

Lesson Title: Solar Oven Challenge - Heating Up a Giant Marshmallow

4th Grade Lesson Plan

Grade Level: 4th Grade

Duration: Two 50-minute sessions

Lesson Overview

Students will investigate solar energy and heat transfer through the design and construction of solar ovens to heat a giant marshmallow, applying scientific principles and engineering practices.

Learning Objectives

By the end of the lesson, students will be able to:

- Describe how solar energy is converted into heat energy.
- Apply the engineering design process to create a functional solar oven.
- Analyze the effectiveness of their designs based on collected data.

Materials Needed

- Pizza boxes or cardboard boxes (ask for donations)
- Aluminum foil
- Plastic wrap
- Black construction paper
- Giant marshmallows
- Thermometers (ask teachers to lend them to you)
- Tape and scissors
- Towels for clean-up

Day 1 Lesson Steps

1. Introduction to Solar Energy (10 minutes)

- Discuss the principles of solar energy and its importance in renewable resources. Ask students for examples of solar energy applications.

2. Engineering Design Process (15 minutes)

- Introduce the engineering design process and how it applies to their solar oven project.

3. Design Phase (15 minutes)

- Students will sketch and elaborate on their designs, detailing the materials they will use and the expected outcome.

4. Building Phase (10 minutes)

- Guide students as they construct their solar ovens, ensuring each oven has a giant marshmallow inside.
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Day 2 Lesson Steps

1. Review (10 minutes)

- Recap the solar energy concepts and the engineering design process. Discuss what they expect to happen during the testing phase.

2. Testing Phase (25 minutes)

- Have students place their solar ovens outside in direct sunlight and monitor the marshmallow heating process.

3. Data Collection and Analysis (10 minutes)

- Measure the temperature of the marshmallow and analyze the results. Discuss which designs were effective and why.

4. Conclusion (5 minutes)

- Summarize the importance of solar energy and how engineering can help us harness it efficiently.