BrainStorm
STEM EDUCATION

STEM KIT

BUILD & LEARN
GUIDE

SOLAR OVEN

SUSTAINABLE MATERIAL

NO GLUE OR MESS

SAFE AND EASY USE

STEMIE AUTHENTICATED

PROJECT OVERVIEW

This lesson will go over renewable and nonrenewable energy, as well as sustainability. Students will learn about solar energy and how sunlight travels. The main objective of this lesson is for students to learn about what a solar oven is, the types of solar cookers, how a solar cooker works, and what contributes to using a solar oven successfully.

SAFTEY WARNINGS:

Please read all saftey warnings before use:

Choking Hazard: Small parts not for children under 6 years or any individual who have a tendency to place inedible objects in their mouths.

Surfaces may be hot, handle with caution and care.

Adult supervision required.

MATERIALS

Durable wooden construction pieces
Fresnel Lens
Thermometer
Plastic Mirror
Black Foil Tape
Air Dry Clay
O-Ring Fasteners

1

Note: If you can not break out a piece(s) by hand, use a small tool or screwdriver to punch and press them out. If you have no experience with tools, get help from an adult or someone with experience. If there are any burrs, points or rough spots do to breaking or cutting, smooth them with a piece of sand paper.

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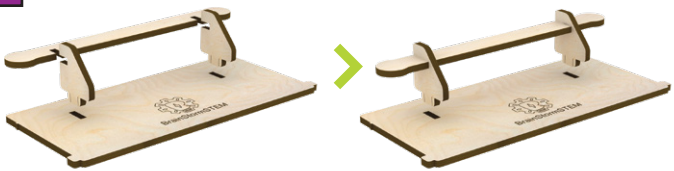

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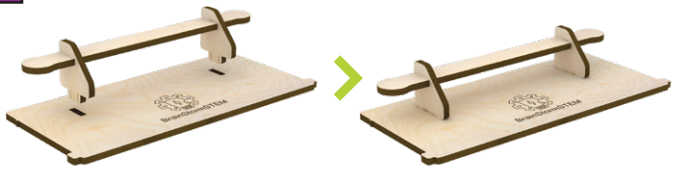

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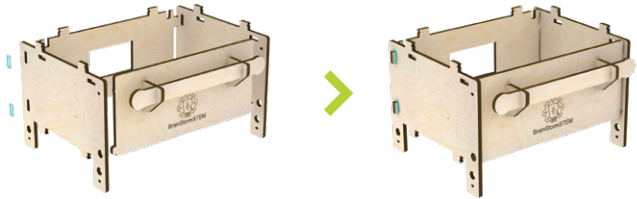

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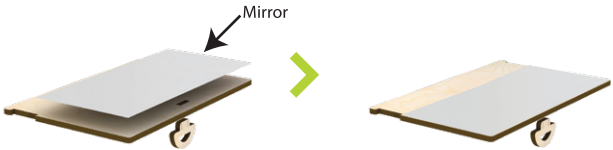

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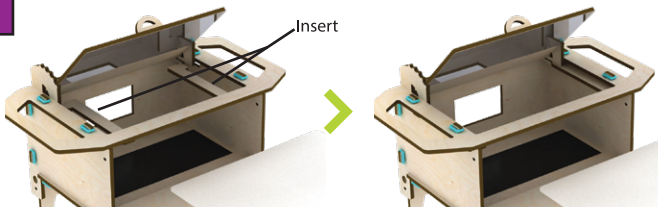

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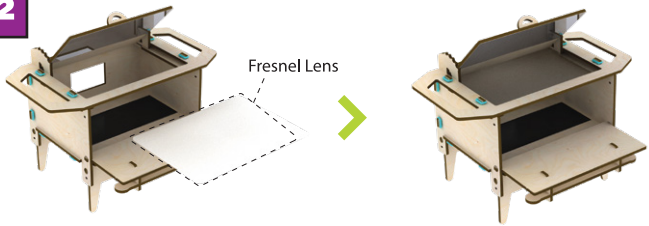

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HOW TO USE

1. MOLD THE CLAY

2. PLACE CLAY ART INTO OVEN

3. CLOSE LID / ANGLE MIRROR

4. PLACE SOLAR OVEN IN DIRECT SUNLIGHT

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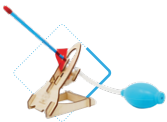
SOLAR RACER



ROCKETRY

EARTHQUAKE ENGINEERING

AND MORE!

TERMINOLOGY

SOLAR ENERGY

Light, heat, and other forms of energy given off by the Sun.

ELECTROMAGNETIC RADIATION(EMR)

The form in which sunlight travels; has varying frequencies and wavelengths.

RENEWABLE ENERGY

All energy that comes from a source that can be replenished faster than it is used.

NONRENEWABLE ENERGY

All energy that comes from a source that will eventually be depleted.

SUSTAINABLE ENERGY

Energy that serves society's short- and long-term needs without putting future generations or climate change at risk.

SOLAR OVEN

Also referred to as a solar cooker, is a device that uses direct sunlight to bake, cook, or pasteurize.

HUMIDITY

The amount of water vapor in the air.

WATER VAPOR

Water in its gas form.

SOLAR OVEN

RENEWABLE ENERGY

Renewable energy often referred to as "clean energy" is any form of energy that comes from a source that can be replenished faster than it is used. There are several types of renewable energy, these include wind, solar, geothermal, biomass, tidal and hydroelectric. Renewable energy has lower emissions than nonrenewable energy. Emissions are greenhouse gases that are released into the atmosphere, or specific area, over some time.

NONRENEWABLE ENERGY

Nonrenewable energy often referred to as "dirty energy" is any form of energy that comes from a source that will eventually be depleted. Nonrenewable energy produces more emissions and contributes to climate change. There are several sources of nonrenewable energy, these include coal, natural gas, oil, and nuclear power. Coal, natural gas, and oil are often referred to as fossil fuels. Fossil fuels are sources of energy that are composed of dead plants and animals that, with the help of heat and pressure, have fermented, for millions of years, below the Earth's surface. The use of these types of energy sources is substantially contributing to climate change, regionally and globally.

SUSTAINABILITY

Sustainability consists of meeting society's needs without causing future generations to be unable to meet their needs. Sustainability always considers three things: the environment, the economy, and society. Sustainable practices are those which focus on the value of the physical environment and use it wisely. Choosing to be sustainable may be impacted by community, personal beliefs and morals, and cultural practices.

SOLAR COOKING

WHAT IS SOLAR ENERGY?

Solar energy is energy that comes from the Sun. Solar energy can be used to generate electricity or to generate heat. Sunlight travels in the form of electromagnetic radiation (EMR). EMR runs on a spectrum, known as the electromagnetic spectrum. EMR on this spectrum has different frequencies (number of times waves repeat themselves over some time) and wavelengths. Depending on the frequency and wavelength, EMR is given names. Waves can run from high frequencies (gamma rays, x-rays, and UV rays) to low frequencies (infrared radiation). A large portion of the heat generated by the Sun comes to Earth in the form of infrared radiation. The heat generated by the Sun can heat homes, heat and cool office and industrial buildings, and be used to heat water.

WHAT ARE SOLAR COOKERS?

Solar cookers, or ovens, are used for cooking and baking, and harness energy from the sun in the form of heat. There are a few types of solar cookers. These types include a box, parabolic reflector, and panel. Each has its advantages and is designed to work like a conventional form of cooking tool.

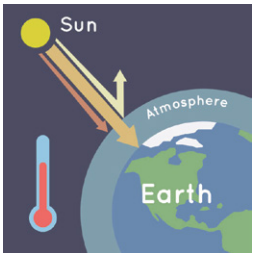
Box cookers act like ovens and have cooking and baking capabilities like conventional ovens or slow cookers. These consist of four main parts: a box, reflectors, glazing, and insulation. As the sunlight enters the top of the box, it shines through the glazing, converting to heat. Once the heat is generated through the glazing, it is trapped in the box, held inside by the insulation.

Parabolic reflector cookers act similarly to frying or grilling food, as these cookers can reach a high temperature. These cookers have two main parts: a rack and reflectors. The reflectors surround the rack, where a cooking pan can be placed, and the sunlight is directed toward the cooking pan, making it the main focal point. These types of cookers can reach up to 500° Fahrenheit.

Panel cookers are like cooking with a pot on a stove. Panel cookers have two main parts: reflectors and insulation. While the reflectors direct sunlight toward the cooking pot, insulation surrounding the cooking pot allows it to retain heat.

GREENHOUSE GASES, HUMIDITY AND BAKING

GREENHOUSE GASES are what cause the greenhouse effect, which is the warming of Earth's surface and surrounding air. This effect happens because sunlight enters Earth's atmosphere, getting converted to heat, and becoming trapped in the atmosphere. The greenhouse effect is one of the things that makes Earth a comfortable place to live.The most common greenhouse gases are water vapor, carbon dioxide, and methane. A box solar oven acts like sunlight entering our atmosphere. As the sunlight goes through the glazing on the box oven, it heats the air inside and is trapped there, just like the greenhouse effect.



HUMIDITY AND BAKING

Humidity is the amount of water vapor in the air. Water vapor is water in its gas state. When the temperature of the air increases, the humidity can increase. This increase can happen because of the molecule movement in the air. Water molecules can conduct heat much faster than air, making it have an intense effect on baking. Too much, or too little, humidity when baking can lead to problems with the baking. Humidity has such an important effect on baking that it's advised not to bake on hot and humid days, or rainy days.

STEM KIT

SOLAR OVEN BUILD & LEARN BOOKLET

For more information on our STEM Kits visit:

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