deSTEMber
SCIENCE ★ TECHNOLOGY ★ ENGINEERING ★ MATH
PRESENTED BY: girlstart

Solar S'mores

Harness the power of the sun! Discover a new marshmallow-roasting technique that utilizes renewable solar energy.

TEKS:

SCI 3.8.A: The student is expected to identify everyday examples of energy, including light, sound, thermal, and mechanical.
SCI 4.8.B: The student is expected to identify conductors and insulators of thermal and electrical energy.
SCI 4.11.A: The student is expected to identify and explain advantages and disadvantages of using Earth's renewable and nonrenewable natural resources such as wind, water, sunlight, plants, animals, coal, oil, and natural gas;
SCI 4.12.B: The student is expected to describe the cycling of matter and flow of energy through food webs, including the roles of the Sun, producers, consumers, and decomposers.

Materials:

- Aluminum foil
- Black construction paper (optional)
- Glue stick (optional)
- Marshmallow
- Plastic wrap
- Small cardboard box with lid flaps (big enough to hold a marshmallow)
- Small plate/bowl (optional)
- Stick or dowel (optional – used to prop up lid of carboard box)
- Tape

How To:

1. Push the two short lid flaps* of your cardboard box to the inside so they lie flat against the side of the box.
2. Push one of the long lid flaps* of your cardboard box to the inside so that only one flap is left – the remaining flap will act as your solar oven's lid.

*If your box is square, push down any three of the lid flaps and leave one open.

3. Line the inside of the lid and the entire box with aluminum foil. You can use a glue stick to secure the foil or wrap the foil around the box edges to help it stay in place.
4. Optional: Line the bottom of the cardboard box with black construction paper.
5. Put one marshmallow into the box on top of a piece of plastic wrap or a small plate/bowl – this will make sure the inside of your solar oven does not get too messy!
6. Place a piece of plastic wrap over the entire top opening of the box and use tape to secure. Make sure that the lid is still sticking out.
7. Find a stick or wooden dowel to use to help prop up your oven's lid, if necessary. Now you are ready to use your oven to cook a marshmallow!
8. Take your solar oven outside and find a very sunny location.
9. Position your oven so that as much sunlight as possible is reflecting off the aluminum foil-lined lid and back towards the inside of the box.
10. Let the solar oven sit in this sunny location for at least 30 minutes.
11. Remove the plastic wrap from your solar oven and take out your marshmallow. Careful – the marshmallow should be hot!
12. Eat this marshmallow plain or add chocolate and graham crackers to enjoy delicious s'mores!

STEM Explanation:

A solar oven is a special type of box that traps some of the sun's energy to heat the air inside the box. The sun's energy, or solar energy, is simply light and heat emitted from the sun. Solar ovens are designed to trap this light and heat energy and use it to cook food! The solar oven that you just built used aluminum foil, black construction paper, and plastic wrap to trap solar energy. Aluminum foil is shiny and reflects sunlight into the box, while the black paper absorbs this reflected sunlight and causes the box to become warm. The plastic wrap that you placed over the top of the box made it easy for sunlight to shine into the oven but difficult for heat to get back out. Over time, this caused the temperature inside of your box to become hotter than the outside air temperature, cooking the marshmallow!

Not only can your solar oven cook delicious treats—it's also great for the environment! The solar oven that you just made uses renewable energy, or energy that we cannot "use up." Sunlight will never run out! Renewable energy sources like solar, wind, and water power also produce less pollution than nonrenewable energy sources like coal and oil. Furthermore, nonrenewable energy sources cannot be replaced within our lifetime, so there is a risk that we could run out. Because renewable energy sources cause less pollution and are easily replenished, scientists and engineers are constantly developing new ways to use solar, wind, and water to power our lives.

Career:

Solar energy engineers study and design the heating, ventilation, and air conditioning systems in solar energy buildings. They suggest ways to use more passive solar techniques to lower costs, reduce energy use, minimize maintenance, reduce greenhouse gas emissions, and provide comfortable indoor environments for people.

Resources:

https://climatekids.nasa.gov/smores/
https://www.livescience.com/37860-hot-enough-to-fry-an-egg-on-the-sidewalk-this-weekend.html
https://www.sciencebuddies.org/stem-activities/solar-oven#exploremore
https://ww2.kqed.org/quest/2014/11/14/how-solar-power-works/
http://www.tc.umn.edu/~dama0023/solar.html
https://www.livescience.com/37860-hot-enough-to-fry-an-egg-on-the-sidewalk-this-weekend.html

