

# LEARN S'MORE ABOUT SOLAR POWER



## LESSON OVERVIEW

Grade Levels: K-4

In this lesson students will learn more about solar energy and how it can be used in unique ways by experimenting with a solar oven.

## STANDARDS

|                    |   |
|--------------------|---|
| NGSS<br>K-2-ETS1-1 | Ask questions, make observations, and gather information about a situation people want to change to define a simple problem that can be solved through the development of a new or improved object or tool. |
| NGSS<br>K-2-ETS1-2 | Develop a simple sketch, drawing, or physical model to illustrate how the shape of an object helps it function as needed to solve a given problem.  |

## OBJECTIVES

- Students will experiment with a solar oven to observe solar energy.
- Students will sketch how a solar oven works.

## MATERIALS

- Empty pizza box
- Aluminum foil
- Saran wrap
- Scissors
- String
- Tape
- Black napkins or construction paper
- Tape measure or ruler
- Paper
- Pencils/crayons/markers
- Marshmallows
- Graham crackers
- Chocolate

## PROCEDURE

- STEP 1:** Review solar energy, asking students questions about how they can observe solar energy (see daylight, feel warmth on skin, feel hot metal cars or pavement, etc.). Set up a scenario: the electricity in your house goes out, so you can't use the oven. But you want to make treats for your friends and family, so you decide to make a solar oven to cook s'mores.
- STEP 2:** Cut a square shape out of the pizza box top, leaving about an inch of box around the side and front edges and a "flap" at the back. Be sure to only cut 3 sides so that you have a flap! This will be the door to your oven.
- STEP 3:** Tape saran wrap to the outer edge of the pizza box top, covering the opening you just made by cutting the flap. This is the window of your oven door.
- STEP 4:** Line the inside of the pizza box with aluminum foil. Also line the underside of the flap with aluminum foil. The box should still be able to close.
- STEP 5:** Put a small hole in the box flap and tie it to one end of the string. The other end of the string will be taped to the back of the box to adjust the flap angle.
- STEP 6:** Lay out black napkins or black construction paper inside the box.
- STEP 7:** Have the students help make open faced s'mores with the graham crackers, marshmallows, and chocolates. Place them on the black napkins.
- STEP 8:** Ask the students to predict what will happen to the s'mores. Ask what they think would happen if it were a cloudy day, there was no flap on the box, or if there was no box at all. Ask students how they think the box should be set up. Should the flap be facing the sun? How tilted should the flap be?
- STEP 9:** Have students draw what they think is happening inside the box. Again, prompt students to think about what would happen if they moved the flap to a different position. They could draw the path of the sun's energy and what they think will happen to the s'mores. Students should label and title their drawings.
- STEP 10:** Let the box sit during the discussion until the s'mores are melted and ready to eat. Serve the s'mores to the class while reviewing what happened and why. Draw a sketch of the path of the solar energy for the entire class to see, or have students share their drawings with the class.

## GUIDING INFORMATION

The sun's rays enter the pizza box through the window. By adjusting the flap in the lid, the sun's rays are more concentrated into the opening. The plastic holds in the heat from the rays, and the aluminum foil directs it toward the s'mores. The black napkins help by absorbing more heat since dark objects absorb heat. The box holds the energy and heats the s'mores to cook them.

## RUBRIC

|   | Target (3)  | Meets (2)   | Partially Meets (1)  | Does Not Meet (0)  |
|---|---|---|--|--|
| DRAWING   | Does a great job drawing the solar oven with clear lines and letters.   | Does an okay job drawing the solar oven with clear lines and letters.   | Tries but has great difficulty drawing the solar oven.   | Does not do a drawing related to the lesson.   |
| CONTENT OF DRAWING  | Does a great job incorporating information from the lesson into the drawing and includes clear labels.                          | Does an okay job incorporating information from the lesson into the drawing and includes some labels.                               | Tries but has great difficulty either incorporating information from the lesson into the drawing or does not include any labels.   | Does not do a drawing related to the lesson content.                                   |
| COLLABORATION   | Works well with others and discusses ideas in a fair, respectful, encouraging way and is considerate of the feelings of others. | Works okay with others and discusses ideas in a fair, respectful way, but may not be encouraging. Considers the feelings of others. | Works with others, but does not contribute a fair share of work OR is discouraging and does not consider the feelings of everyone. | Does not work well with others and/or discusses ideas in an unfair, disrespectful way. |
| REQUIREMENTS  | Meets all of the requirements for the project.  | Meets most of the requirements for the project.   | Meets some of the requirements for the project.  | Does not meet the requirements for the project.  |
| DEMONSTRATION OF KNOWLEDGE OF CONTENT IN DISCUSSIONS AND ACTIVITIES | Does a great job showing an understanding of the content covered in class.  | Does an okay job with showing an understanding of the content covered in class.   | Tries but has a difficult time showing an understanding of the content covered in class.   | Does not show an understanding of the content covered in class.                        |
| Total   |   |   |  | /15  |