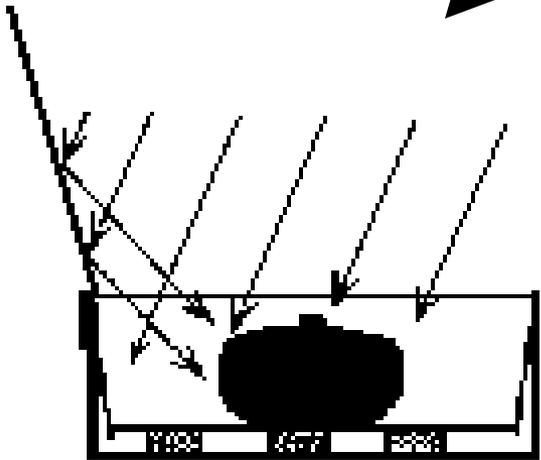
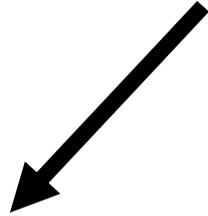
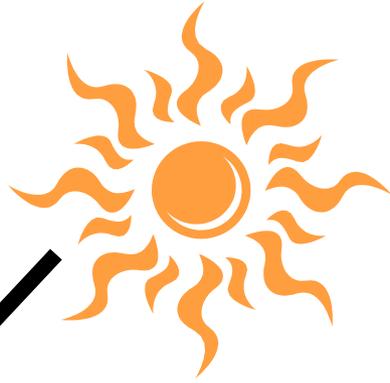


The sun provides enough energy in **one hour** to.....?

**WHAT DO YOU
THINK?**

Solar Ovens



Slide [Show](#)

Assignment:

Build a solar oven out of the materials listed below.

- One pizza box
- Black Paper
- Clear Plastic
- Aluminum Foil
- Glue
- Tape (on outside only)
- Scissors
- Ruler
- Marker
- String

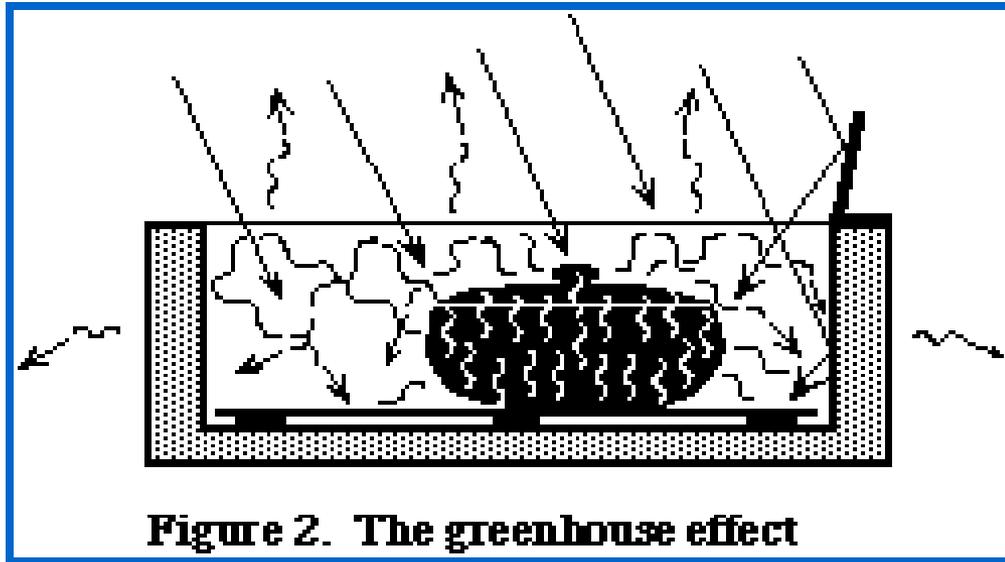
Optional Items:
(provided by you)
Cardboard
Oven thermometer
Plexi-Glass
Mirrors
Things to bake

Grading

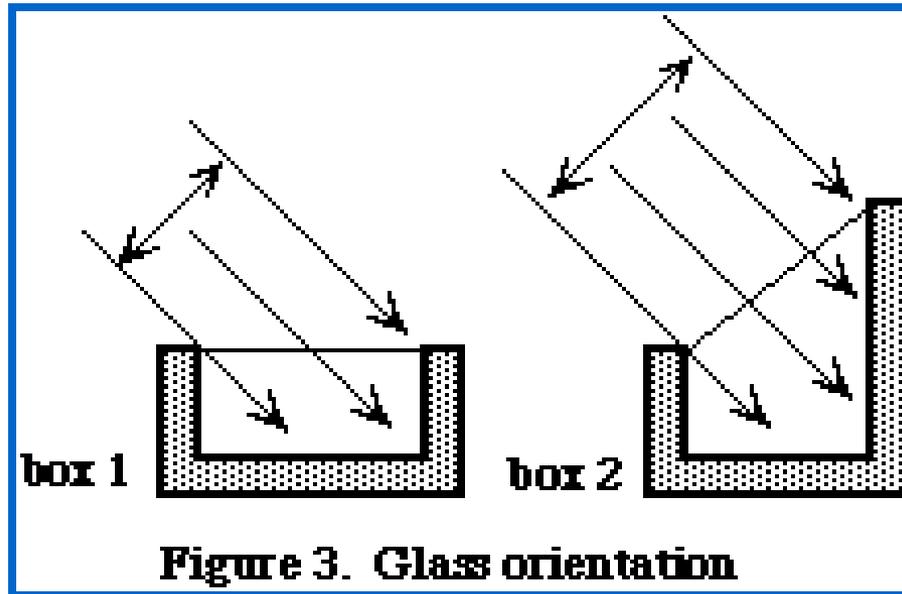
Your oven must demonstrate the knowledge of these three concepts.

- Heat Gain
- Heat Loss
- Heat Storage

Greenhouse effect



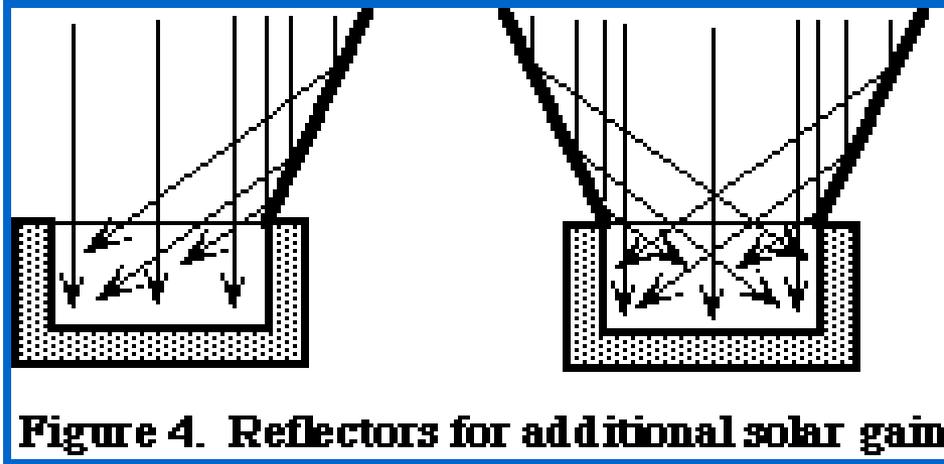
This effect results in the heating of enclosed spaces into which the sun shines through a transparent material such as glass or plastic. Visible light easily passes through the glass and is absorbed and reflected by materials within the enclosed space



Glass orientation

The more directly the glass faces the sun, the greater the solar heat gain. Although the glass is the same size on box 1 and box 2, more sun shines through the glass on box 2 because it faces the sun more directly. Note that box 2 also has more wall area through which to lose heat.

Reflectors, additional gain

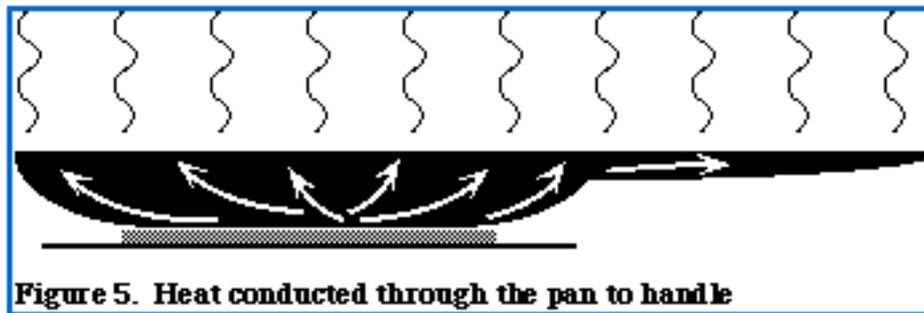


Single or multiple reflectors bounce additional sunlight through the glass, into the solar box. This additional input of solar energy results in higher cooker temperatures.

Heat loss

The Second Law of Thermodynamics states that heat always travels from high to low energy. Heat within a solar box cooker is lost in three fundamental ways: Conduction, Radiation, and Convection

Conduction



Conduction

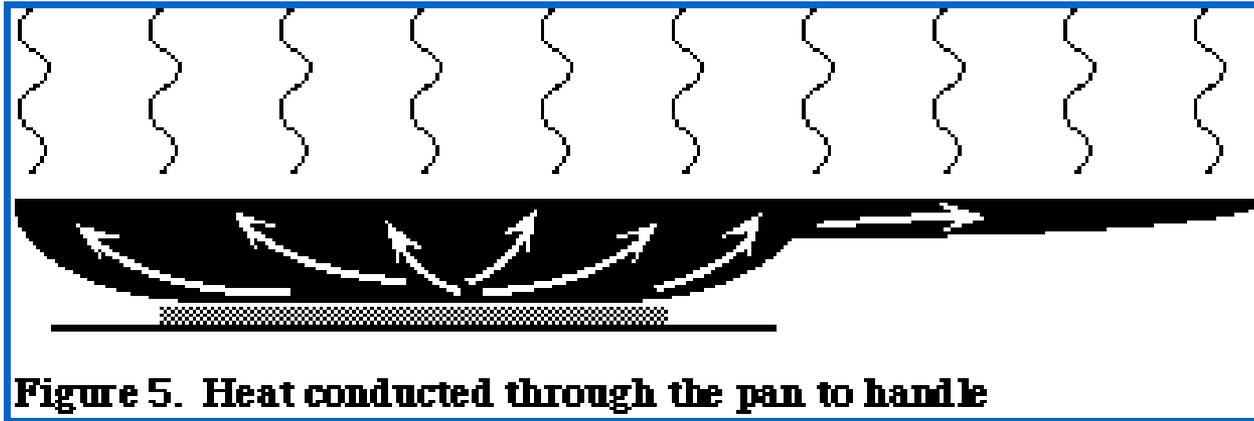
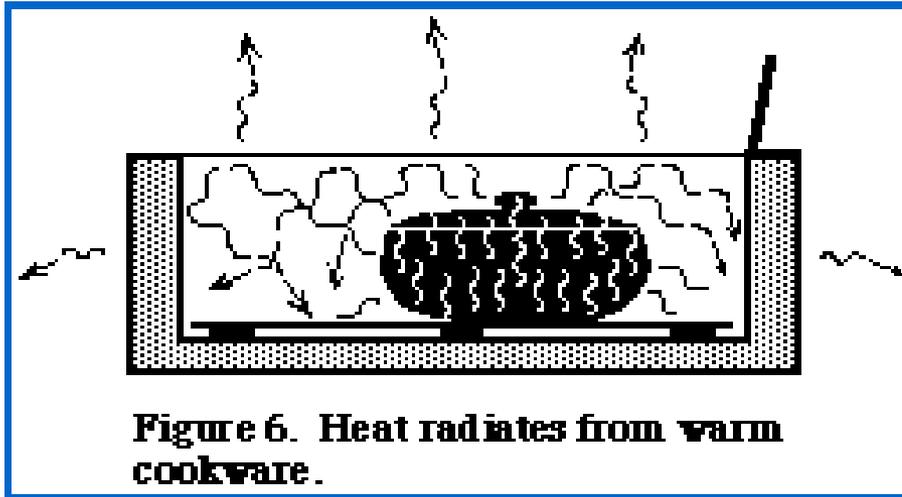


Figure 5. Heat conducted through the pan to handle

The handle of a metal pan on a stove or fire becomes hot through the transfer of heat from the fire through the materials of the pan, to the materials of the handle. In the same way, heat within a solar box is lost when it travels through the molecules of tin foil, glass, cardboard, air, and insulation, to the air outside of the box.

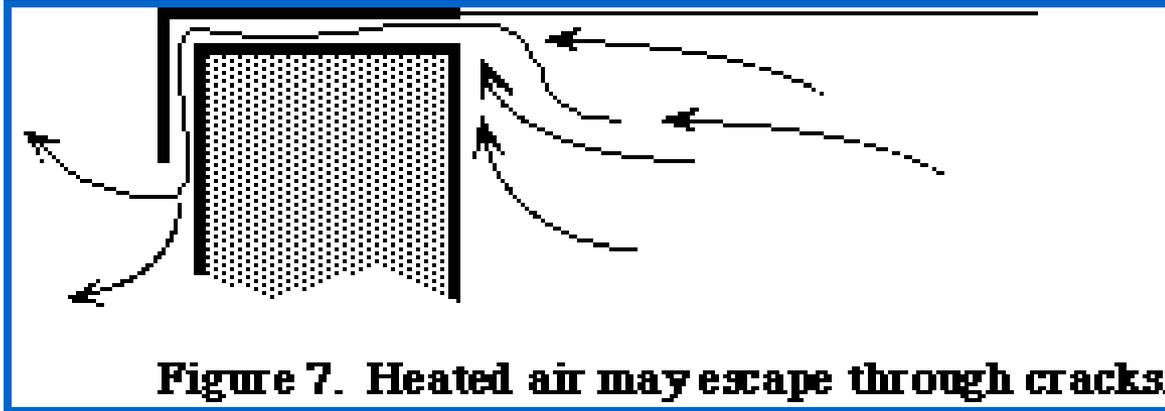
The solar heated absorber plate conducts heat to the bottoms of the pots. To prevent loss of this heat via conduction through the bottom of the cooker, the absorber plate is raised from the bottom using small insulating spacers as in figure 6.

Radiation



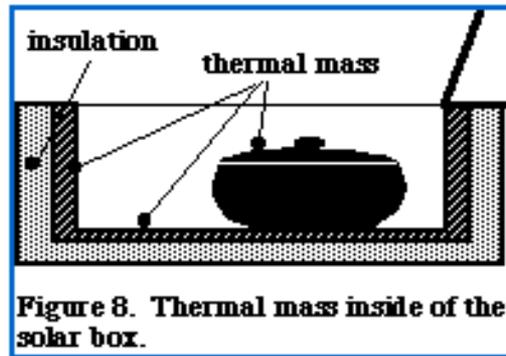
Things that are warm or hot -- fires, stoves, or pots and food within a solar box cooker -- give off heat waves, or radiate heat to their surroundings. These heat waves are radiated from warm objects through air or space. Most of the radiant heat given off by the warm pots within a solar box is reflected from the foil and glass back to the pots and bottom tray. Although the transparent glazings do trap most of the radiant heat, some does escape directly through the glazing. Glass traps radiant heat better than most plastics.

Convection



Molecules of air move in and out of the box through cracks. They convect. Heated air molecules within a solar box escape, primarily through the cracks around the top lid, a side "oven door" opening, or construction imperfections. Cooler air from outside the box also enters through these openings.

Heat storage



As the density and weight of the materials within the insulated shell of a solar box cooker increase, the capacity of the box to hold heat increases. The interior of a box including heavy materials such as rocks, bricks, heavy pans, water, or heavy foods will take longer to heat up because of this additional heat storage capacity. The incoming energy is stored as heat in these heavy materials, slowing down the heating of the air in the box.

These dense materials, charged with heat, will radiate that heat within the box, keeping it warm for a longer period at the day's end.

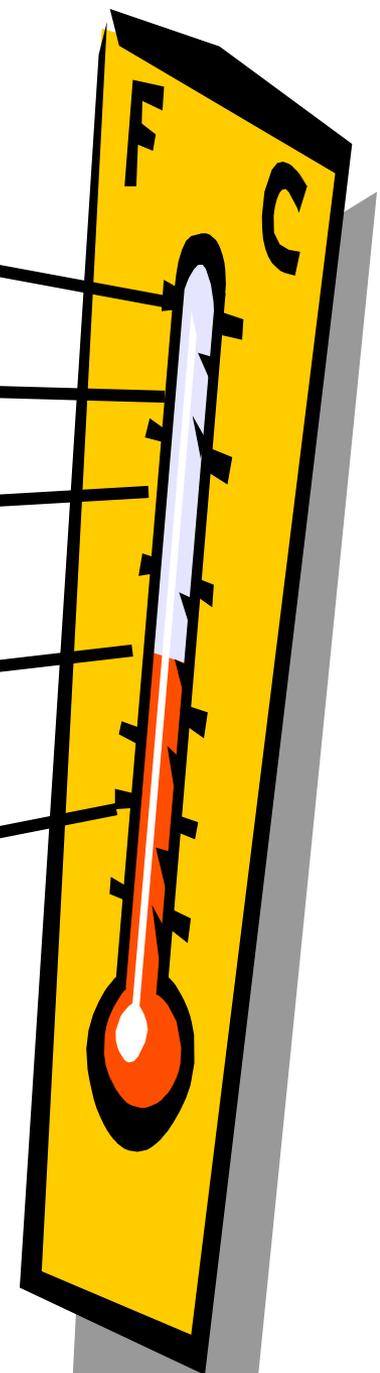
210 = A+

190 = A

180 = A-

160 = B+

159 and Below = B



Temperature must be recorded accurately on a excel graph to get credit for the project.

Groups

- Due to limited supplies groups must contain two-four students
 - Each member of the group is responsible for helping in construction the oven and developing graphs that show the success of the oven.

Follow any of the links below to begin your research on solar ovens

- [Solar Cooking Plans](#)
- [Pizza Box Solar Cooker](#)
- [Solar Cooking Tips](#)
- [Solar Cooking Documents](#)



If necessary you may search the web for any additional pages