LET THE FUN BEGIN AND MAKE A SOLAR (SUN) S'MORES OVEN.

(S'more is short for wanting "some more.") Modified from Make S'mores With a Solar Oven! | NASA Climate Kids

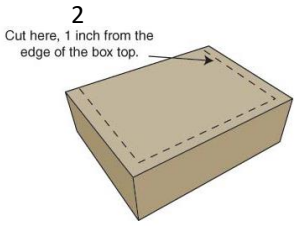
TERMS TO KNOW (MORE TERMS ARE ON THE LAST PAGE. TERMS ARE IN **BOLD.**)

Absorb: to soak up or take in
Insulation: material used to reduce heat loss (Your jacket is insulation. It keeps your body's heat close to you.)
Reflect: to bounce off a surface
Heat: a form of energy
Temperature: a measurement of hotness or coldness
Thermometer: A tool to measure hotness or coldness

MATERIALS LIST: *Unless noted, images are from* Make S'mores With a Solar Oven! | NASA Climate Kids

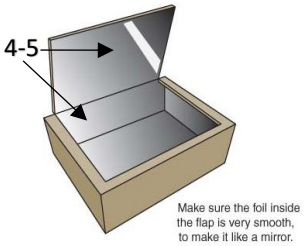
- Cardboard box with an attached, hinged lid, like a shoebox or pizza box
- Aluminum foil
- Plastic wrap
- Black construction paper (any dark paper will work)
- Newspaper
- Glue stick or white glue
- Transparent tape
- 1 twelve-inch stick, skewer, knitting needle or ruler to prop up flap in the lid
- Ruler or straight-edge to draw cutting lines
- Box cutter or Xacto knife (**with adult help!!!**)
- Optional: something to heat up—pizza or s'mores (s'more ingredients: graham cracker square, thin chocolate square, marshmallow)
- Optional: **thermometer**

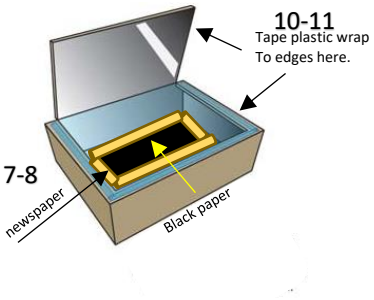
DIRECTIONS: *Numbers on pictures match the number of a direction.*

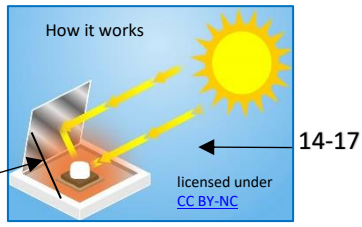


1. Start with a hinged pizza or shoe box folded into its box shape.
2. **With adult help** use a straight edge or ruler as a guide to draw and then cut a 3-sided flap out of the top of the box, leaving a 1-inch border around the three sides. DO NOT cut the hinged edge of the box.
3. Gently fold the flap back along the UNCUT hinged edge to make a crease.
4. Wrap the inside of this flap with aluminum foil. Tape the ends of the foil on the outside of the flap, making the foil as smooth as possible—the more mirror-like the foil , the better. TIP: It might help to dab glue on the cardboard first, then wrap the flap with foil. (See the image on the next page.)

5. If using a pizza or shoe box that can be flattened, open the box so it's completely flat and line the entire rest of the inside of the box with aluminum foil (flap already done). Glue the cardboard first and make it as smooth as possible. If the box is not able to be flattened, do the best you can to cover EVERY inch of the inside with foil.
6. Refold the container into a box shape again.
7. Glue a black piece of construction paper to the bottom of the box, on top of the foil. (It **absorbs heat**.)
8. Roll up and tape newspapers into 1-inch rolls and fit them into the bottom edges of the box. Tape them in place if needed. (They will be used for **insulation**.)
9. Cut 2 pieces of plastic wrap 2 or 3 inches larger than the opening cut in the box.
10. Wrap and tape one piece of plastic wrap to the underside of the flap, over the foil. After taping one side, be sure to pull the plastic wrap tight, and then tape down all **4** sides. A helper would be useful. Remember to tape/seal the hinged end of the plastic wrap to the foil inside of the box.
11. Tape the other piece of plastic wrap over the box opening. Making sure the plastic wrap is tight, then tape down all **4** sides making a good seal. **CAUTION**: if you are unable to open the box BEFORE this, put your food inside before you wrap the opening in plastic!
12. If you want, open the box as you normally would, and insert some food inside to heat up. Don't let your food touch the plastic wrap, though. For that reason, if you're heating s'mores in a pizza box, maybe separate ingredients into two layers: graham cracker with chocolate, and graham cracker with a marshmallow; side by side not stacked.
13. If you have a **thermometer** but not food, just place a **thermometer** inside the box. Do you think the **temperature** will change from the time you put it in, until later? If yes, how much? Why?
14. If you haven't food or a **thermometer**, wait 30-60 minutes and gently feel the heat on the plastic and the bottom of the box.
15. Take the box outside on a nice sunny day. Open the flap and turn the box so the foil on the flap is facing the Sun. Move the flap gently up and down to see how the Sun **reflects** off the foil into the box. NOTE: If it's cold, but clear and sunny outside, put a towel or blanket under the box for added **insulation**.
16. Find the best angle to get the most **reflect**ed sunlight into the box.
17. Use a stick or ruler to prop up the flap so that it bounces sunlight into the box. You will probably need to tape it in place. Now be patient. You might have to wait 30 minutes or more before you have s'mores, longer for warm pizza.







For fun, experiment with different sized boxes to see if there's a difference in temperature and cooking time.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