

Build a **SOLAR OVEN**



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SOLAR OVEN

PLANNING GUIDE: 3-4 DAYS NEEDED

1. Gather materials in advance (list on page 4). Prep the boxes by cutting them as shown on page 5. I recommend having no more than three students per team to construct a solar oven.
2. Introduce the solar oven challenge using the “Challenge Info” page provided. Use the questions to discuss how the materials might be used.
3. Allow teams at least one class period to build their solar oven. You might be more open-ended with the construction or go step-by-step. It just depends on you and your class!
4. On a nice sunny day, hand out recording sheets (2 options available), and test out your solar ovens. Plan for 30 minutes of cook time!
5. Students complete their recording sheets as the s'mores cook and after they enjoy their treats!



MATERIALS *list*

RECORDING SHEETS

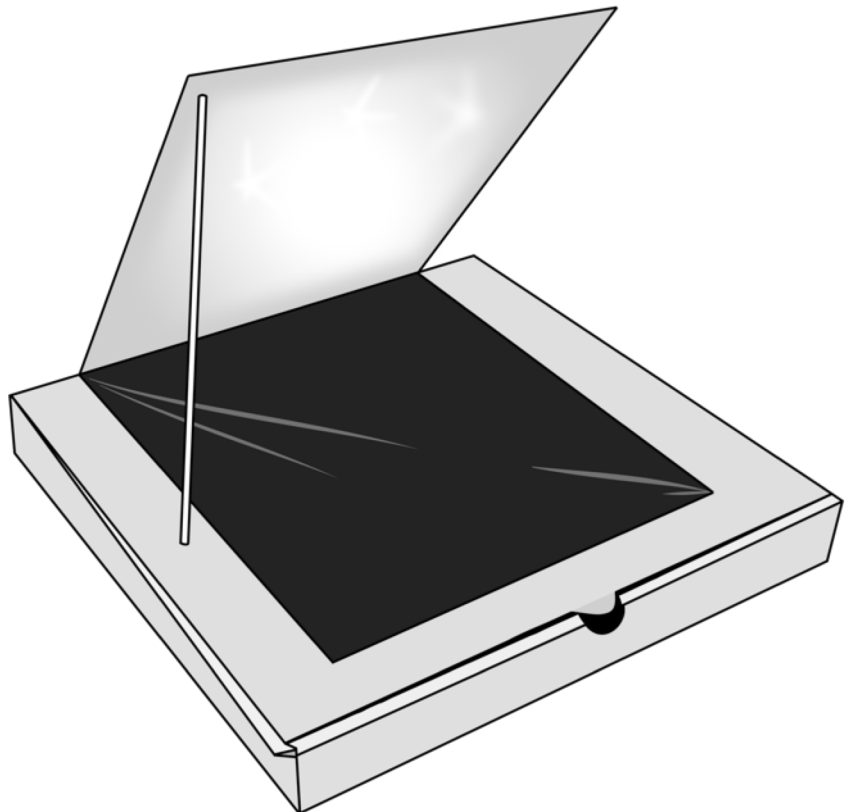
Each student needs one recording sheet. Copy front/back or use the smaller pages to fit in student science notebooks.

S'MORE MATERIALS

- Graham crackers
- Chocolate bars
- Jumbo marshmallows
- Small clear plastic plate

BUILDING MATERIALS

- Pizza box, shoebox, or other small cardboard box with attached lid/top
- Box cutter or X-acto knife (for teacher only!)
- Thermometer
- Tape
- Scissors
- Black construction paper
- Aluminum foil
- Plastic wrap
- Newspaper
- Pencil, bamboo skewers, or other item to prop up the top of the box
- Any other materials you want to include!



SOLAR OVEN

HOW TO BUILD A SOLAR OVEN

This is just one of many ways to build a solar oven. On a partly cloudy day around noon, my solar oven reached 55°C in 30 minutes.



1. Cut the boxes before students arrive using a box cutter or X-acto knife. (Before Class- TEACHER ONLY)
2. Cut a sheet of black paper to fit the bottom of the box and tape it down.
3. Cut a piece of plastic wrap or the back of a gallon bag so you have one piece of plastic with no writing on it.



4. Cut the plastic to cover the opening.

5. Tape the plastic below the opening. Use tape all the way around so it is insulated.

6. Cut a piece of foil to fit the flip top. Wrap it around and tape it on the back.

7. Roll up newspaper and place it around the sides. Close the box. Tape a pencil to the flip top lid to properly angle the lid for the maximum amount of sunlight.



SOLAR OVEN

SAMPLE RECORDING SHEET

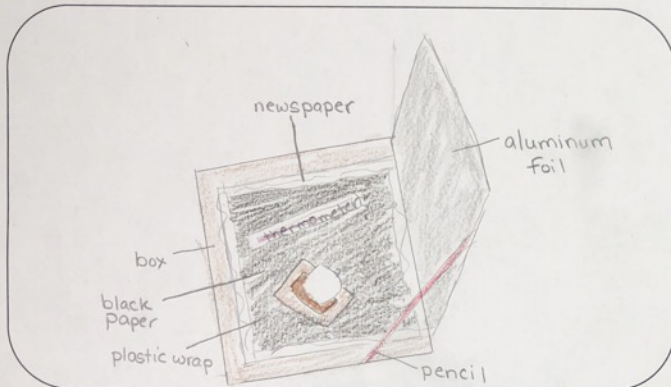
As the solar oven heats up, students can complete the sketch and questions about materials.

As they enjoy their treats, they can complete the Requirements Table and answer the Improvement question.

MY SOLAR OVEN

Name _____

LABELLED SKETCH



REQUIREMENTS

COMPONENT	QUESTION	ANSWER
Time	Did you complete your solar oven in the time allotted?	yes
Absorbing Heat	What material(s) did you use to absorb heat and directly heat the s'more?	black paper
Thermal Insulator	What material(s) did you use to keep heat in the box?	plastic wrap newspaper
Temperature	What was the highest temperature the inside of your oven reached?	55°C
Marshmallow	Did your marshmallow begin to melt?	yes
Chocolate	Did your chocolate melt?	yes

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MATERIALS

What was the purpose of the plastic wrap?

It allows sunlight to enter the box and keeps the heat inside the box.

What was the purpose of the foil?

The aluminum foil reflects light from the sun into the box.

What was the purpose of the newspaper?

The newspaper is a thermal insulator.

What was the purpose of the black paper?

It absorbs sunlight and gets warmer.

IMPROVEMENT

How do you think you could improve your solar oven so it could reach an even higher temperature?

I would adjust the angle of the foil lid so more light enters the box.

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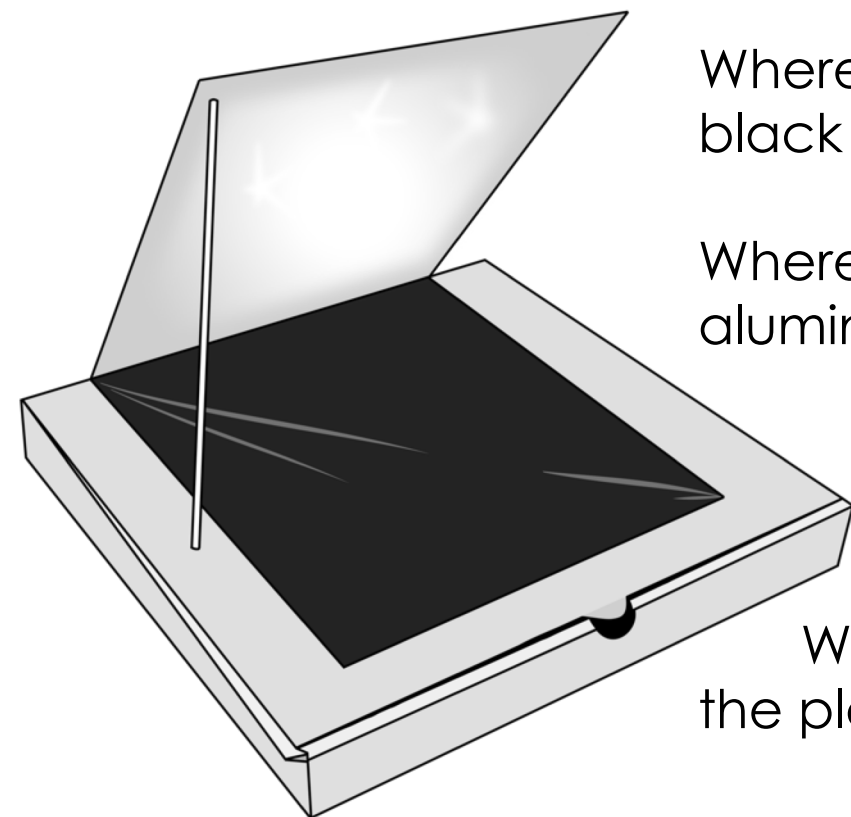
CHALLENGE Info

WE ARE MAKING S'MORES!

Your challenge is to create a solar oven that will heat a s'more!

Each team will receive a box, aluminum foil, plastic wrap, newspaper, a stick, and a sheet of black paper.

Your team's s'mores will be placed inside the oven to cook using energy from the sun.



Where should you place the black paper? Why?

Where should you place the aluminum foil? Why?

What should you do with the newspaper? Why?

What should you do with the plastic wrap? Why?

The better your design, the more gooey your chocolate and marshmallow will be! Let's do this!

MY SOLAR OVEN

Name _____

LABELED SKETCH

REQUIREMENTS

COMPONENT	QUESTION	ANSWER
Time	Did you complete your solar oven in the time allotted?	
Absorbing Heat	What material(s) did you use to absorb heat and directly heat the s'more?	
Thermal Insulator	What material(s) did you use to keep heat in the box?	
Temperature	What was the highest temperature the inside of your oven reached?	
Marshmallow	Did your marshmallow begin to melt?	
Chocolate	Did your chocolate melt?	

MATERIALS

What was the purpose of the plastic wrap?

What was the purpose of the foil?

What was the purpose of the newspaper?

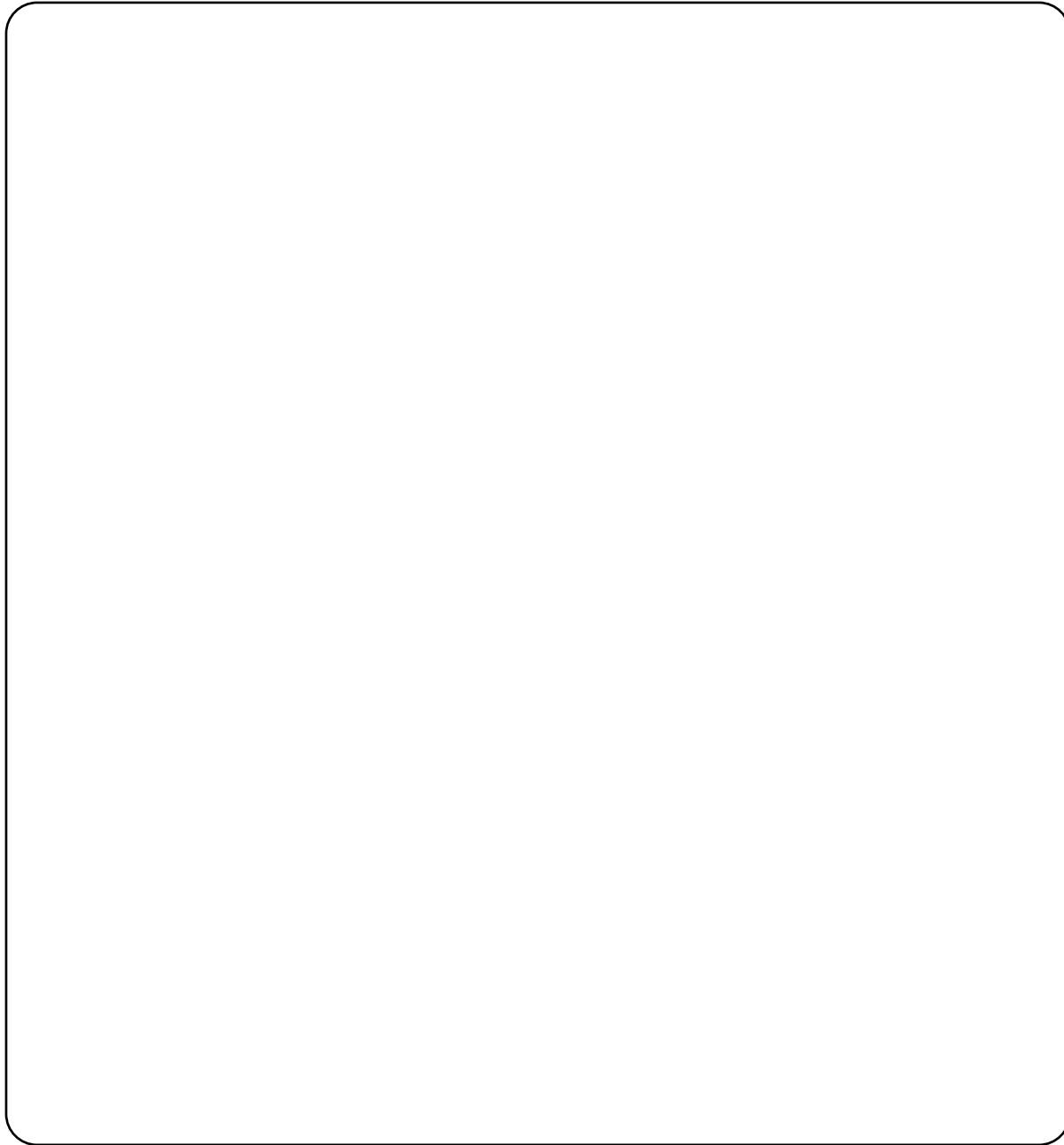
What was the purpose of the black paper?

IMPROVEMENT

How do you think you could improve your solar oven so it could reach an even higher temperature?

MY SOLAR OVEN

LABELED SKETCH



REQUIREMENTS

COMPONENT	QUESTION	ANSWER
Time	Did you complete your solar oven in the time allotted?	
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IMPROVEMENT

How do you think you could improve your solar oven so it could reach an even higher temperature?

MATERIALS

What was the purpose of the plastic wrap?

What was the purpose of the foil?

What was the purpose of the newspaper?

What was the purpose of the black paper?

Graphics

