

Lesson Plan: Constructing a Solar Oven for STEM Education	Length: 50 minutes
Grade Range: 8th to 10th grade	Fields of Study: Science, Technology, Engineering, Mathematics

Learning Goals:
<ol style="list-style-type: none"> <li>1. Students will utilize scientific and engineering ideas in order to construct a functional solar oven.</li> <li>2. Students will acquire knowledge about renewable energy sources and their practical uses.</li> <li>3. Students will cultivate problem-solving, collaboration, and innovative thinking abilities.</li> </ol>

Required materials:
<p>Cardboard containers used for storing and transporting pizzas.</p> <p>Aluminium foil</p> <p>Polyethylene film</p> <p>Construction paper that is black in color</p> <p>Adhesive tape Cutting tool</p> <p>Temperature measuring devices</p> <p>Marshmallows and chocolate (for experimentation)</p>

Instruction Method:
<p><i>Introduction (5 minutes):</i> Present an overview of solar energy and its applications, with a specific focus on solar ovens.</p> <p>During the study phase, which lasts for 10 minutes, students investigate the functioning of solar ovens, with a particular emphasis on the underlying scientific principles. It is important for them to grasp the principles of reflection, absorption, and insulation.</p> <p>During the Design Phase, which lasts for 10 minutes, students collaborate in teams to create sketches of their solar oven ideas on paper. They strategically plan how to utilize the given materials in order to optimize the effectiveness of their ovens.</p> <p><i>Construction Phase (15 minutes):</i> Students utilize the provided materials to assemble their solar ovens, adhering to their predetermined designs. The current stage of the project necessitates active participation from students, involving the physical actions of cutting, taping, and building their ovens.</p>

*Testing Phase (5 minutes):* Insert marshmallows and chocolate into the ovens and position them outdoors in a sunny location. Utilize thermometers to quantify the alteration in temperature.

*Analysis and Discussion (5 minutes):* Following the experimentation phase, students engage in a conversation to examine their findings, evaluate the effectiveness of their oven designs, and identify areas for potential improvement.

*Evaluation Standards (Self-Evaluation):*

- The lesson is designed to meet Grade-Level Standards (3) by using STEM standards that specifically address topics related to renewable energy, heat transport, and engineering design.
- Multidisciplinary (3): Combines the fields of science (specifically solar energy), technology (research), engineering (planning and constructing the oven), and mathematics (measured and calculating angles of reflection).
- Addresses Genuine Challenges (3): Emphasizes the practical use of renewable energy in real-world scenarios.
- Incorporates 21st Century Skills (3): Promotes creativity, analytical thinking, effective problem-solving, and collaboration.
- Multiple Solutions (3): Each team is responsible for designing and constructing a distinct solar oven.
- Applies the Engineering Design Process (3): Adheres to the design process when constructing the ovens.
- Hands-On (3): Requires constructing a tangible replica of a solar oven.
- Utilizes Technology (3): Employs technology for the purpose of conducting research and potentially recording the process and outcomes.