pizza box
- Aluminum foil
- Black construction paper
- Clear kitchen plastic wrap
- Scissors
- Glue
- Stick or pencil

Standards

NGSS

3-5-ETS1-2; 4-PS3-2; 4-PS3-4; 4-ESS3-1, 4-ESS3-2, 3-5-ETS1-2, MS-PS3-3; MS-PS1-4; MS-PS3-3-4

Lesson Summary

This lesson is designed to provide students an opportunity to build a solar oven in order to cook food using solely the sun's energy.

Suggested Sequence of Events:

1. Read *Time to Shine* by Catherine Daly to learn more about how solar ovens can be built and used to cook food.
2. Complete the activity following the procedures:
 - Give each group the necessary materials to build their own solar ovens.
 - On the lid of the pizza box, use scissors or a box knife (with help from an adult!) to cut through the cardboard on three sides, leaving about an inch between the sides of the flap and the edges of the lid. Fold this flap out on the uncut side so that it stands when the box lid is closed.
 - Cut aluminum foil to fit on the inside of this flap. Use glue to attach.
 - Cut clear plastic wrap to fit the hole from the flap in the lid of the box. Attach from the underside of the lid with tape or glue.
 - Next, line the inside of the box with foil adhered with glue.
 - Then, cut black construction paper to the size of the bottom of the box and glue to the foil.
 - Use a pencil or stick to prop open the flap of the solar oven. Place food, such as a piece of pizza or a s'more, into the oven and position to maximize the reflection of the sun's rays into the oven chamber beneath the clear plastic.
 - Allow students to experiment by changing the types of food, the angle of the flap, and attempting to cook with different outside temperatures and cloud cover.
4. Whole class discussion and reflection of activity. In what types of situations might this solar oven be useful? What are ways this design could be perfected to cook food more efficiently? What is the purpose of the plastic wrap in the solar oven?

TEACHER RESOURCES

Extension Ideas:

- Learn more about the types of thermal transfer: radiation, conduction, and convection. This activity uses radiation—the transfer of heat without direct contact between the two objects.
- Discuss how the solar oven traps the sun's heat (thermal energy) inside to raise the temperatures.
 - Keep in mind that extreme physical changes in the food may not occur but that the temperatures of the food will increase. Recording the temperature of the food before and after would show the trapping of the heat of the sun.
- Learn more about how temperature affects the properties of materials and sometimes those changes cannot be undone.
 - For example, heating chocolate will cause melting, but a decrease in the temperature will cause the chocolate to become a solid again. But a marshmallow heated over a fire will brown and the change in properties cannot be undone.
- Learn more about renewable energies and the concept of greenhouse gases.
- Learn about how the sun's energy is important for many different reasons. Can they trace the flow of the sun's energy through the food chain? Can they explain how the sun's energy drives the water cycle?
- Discuss the pros and cons of using the solar oven for cooking their food.
- Incorporate the IAITC Pizza and Nutrition Ag Mags into this lesson to provide background information on how some of our favorite foods are grown and transported to our tables.
- Use thermometers inside the solar ovens to test how hot they can get on days with different environmental conditions.
- Provide students with materials to make their own versions and see which design is most effective in heating up food.
- Go to agintheclassroom.org to contact your County Literacy Coordinator for free classroom sets of our Ag Mags!

