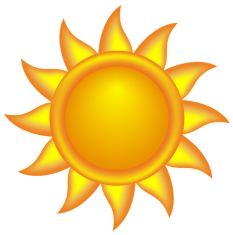
Energy From the Sun:
Let's Get Cookin'!

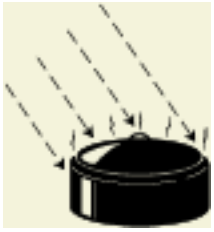
As we learned during our Four Sphere's Unit, the Earth's atmosphere reflects some of the sunlight that reaches our planet. However, much of the Sun's energy reaches the surface of the Earth as heat and light. This week, it's time to harness some of that energy! Your challenge is to learn a bit about solar cookers, then decide how your group will craft its own solar cooking device.

How Solar Cookers Work:

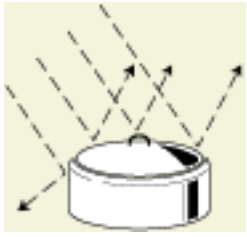


Most solar cookers work by converting sunlight into heat energy that is then used for cooking. The "fuel" for these ovens is sunlight, so a solar cooker needs to be placed in a spot where it will be exposed to direct sunlight for several hours. As you might imagine, solar cookers are not useful at night or on cloudy days.

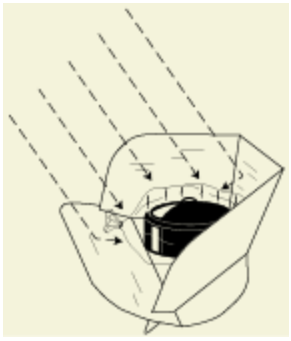
Since dark-colored surfaces tend to absorb more heat energy while light-colored surfaces reflect it, most solar cookers avoid light surfaces. However, surfaces that reflect light ***into*** the cooker ***are*** beneficial. Look at the diagrams below and think about what the arrows are demonstrating.

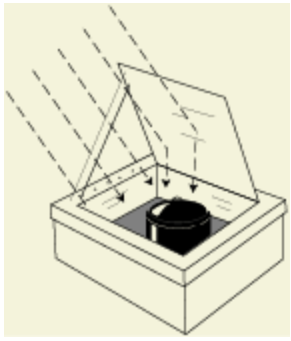


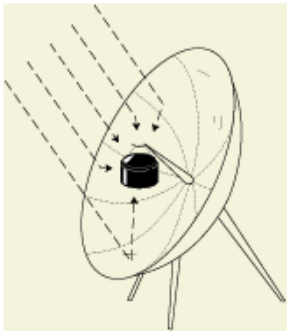
Dark colors absorb



Light colors reflect







Notice the different ways reflective surfaces are used to guide light into the cooking area.

When it enters the oven, the energy of the sun heats the interior. Sunlight, both direct and reflected, usually enters the solar box through a glass or plastic top. The more directly the glass or plastic faces the sun, the greater the solar heat gain. Single or multiple reflective surfaces can be added to bounce additional sunlight through the glass to increase internal temperatures.

According to Solar Cookers International, there are three main types of solar cookers: box cookers, curved concentrator cookers, and panel cookers. Take a look at each type below. (All content is from solarcookers.org)

Box Cookers

Box cookers cook at moderate to high temperatures and often accommodate multiple pots. Worldwide, they are the most widespread.

Curved Concentrator Cookers

Curved concentrator cookers, or "parabolics," cook fast at high temperatures, but require frequent adjustment and supervision for safe operation. Several hundred thousand exist, mainly in China. They are especially useful for large-scale institutional cooking.

Panel Cookers

Panel cookers incorporate elements of box and curved concentrator cookers. They are simple and relatively inexpensive to buy or produce.

Look at the solar cookers on the following pages. What makes a good solar cooker? Talk about these features with your group mates.

Now...It's Time to Plan and Build!

Based on your observations, what kind of materials could you use to make a solar cooker? These must be things you can get access to at home or at school. Your cooker must have enough cook space to bake one cookie for each group member.

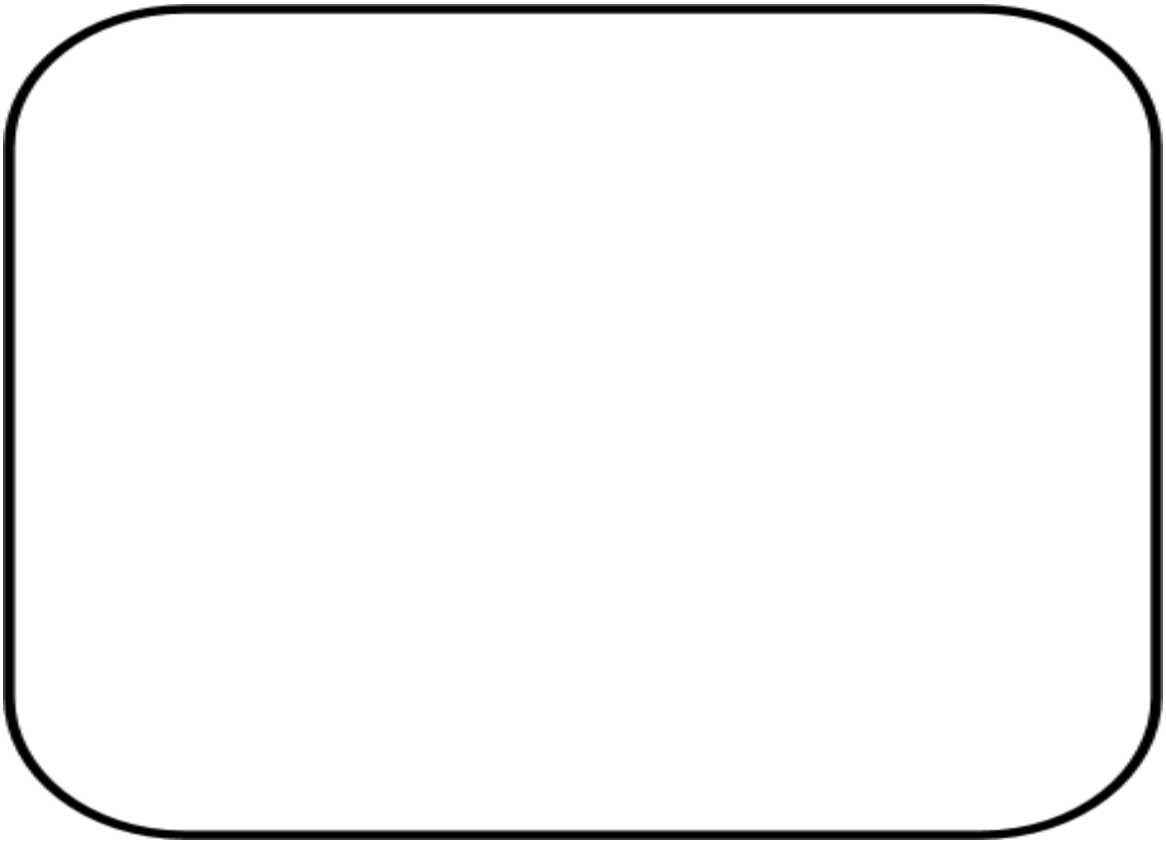
_____

_____

_____

_____

Draw a picture of your solar cooker in the box below. Label all the parts.



Why did you choose this design?

_____

_____

It's Cookie Time!

Once you've built your solar cooker, it's time to test it out! Ask your teacher for your cookie dough, arrange it in your solar cooker, then watch as the Sun bakes you a cookie!

How long did it take to bake your cookie?_____

Did other cookers bake cookies faster than yours? _____

If yes, why do you think the other cookers were more efficient? _____

_____

_____

If no, what features of your cooker do you think made it so efficient? _____

_____

_____

If you built another solar cooker, what features of your design would you change? Why? _____

_____

_____

_____

_____

_____

_____

_____

_____

_____