



Design a Solar Cooker

In this engineering activity, you will need to design a solar oven that gets hot enough to melt marshmallows and chocolate for s'mores.

Some solar ovens get hot enough to boil water, which happens at 212°F. For s'mores, you only need to get it a bit above 100°F, since chocolate melts around 90°F and marshmallow melts at a slightly higher temperature.

OBJECTIVE: Design a cooker that melts chocolate and makes marshmallows gooey for a perfect s'more. Consider what's best for the solar radiation to be reflected, concentrated, and trapped in your cooker. Also remember you will need a way to easily open and close your cooker to get your s'more in and out.

SUGGESTED MATERIALS

- ▶ Cardboard box
- ▶ Aluminum foil
- ▶ Plastic wrap
- ▶ Scissors or box cutter (requires adult assistance!)
- ▶ Tape
- ▶ Plate or item to hold the s'more
- ▶ Graham cracker
- ▶ Chocolate bar
- ▶ Marshmallow
- ▶ Thermometer
- ▶ Sunny day

INSTRUCTIONS

1. Draw up a plan of how to design your cooker.
2. Build your box, and get adult assistance with cutting. Add foil to reflect and concentrate the solar radiation. Add plastic wrap to trap in the heat.
3. Find a good location that receives direct sunlight.
4. Take some temperature readings. What is the outside temperature? What is the temperature if you leave the thermometer in the sun? What is the temperature inside your cooker before you put it in the sun? Record these so you can compare any changes.
5. You may want to leave your thermometer inside your box and read it through the plastic wrap.
6. Set up your graham cracker on your plate and add your marshmallow. Chocolate will melt faster than the marshmallow, so you will want to add the chocolate after the marshmallow has had a chance to warm up.
7. Now sit back and see what happens. Check the temperature every five minutes. On a sunny day the temperature may rise quickly.
8. Adjust your design if the temperature is not increasing,

NOTES

- ▶ What are some factors that affect how fast your cooker is heating up?
- ▶ How can you improve your design? Would it work better with a bigger, smaller or different shaped box?
- ▶ If you come up with new ideas, try it! You can have multiple cookers going at the same time. And more yummy s'mores to eat in the end!