SOLAR SCIENTIST LIKE NACHOS

LESSON'S CONCEPT
Explore the world of solar power and how you can harness the sun's energy to make heat and electricity.

CALIFORNIA FRAMEWORK CONNECTIONS
For specific information refer to the California State Board of Education's Standards & Frameworks.

Grade Three – Science Content Standards, Physical Sciences, 1.
Energy and matter have multiple forms and can be changed from one form to another.

Grade Five – Science Content Standards, Earth Sciences, 4 and 5.
Energy from the Sun heats Earth unevenly, causing air movements and the solar system consists of planets and other bodies that orbit the Sun.

PURPOSE
Students will learn first hand that energy from the sun is renewable, abundant, and easy to harness by building and using a solar oven.

OVERVIEW
In this lesson students will:

- Learn about energy resources used in the U.S.
- Learn about sustainable energy options
- Focus on solar energy and its applications
- Build a solar oven and use it to prepare food

TIME
30 minutes to prepare for the lesson; 60 minutes to review the lesson and build a solar oven; 30 minutes to cook the food; 15 minutes for reflection questions

PREPARATION
Have students bring in boxes or purchase them in advance. Plan activity on a sunny day for best results. To incorporate a real solar oven into the lesson, contact RecycleWorks in advance to arrange to check one out. RecycleWorks may also have boxes available, contact them to check on status and quantity.

MATERIALS

- Pizza box (a used one is fine)
- Black construction paper
- Aluminum foil
- Clear plastic (heavy plastic laminate works best)
- Non-toxic glue, tape, scissors, ruler, magic marker
- Wooden dowel or straw

BACKGROUND INFORMATION

Who uses solar ovens?

- People who live in areas with poor amounts of fuel and/or high costs of fuel
- Campers who do not want to use dangerous, messy fuels in the wilderness
- Families that enjoy a home-cooked meal with no worries about burning the food

PRE-ACTIVITY QUESTIONS

1. What do you use at home to cook your food?
2. Where does the energy come from to power those appliances?
3. Describe the sun?
4. What do we use the sun for?
5. How hot do you think a pizza box solar oven can reach?

   (Answer: The pizza box solar oven can reach temperatures of 275 degrees, hot enough to cook food and to kill germs in water.)

PROCEDURE

Draw a one-inch border on all four sides of the top of the pizza box. Cut along three sides leaving the line along the back of the box uncut. (Diagram #1)

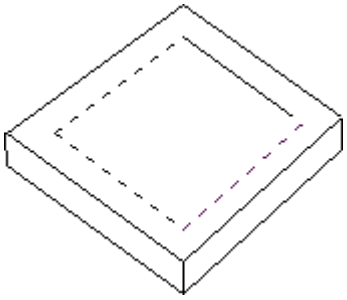

Diagram #1

Form a flap by gently folding back along the uncut line to form a crease. (Diagram #2) Cut a piece of aluminum foil to fit on the inside of the flap. Smooth out any wrinkles and glue into place. Measure a piece of plastic to fit over the opening you created by forming the flap in your pizza box. The plastic should be cut larger than the opening so that it can be taped to the underside of the box top. Be sure the plastic becomes a tightly sealed window so that the air cannot escape from the oven interior.

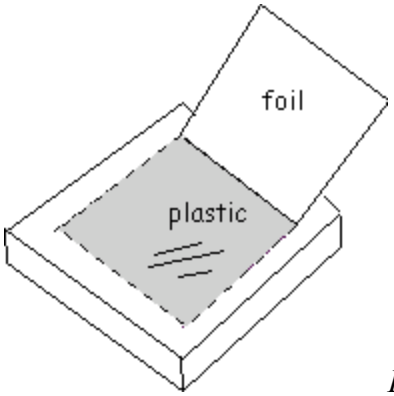

Diagram #2

Cut another piece of aluminum foil to line the bottom of the pizza box and carefully glue into place. Cover the aluminum foil with a piece of black construction paper and tape into place. (Diagram #3)

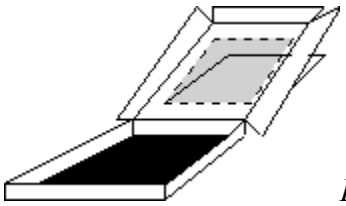

Diagram #3

Close the pizza box top (window), and prop open the flap of the box with a wooden dowel, straw, or other device and face towards the sun. (Diagram #4) Adjust until the aluminum reflects the maximum sunlight through the window into the oven interior.

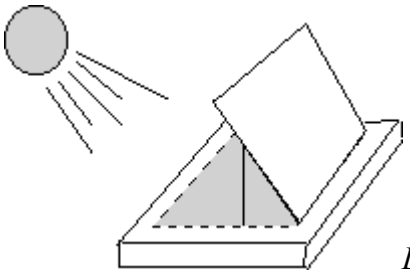

Diagram #4

Your oven is ready! You can try heating nachos, s'mores, English muffin pizzas, or hot dogs, or even try baking cookies or biscuits. Test how hot your oven can get using a simple oven thermometer! Note: A general rule for cooking in a solar oven is to get the food in early and don't worry about overcooking. Expect the cooking time to take about twice as long as conventional methods, and allow about one half hour to preheat.

DISCUSSION/QUESTIONS
1. What are the benefits of cooking our food with the sun?
2. What were some difficulties cooking with the sun?
3. How else can we capture and use the sun's energy?
4. What is another renewable energy?
5. What are other ways we can save energy?

RESOURCES
RecycleWorks has a solar oven, curriculum, and lots of resources related to resource conservation available for loan to schools, visit **www.RecycleWorks.org** for more information or call 1-888-442-2666.

Solar School House: **www.solarschoolhouse.org/ssh.html**

California Integrated Waste Management Board:
www.ciwmb.ca.gov/Schools/WasteReduce/

Project Learning Tree **www.plt.org**

COOK YOUR OWN SNACK

Now that you have made your very own pizza box solar oven, you can try cooking a snack with it at home! For larger ovens, such as the Global Sun Oven® that teachers can borrow from RecycleWorks, you can try tasty meals such as Lasagna, Cheesy Potato Casserole, Flank Steak, Home Baked Bread and more! Find these and other delicious recipes at **http://sunoven.com/recipes.asp**.

Remember: A general rule for cooking in a solar oven is to get the food in early and don't worry about overcooking. Expect the cooking time to take about twice as long as conventional methods, and allow about one half hour to preheat.

Here are some quick, easy recipes that can be cooked in your pizza box solar oven:

Cheesy Nachos:

Preheat the oven for half an hour. Place American cheese slices or grated cheddar cheese on a tray and place it in the oven. Close the lid and adjust the position of the oven to face the sun.

Slizzlin' S'mores:

Preheat the oven for half an hour. Assemble the s'mores (graham crackers, chocolate, marshmallows) and place them on a tray in the oven. Close the oven and adjust the position to face the sun.