STEM in

# LESSON PLAN

## Create your own solar oven

In this activity, students will design and build their own solar oven, learning how to harness solar energy and  explore the greenhouse effect..

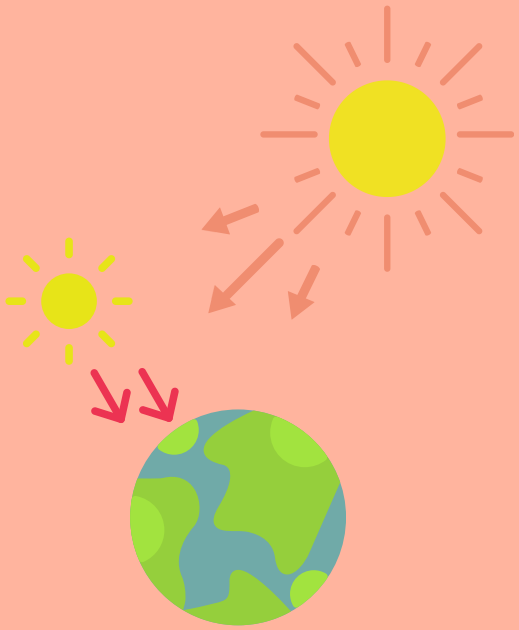
**45-60 min**

**Duration**

## Recommended age for this game

**10-12 years**

## Learning Objectives



- Understand the greenhouse effect and how solar energy can be harnessed for cooking.
- Explore renewable energy concepts and sustainability.
- Develop problem-solving and teamwork skills by designing and building a functional solar oven.

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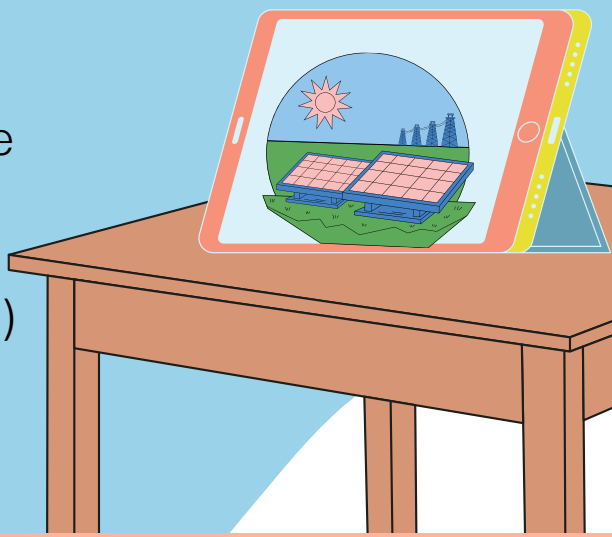
## Materials and tools needed

- Large cardboard boxes (1 per group)
- Aluminum foil
- Black construction paper
- Plastic wrap or a clear plastic sheet
- Tape and glue
- Scissors or box cutters
- Ruler
- Thermometer (optional, to measure the temperature inside the oven)
- Marshmallows, chocolate, and graham crackers (to make s'mores)



## Guidance for Teachers

### Activity description

Students will design and build a solar oven that uses sunlight to cook or heat food, allowing them to learn about solar energy, heat absorption, and the greenhouse effect.

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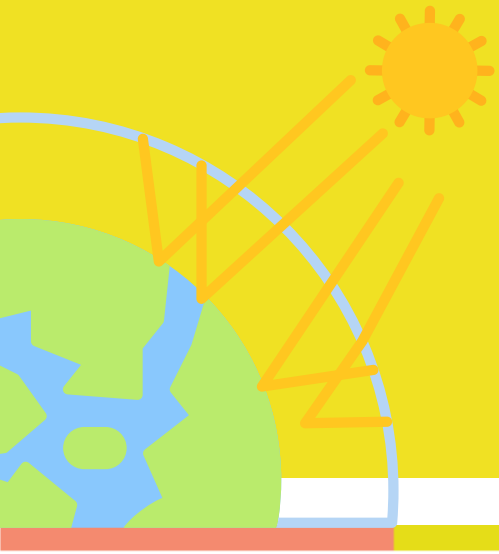
## Guidance for Teachers

### Preparation

- Gather and prepare materials for each group.
- Create a sample solar oven to demonstrate the final product.
- Choose a sunny day for this activity or set up heat lamps for an indoor alternative.

### Implementation steps

- INTRO: Discuss the greenhouse effect and the importance of renewable energy. Explain also how solar ovens work, emphasizing the concepts of reflection, absorption, and insulation.
- DESIGN AND CONSTRUCTION: Students line the inside of a cardboard box with aluminum foil (for reflection). Place black construction paper at the bottom (to absorb heat). Cover the top with plastic wrap to trap heat inside the box.



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## Guidance for Teachers

- TESTING THE SOLAR OVEN:

Place marshmallows, chocolate, and graham crackers inside the oven to make s'mores.

Allow the ovens to sit in direct sunlight or under heat lamps for 15-20 minutes.

Observe and record how long it takes for the chocolate to melt or the marshmallows to soften.

### Follow-up and reflection

- Discuss the effectiveness of each group's design and any adjustments they would make.
- Relate the activity to real-world solar cooking and its applications in sustainability.

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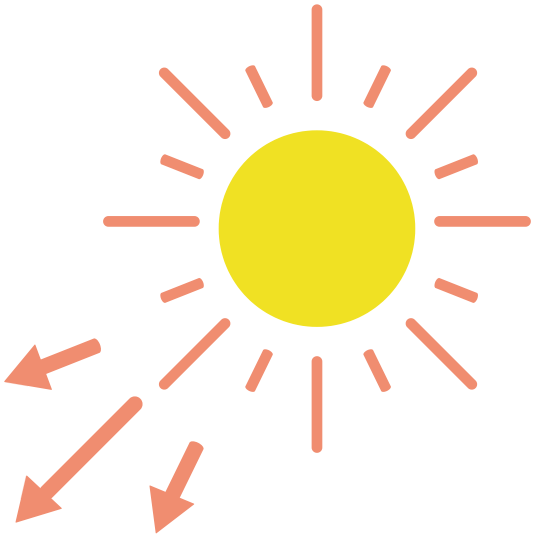
# Student Activities

| Activity description | Expected outcome | Technology integration |
|---|---|---|
| **Design and build a solar oven** | Students understand solar energy concepts and how heat can be harnessed. | Use design software (e.g., Tinkercad) for planning the oven. |
| **Test the oven by cooking s'mores** | Students observe heat absorption and the greenhouse effect in action. | Use a thermometer app to measure internal temperature changes. |
| **Analyze and improve oven design** | Students develop critical thinking skills by making iterative improvements. | Create a presentation using Canva to share their results. |



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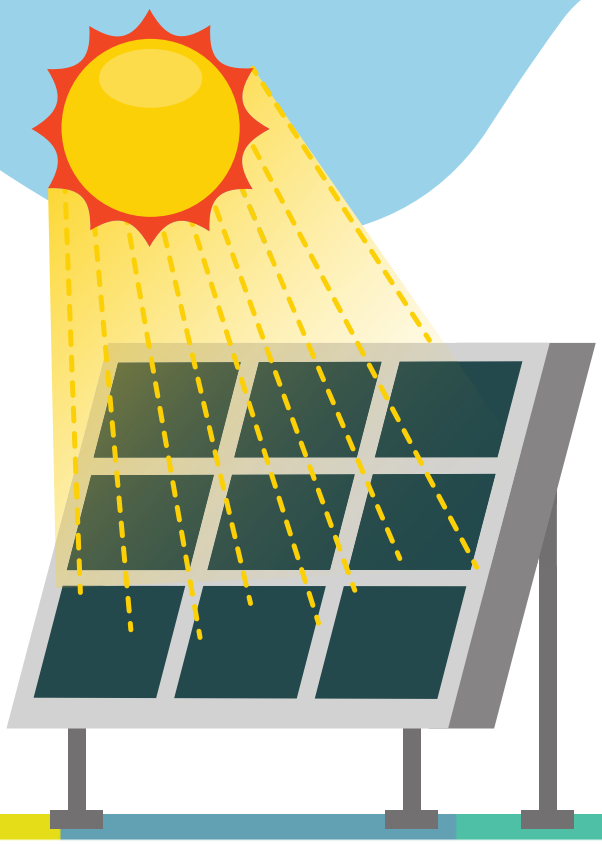
## Reflective questions for students

- What worked well in your solar oven design, and why?
- How does the color of the materials affect heat absorption?
- What changes would you make to improve the efficiency of your oven?
- How can solar cooking benefit communities with limited access to electricity or fuel?



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# Differentiation ideas

### Advanced Students

- Challenge them to design a dual-chamber oven to cook two items at once.
- Introduce scientific measurements, like tracking temperature changes at regular intervals.

### Students with special needs

- Pre-cut materials for easier assembly.
- Provide visual instructions or step-by-step guides.
- Pair them with a supportive peer for collaborative learning.

## Tips

- Choose a sunny day and a clear outdoor area for testing.
- Remind students to handle materials like scissors and box cutters safely.
- Encourage teamwork and experimentation to improve designs.

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# Additional materials and references

- Video How to make a homemade Solar Oven

- Blog Science Experiments for Kids-Renewable Energy

- Interactive simulation How can you cook using the Sun's energy?



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