

HOW TO MAKE A SOLAR OVEN/COOKER

OUTREACH LESSON PLAN



Working To Advance STEM Education for African Girls

WAAW Foundation is an international non-profit organization dedicated to bringing hands-on STEM education to girls all over Africa.

Our Mission: To increase the pipeline of African women in Science, Technology, Engineering and Math (STEM) disciplines and to ensure this talent is engaged in African innovation.

Our Vision: To eradicate poverty in Africa through female education and science and technology innovation.

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Solar Cooker/Oven

CLASS DESCRIPTION:

In this class, students would make a solar oven/cooker using locally sourced materials as they explore the basics of their previous knowledge on renewable energy.

***TOTAL CLASS TIME:* 1hr 15mins**

CLASS OUTCOMES:

- Students would be able to make the solar cooker/oven.
- They should be able to cook a raw meal (an egg in this case) with the solar cooker/oven.
- They should be able to understand the principle of operation of the solar cooker/oven.

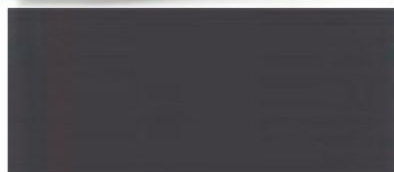
LIST OF MATERIALS

- Aluminum foil paper Thermocole 2 Box carton An egg
- Black paper Adhesive glue An aluminum plate

Aluminium foil



Carton



Black paper



Thermocole

PRE-CLASS PREPARATION

In preparation to teach this class, you should carry out the outlined procedure yourself so that you can familiarize yourself with various challenges the students may have during the class as well as preview the previous lesson plans on how the solar energy works.

INTRODUCTION (5 minutes)

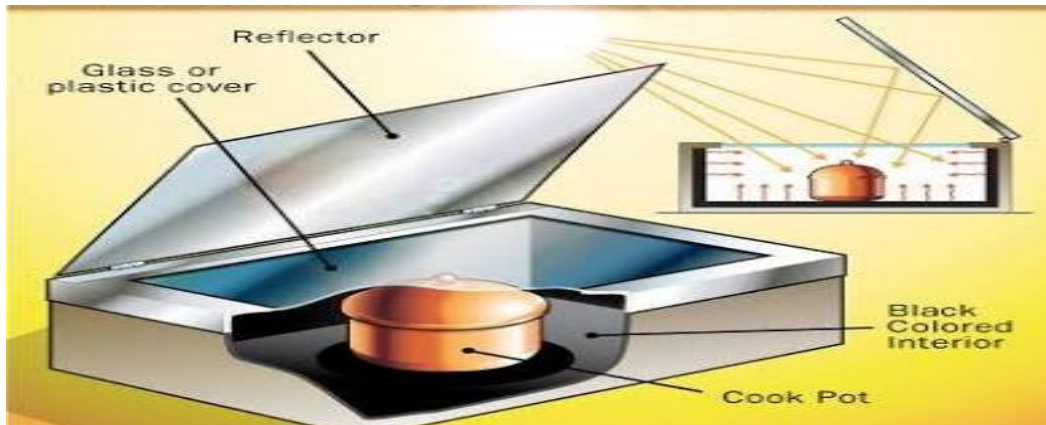
With the use of cookers and ovens, we can cook foods like meat, vegetables, beans, rice, bread and fruit in just about any way. We can bake, stew, steam, fry and braise. A solar cooker/oven can do the same things, but by using sunlight instead of gas or electricity.

Sunlight isn't hot in and of itself. It's just radiation, or light waves – basically energy generated by fluctuating electric and magnetic fields. It feels warm on your skin, but that's because of what happens when those light waves hit the molecules in your skin. This interaction is similar to the concept that makes one form of solar cooker/oven (the box cooker/oven which is one we consider in this class) generate high temperatures from sunlight.

The sunlight-to-heat conversion occurs when photons (particles of light) moving around within light waves interact with molecules moving around in a substance. The electromagnetic rays emitted by the sun have a lot of energy in them. When they strike a matter, whether solid or liquid, all of this energy causes the molecules in that matter to vibrate. They get excited and start jumping around. This activity generates heat. Solar cooker/oven uses a couple of different methods to harness this heat.

A solar cooker/oven is a device which is used directly under sunlight to cook foods, without using any conventional fuel like LPG, kerosene.

Aside the box cooker/oven, we have the parabolic type which converge heat to a single point



The box cooker/oven consists of an open-topped box that's black on the inside and has a piece of glass or transparent plastic that sits on top. It also has a reflector (flat, metallic or mirrored surfaces) positioned outside the box to collect and direct additional sunlight onto the glass.

PROCEDURE: (15 minutes)

- Cut out a piece of the thermocole the size of the base of the box that would fit the base.
- Glue the black paper to the one of the face of the piece and add glue to the other side then attach it to the box.
- Cut out another four pieces of the thermocole that would fit into the side of the box
- Then glue the aluminum foil paper to one face of each of the four pieces and glue the other faces to each sides of the box
- Cut off the top cover of the box and leave one side out so we can attach the reflector to it

Dark colors are better at absorbing heat, that's why the inside is glued to the black paper

HOW TO MAKE THE REFLECTOR

- Cut off three side of the other carton that are attached together
- Glue the aluminum foil to it surface as shown below
- Attach the reflector to box so it looks like the picture beneath.



EXPERIMENT (45 minutes)

The experiment which involves testing the cooker/oven by cooking a raw meal and make it cooked. To cook an egg for instance,

- Crack open the egg into the metallic plate
- Place the plate inside sitting on top of the black bottom of the box.
- Cover back the box with the glass top to prevent particles from entering the cooker/oven. Also, as the sunlight enters the box through the glass top, the light waves strike the bottom, making it scorching hot.

The box traps the heat, and the oven gets hotter and hotter. The effect is the same as what goes on in a standard oven: The food becomes cooked.

After about 30 minutes, we have the cooked egg as seen below.



CONCLUSION(10 minutes)

- Ask the students what better ways they could improve the already designed oven/cooker.
- Also ask them what they think would be the problem the design may have.

REFERENCES

To learn more, check out these sites:

https://en.wikipedia.org/wiki/Solar_cooker

<https://www.popsci.com/build-diy-solar-oven>

Solar Energy Lesson Plan

Ensure the students discuss their observations.

Let them state various ways these projects can solve problems.

Relate this lesson to various Real-world Applications.

The Key here is **problem solving**.

“Today’s Play is tomorrow’s Pay”

Instructors should always make more research to stay updated and become more proficient.