

## SOLAR OVEN DESIGN AND EXPERIMENT

**Objective:** Understand renewable energy and thermodynamics by designing a solar oven to cook s'mores.

### Materials Needed:

- Pizza box (or any cardboard box)
- Aluminum foil
- Plastic wrap (clear)
- Black construction paper
- Tape
- Scissors
- Thermometer
- Marshmallows, chocolate, and graham crackers for s'mores
- Ruler
- A sunny day for the experiment

### Instructions:

- 1. Research Phase:** Start by discussing how solar energy works and the concept of heat transfer. Explain how a solar oven uses sunlight to heat and cook food, with heat being trapped by the reflective surfaces inside.
- 2. Design and Build:** Students should design their solar ovens by cutting a flap in the pizza box and covering it with aluminum foil to reflect sunlight. Then, line the bottom of the box with black construction paper to absorb heat, and cover the opening with clear plastic wrap to trap the heat inside.
- 3. Testing Phase:** Place marshmallows, chocolate, and graham crackers inside the oven and close the box. Position the oven to face the sun. Use a thermometer to measure the temperature inside the oven and record the results every 10 minutes.
- 4. Cook and Compare:** After 30-45 minutes, check to see if the marshmallows have melted and if the s'mores are ready. Compare the effectiveness of the solar oven on different days based on temperature and sunlight.
- 5. Analysis:** Discuss what factors affected the performance of the solar oven (e.g., angle of the sun, materials used, and insulation). Have students calculate the temperature increase inside the box and relate it to concepts of energy conservation and heat transfer.

### Learning Goals:

- Learn about renewable energy and solar power.
- Understand the principles of heat transfer (conduction, convection, radiation).
- Develop skills in designing experiments and analyzing results.

*These activities engage students with hands-on learning, introduce them to key STEM concepts, and foster creativity, critical thinking, and problem-solving.*

