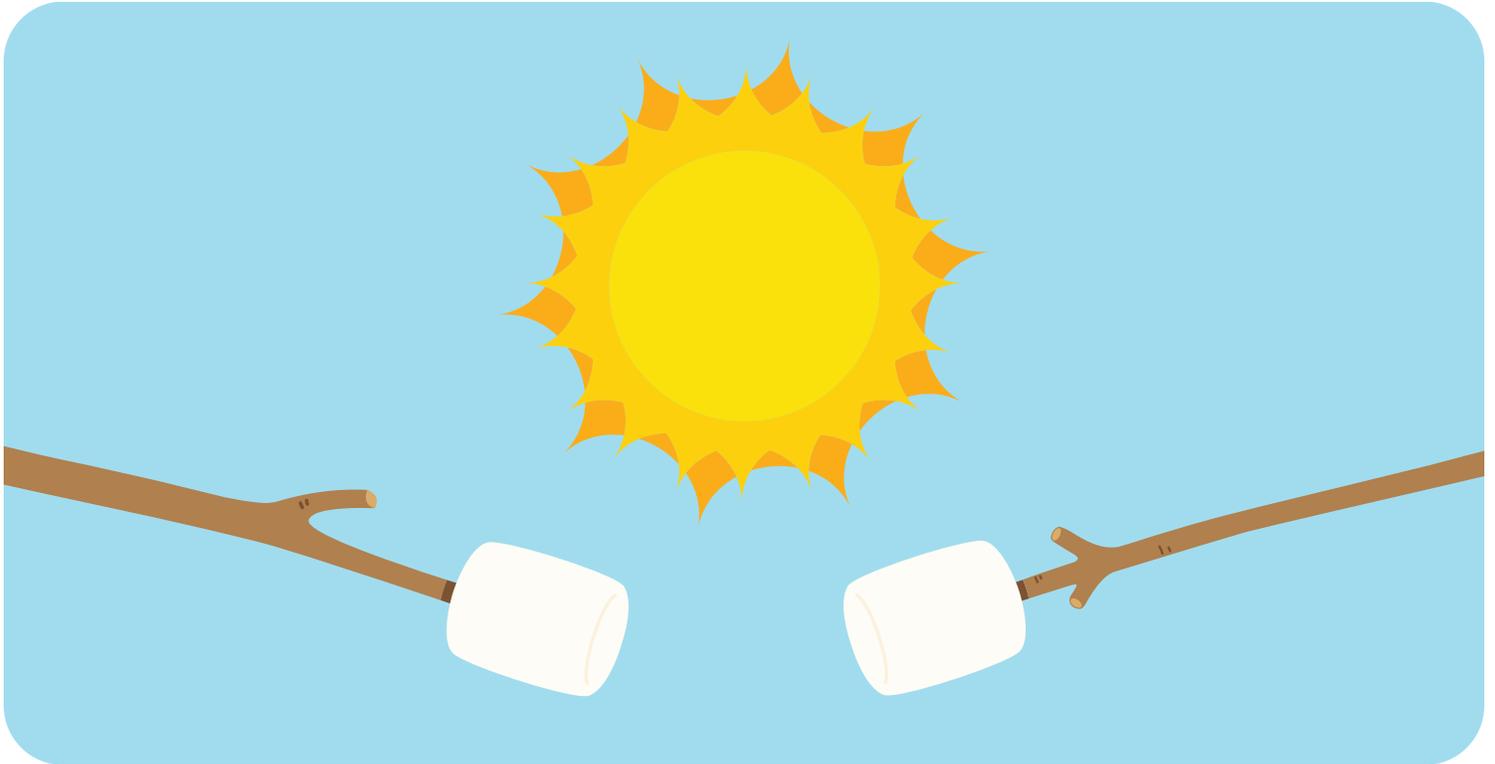




**Who says all the fun has to happen at The Tech Interactive?  
This science activity introduces the concepts of solar radiation  
and energy, while producing a tasty treat!**



## Introduction

How would you cook if you did not have a kitchen or electricity? A campfire is a good alternative, but that could be dangerous or have negative effects on the environment. Can you think of other natural and clean sources of energy? That's right, the sun is one!

In this activity, you will engineer a solar oven using some basic kitchen supplies, construction paper and a box. The oven takes approximately 40 minutes to build, with an additional hour of "cooking" in a sunny spot. This hands-on introduction to solar energy and radiation is fun for the whole family — and tasty because it results in s'mores!

## Fun Fact!

In 1767, the first solar oven was invented. The credit goes to Horace de Saussure, a Swiss physicist, who probably had no idea his invention would help people prepare their dinner two and a half centuries into the future. For more information on how solar cookers are used today, visit [solarcooking.fandom.com/wiki/India](http://solarcooking.fandom.com/wiki/India)

## Subject:

Engineering Design,  
Physical Science  
(Solar Energy)

## Ages:

8-13

## Time:

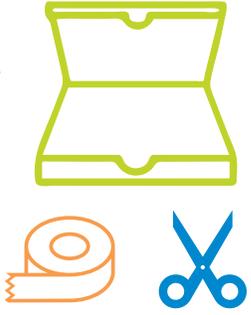
40 minutes to build,  
1 hour to "cook"

## Key concepts:

Solar radiation, solar  
energy, solar reflection,  
greenhouse effect

## Materials

In addition to your building materials, you'll need ingredients to cook with. While there are all kinds of recipes that can be cooked in a solar oven, our favorite is the classic s'mores.

Building materials	Ingredients for s'mores
<ul style="list-style-type: none"><li>• Pizza box or other small shallow box with a lid</li><li>• Dark construction paper</li><li>• Scissors</li><li>• Plastic wrap</li><li>• Aluminum foil</li><li>• Tape</li><li>• Glue stick</li><li>• Ruler</li><li>• <i>Optional: Oven thermometer</i></li></ul> 	<ul style="list-style-type: none"><li>• Graham crackers</li><li>• Chocolate</li><li>• Marshmallows</li></ul> 

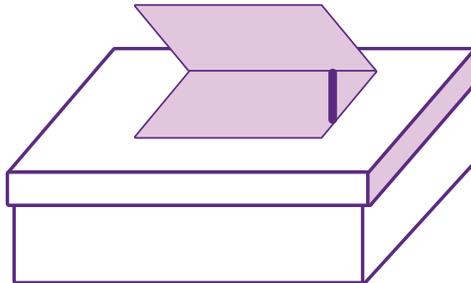
## How to build

**Step 1:** Cut a flap in the lid of the box, leaving an inch or two between the flap and the box edge. Fold the flap up so it is sticking out of the top of the box.

**Step 2:** Cover the inside of the flap with your foil to reflect sunlight into the box. Secure it with tape.

**Step 3:** Take off or open the top of the box. Glue black construction paper along the inside walls and bottom of the box. Put the lid back on the box, leaving the flap open.

**Step 4:** Cover the opening created by the flap with plastic wrap. It can be helpful to use multiple layers. Make sure it's tight across the opening and taped into place. If you have an oven thermometer, place it inside to easily watch your oven "preheat."



**Step 5:** Place all ingredients in traditional s'mores fashion inside the box and close the lid up tight. Locate a sunny spot outside and aim the foil coated flap so the sun reflects off it and into the box. You can use a ruler or stick to help prop it into place.

Your oven's set — now sit back, relax and let the sun do the work. In about 45 minutes to an hour, you should have a nice hot treat!

## Think about it!

Why did you use the:

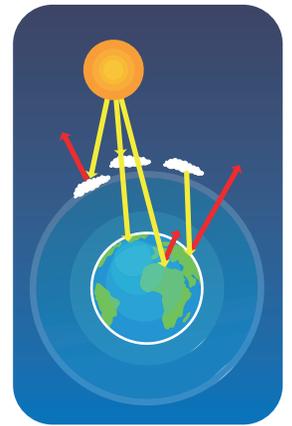
- Aluminum foil?
- Black paper?
- Plastic wrap?

How will each of these help cook your food?



## Greenhouse Effect

The phenomenon where the earth's atmosphere traps solar radiation, caused by gases in the atmosphere such as carbon dioxide, water vapor and methane. These gases allow incoming sunlight to pass through, but trap the heat radiated back from the earth's surface, making the earth's surface warmer.



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## Take it Further

- As your oven is heating up, graph the internal temperature of your oven. Using your thermometer, take an initial reading, and additional readings every 10 minutes for an hour. What do you notice? How can this be applied to our planet?
- Without adding food, try leaving the solar cooker out all day and check the temperature throughout the day. When was it the hottest? When was it the coolest? Why? You could also try putting the solar cooker in different areas and compare temperatures with locations.
- Try using different colored paper in the solar cooker. Which color got the warmest? Why? Which was coolest? Why? Graph the different temperatures and colors as a comparison.
- How can solar cookers/ovens make a difference? While waiting for your s'mores, research solar ovens and the impact they have in different communities around the world. Are there other ways they could be used in the real world?

## Student Observations

1. How many minutes did it take for your solar cooker to reach its warmest temperature? What part of your design do you think contributed to this?
2. What was the peak temperature for your solar cooker?
3. What changes could you make to your solar cooker to maximize the cooking capability? Can you make it get hotter? Cook bigger items? Cook in less time?
4. Finally, how good was your solar-cooked snack? What do you want to cook next?

Elapsed Time	Temperature and Observations
Start time (0 minutes)	
10 minutes	
20 minutes	
30 minutes	
40 minutes	
50 minutes	
60 minutes	

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