Related Standards:

4-PS3-2, 4-PS3-4, 5-PS1-3, MS-PS1-4, MS-PS3-3

Record your observations?

Create a chart to record the temperature details along with observations of the item you are cooking inside. This will vary according to factors like the outside temperature, how high the sun is in the sky and the angle of your reflector in relation to the sun.

Solar Energy: *Solar Oven*

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Materials:

- ❑ Cardboard box (take-out pizza box, shoe box, etc.)
- ❑ Aluminum foil
- ❑ Plastic wrap
- ❑ 1-2 Sheets of black construction paper
- ❑ Box cutter
- ❑ 1-2 Wooden skewers/kabob sticks
- ❑ Hot glue/glue stick
- ❑ Permanent Marker
- ❑ Marshmallows
- ❑ Chocolate bars
- ❑ Graham cracker
- ❑ Plates (if desired)
- ❑ Packing tape
- ❑ Direct sunlight

Instructions:

1. Gather the cardboard box and marker, and draw a rectangle/square on the top of the box, making the back end of the rectangle/square on the same side as the back end of the box. Depending on the size of your box, make sure the sides are at least 2 inches from the edges of the box (if using a smaller box, at least 1 inch from the edges of the box).
2. Next, cut the traced rectangle/square with the box cutter, leaving the back end of the rectangle/square still attached to the box. The other three sides should be detached from the box, allowing the cut flap to open in the same direction as the box opens.

Solar Energy: *Solar Oven continued*

Instructions continued:

3. Take the aluminum foil and cut out enough foil to completely cover the inside of the box. The base, sides, and the rectangle/square that you cut should be completely covered in aluminium foil. When you've measured the right amount of foil needed, cut the foil and glue the cut pieces onto the designated areas within the box.
4. Next take the sheet of black construction paper and tape the edges of the paper onto the base of the box in, centering the sheet in the middle. The paper should be taped on top of the aluminum foil. Use as much tape as needed to secure the paper onto the foil.
5. After that, gather the plastic wrap and open the box. Measure how much plastic wrap is needed to cover the entire opening where the the rectangle/square flap was cut.Once measured, cut the plastic wrap and tape the plastic onto the opening. Make sure the plastic wrap is secured tightly and no holes puncture the plastic. No air should escape the oven which will cause the heat to become trapped in the oven.
6. Next, close the box, open the flap, and puncture a hole in the box near the edge of the opening and puncture another hole near the edge of the flap on the same side as the hole in the box. Fasten the skewer within the punctured holes and the flap should be standing open on its own.
7. After, prepare a s'more, or a few, open the "oven," and place the finished product(s) onto the black sheet. For the best results, place the marshmallow on the graham cracker, then the chocolate, since the marshmallow takes longer to melt. Close the oven, make sure the flap is propped open, and place the oven in an area where the sunlight/light will directly shine onto the box.
8. The s'mores can take about 30-60 minutes to fully cook. The time can vary due to the amount of sunlight/light exposure and amount of heat at the present time. You can even place a thermometer inside the oven to track how high the temperature of the oven reaches. Once the time is up, take the s'mores out, place another graham cracker on top each one, and enjoy!

What's the science behind it?

The energy from the sun shines onto the foil and become absorbed and trapped in the box through the black sheet and concealed by the plastic wrap. The heat from the sun remains in the oven, which then can heat up to over 200° F depending on how long the oven remains in the sun! When you take out your smores they should be cooked to perfection!