

# SOLAR S'MORES

## OR HOW TO BUILD A SOLAR OVEN!

Make a way to cook and keep the environment safe at the same time!

### How Do Solar Ovens Work?

Solar ovens use light from the sun to cook food. Something reflective like foil is used to direct as much light as possible into the box where the food will be cooked. The light hitting the inside creates heat that is trapped by layers of clear material like plastic wrap.

On a hot sunny day this oven could raise the inside temperature to 200 °C, easily hot enough to cook s'mores.

### Supplies Needed:

- Pizza box (*It's always better to reuse than recycle!*)
- Ruler
- Felt marker
- Aluminum foil
- Box cutter
- Glue
- Scissors
- Clear plastic wrap
- Tape
- Black construction paper
- Straw

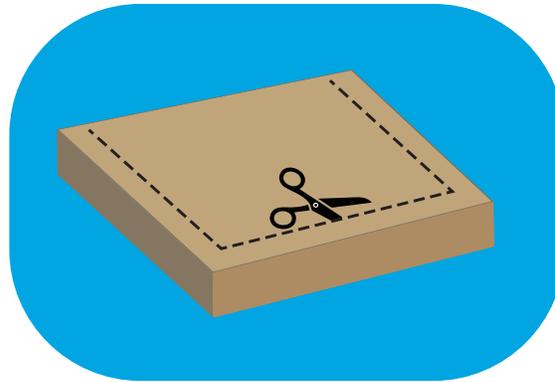


### Step 1

Collect all of your supplies!

### Step 2

On the top of the lid, measure 2 cm from the front and each side. Draw a square so that it touches the back side of the lid.



### Step 3

Cut the front and two sides of the square, leaving the back edge attached. This will make a flap that folds up.



### Did You Know?

Plants use sunlight to make their food (called photosynthesis).

Animals get their energy by eating the plants.

Sunlight makes heat energy that drives ocean currents, wind and weather!

In fact, nearly all energy on Earth originates from sunlight.

Powerful stuff!



### Step 4

Take a piece of foil and glue it to the inside of the flap you just made, shiny side out.

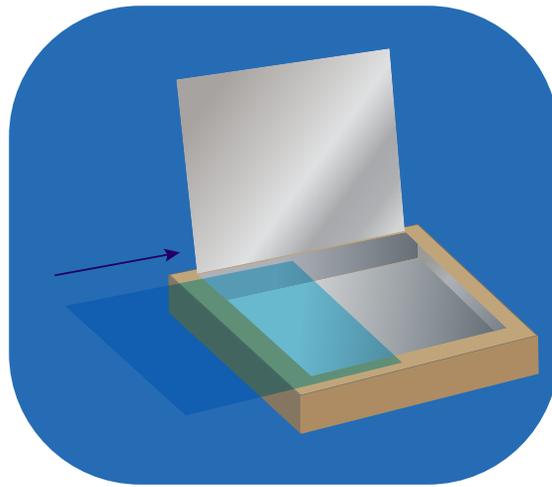
Glue more foil to the inside of the box so it is also covered, shiny side out.



### Step 5

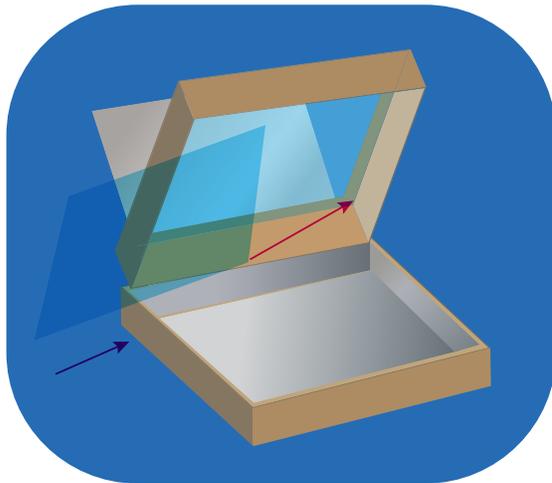
Next you are going to make a “double pane” window.

Tape a piece of plastic wrap to the lid of the box, completely covering the hole you made when you cut the flap.



### Step 6

Close the top and tape a piece of plastic wrap to the outside part of the window.



### Did You Know?

Light travels through space to Earth as a wave.

When this wave of light shines on something, it causes the molecules to start vibrating faster. When this happens, it makes more heat!

Just like when you rub your hands together quickly. Try it! Feel them heating up? This is what sunlight does to tiny molecules.

Something lightly colored, such as snow reflects most of the light that touches it, keeping it cool.

Dark colored things absorb most of the light that touches them, so very little is reflected. This means the molecules vibrate more and make more heat.

## Step 7

Cut your black paper to size and lay it inside the bottom of the box.

The black construction paper helps to absorb the sun's heat!

Attach a straw (or other stick) to hold the lid open as shown.



## Step 8 - Get Cooking!

Place your oven in the sun and put your s'mores inside. Adjust the straw to help angle the sun into the oven. Watch and enjoy!

## Did You Know?

Your solar oven works like a greenhouse, the **transparent** plastic allows sunlight in and helps trap the heat.

The black construction paper helps **absorb the light** and make more heat.

The aluminum foil **reflects the light** onto the food.

On a hot sunny day this oven could raise the temperature up to 200 °C.

## CHALLENGE!

What else could you cook in your oven?

How hot does it get if it is cloudy?

Is morning or afternoon better, what about direct or indirect sunlight?

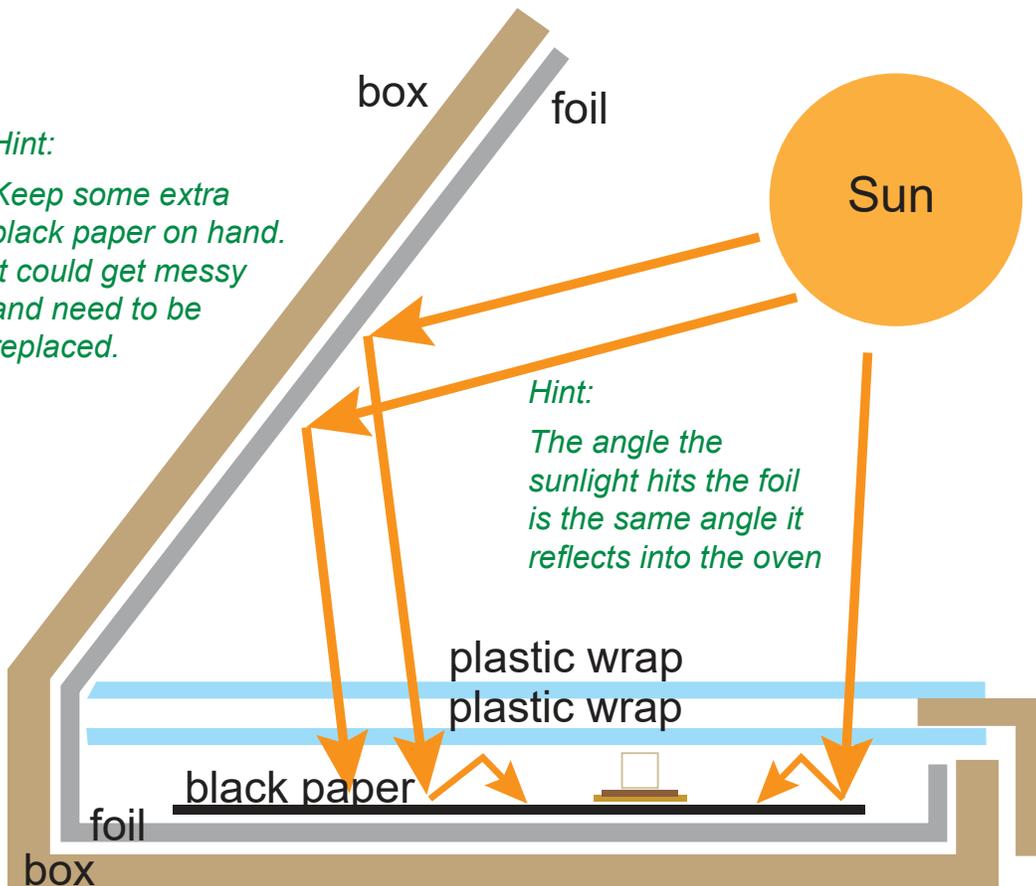
What other materials could you use for a solar oven?

### Hint:

Keep some extra black paper on hand. It could get messy and need to be replaced.

### Hint:

The angle the sunlight hits the foil is the same angle it reflects into the oven



# Solar Oven Experiment: Will Clouds Make a Difference?

*(optional - takes 2 days, 1 hour per day)*

**An experiment is testing an idea (hypothesis) to see if it is correct.**

**In science it is important to have something to compare with so we know when things change - this is called a base line.**

**PART 1** Cook some food on a hot sunny day, in direct sunlight.

We will compare future experiments to this, so it is important to write down what you do. Record these in the chart at the bottom of the page:

- Time of day
- Where you placed your oven
- Type and size of food
- How long it takes to cook your food
- Use a thermometer to test temperatures
  - Temperature outside °C
  - Temperature inside the box °C

Any other observations (things you saw, felt, smelled, heard or tasted):

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Make a hypothesis. Do you think it will cook faster or slower on a cloudy day? \_\_\_\_\_

What else do you think you could cook in your solar oven? \_\_\_\_\_

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**Pro Tip!** Take photographs of the temperature, time of day and angle of the sun on the ground, as an easy way to record this information.

**PART 2** On the next cloudy day do the experiment again the exact same way including:

- Time of day
- Where you placed your solar oven
- Type and size of food

Record the same information as before in the chart below.

**It is important to only change one thing (variable) in an experiment so you know what is causing the difference.**

**PART 3** What did you find out? Did it cook as well as the first time? Explain why you think it did or did not. Look at some of the hints on the Activity Sheet where it says “Did You Know?”.

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How about building a BIG solar cooker?

(Wikimedia)

**CHALLENGE!** Try changing the design of the oven, could you use different materials? Try different foods and even make a solar cook book.

Experiment	Time of Day (keep this the same)	Cook Time (keep this the same) Min.	Outside Temperature °C	Inside Pizza Box Temperature °C
Part 1 - Sunny Day				
Part 2 - Cloudy Day				