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Science Experiences That Come To You

Solar Oven S'Mores

Ingredients & Supplies:

- Pizza box
- Two clear sheet protectors
- Black construction paper (2-4 sheets)
- Duct tape
- Clear packing tape
- Box cutter
- Scissors
- Wooden skewer
- Elmer's glue
- Aluminum foil
- Ruler
- Pen

Instructions:

Everyday, we use energy to heat up and cook food. Yes, you can turn on the oven or microwave to heat food. But this science activity will show you how to heat food in your own backyard! With just a pizza box, aluminum foil, and some household materials, you can create a solar oven that uses thermal energy to heat one of the best outdoor snacks – s'mores!

Ask an adult to help you create a solar oven. (You will need assistance when cutting the pizza box.) For this activity, you will need a pizza box, two clear sheet protectors, 2-4 sheets of black construction paper, duct tape, packing tape, box cutter, scissors, wooden skewer, Elmer's glue, aluminum foil, a ruler, and a pen.

First, you will need to draw a square on the lid of the pizza box. Use the ruler to measure 1-2" from the sides of the box. Each side of the drawn square should be 1-2" from the box edges.

Ask an adult to use the box cutter knife to cut along 3 sides of the square. **Do NOT cut the side where the lid connects to the bottom of the box.** You want the pizza box to open and close.

Next, you will line the inside of the pizza box with aluminum foil. Measure and cut a square of aluminum foil that covers the bottom of the box. Next, measure and cut a square of foil that covers the bottom of the flap that you cut. (Think of the



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box as a mouth that opens and closes. You want the inside of the mouth to be covered by aluminum foil.)

Apply Elmer's glue to the bottom of the box lid. Carefully, lay the aluminum foil down so that it covers the entire flap. Now apply glue to the bottom of the box. Lay down the foil.

Next, measure and cut the black construction paper into a square that is 1-2" smaller than the edge of the aluminum foil on the bottom of the box. Use the clear packing tape to attach the black construction paper to the aluminum foil on the bottom of the box. (You should see the aluminum foil surrounding the black construction paper.)

Tape the 2 sheet protectors together along the long edges to make 1 larger sheet protector. Tape the sheet protector to the bottom of the pizza box. (Not the flap.)

Ask an adult to use a wooden skewer to poke 2 small holes on the lid and the bottom of the pizza box. The top of the wooden skewer will attach to the lid, and the bottom of the skewer will attach to the bottom of the box. The wooden skewer will be between the top and bottom of the box.

You have created a solar oven!

Now it is time to make your s'mores. You need graham crackers, chocolate bar, and some marshmallow. Construct your s'more and set in inside the solar oven. Place your solar oven in a sunny spot. You want the Sun's rays to hit the aluminum foil on the lid and reflect onto the bottom of the oven. The energy will move back and forth creating thermal energy – heat. The s'more will slowly heat up and melt your marshmallow and chocolate! This may take a while, so have fun playing outside as your outdoor snack melts from the Sun's energy.

The Science Behind It:

When you hear the word "summer," what pops into your head? Swimming, the beach, waterslides, popsicles, playing outside, and of course, the Sun! We are able to go outside and have fun during the summer because it is hot. What causes this temperature change in the summer? The Sun! The Sun has amazing qualities that provide the Earth with energy.

The Sun is an enormous celestial body in outer space. The surface of the Sun is around 10,000°F while the core is more than 18 million°F! The Sun is actually a giant ball of Hydrogen and Helium gas that produces this immense heat. The



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heat is created by a process called *nuclear fusion*. When the nuclei of two hydrogen atoms fuse together, it actually creates one helium atom. The nuclear fusion produces two different types of energy that are extremely important to life on Earth – *thermal energy* and *radiant energy*.

Radiant energy is sent out from the Sun as *rays*. Most of this energy gets sent out into Space. However, Earth receives a small fraction of the Sun's rays. Some of the rays bounce off the Earth's atmosphere and reflect back into Space, but most of the radiant energy reaches Earth's surface.

Thermal energy is heat. This is why the Sun is extremely hot! Thermal energy is vital to life on Earth. When energy from the Sun hits an object, the atoms of the object begin moving faster creating more thermal energy. Think about when you move faster, your body warms up. When you run, you get really hot! Do you get hotter when standing in the shade or the sun? Definitely the Sun! This is because the atoms inside your body start moving faster from the Sun's energy.

Temperature is the degree of heat intensity of a substance. In fact, temperature is the measure of thermal energy. When an object heats up, its tiny molecules begin to bounce around. This is just like when you move. The faster you move, the hotter you get because the molecules that make up your body are bouncing around very quickly! When you jump into a cold pool, your body temperature decreases because the molecules slow down.