

Solar Cooker

Overview: This lesson gives students the opportunity to practice their skills in the field of scientific inquiry in the natural world by investigating the energy of the sun. By building a solar oven, students can use the heat and light energy produced by the Sun to cook simple food treats like s'mores. This experiment can be used not only to investigate and illustrate energy produced by the Sun, but as a way to practice the steps in the scientific method: asking questions, making a guess/hypothesis, performing an experiment, collecting/analyzing data, and drawing a conclusion.

Procedure: Begin class with a discussion of sources of energy. Have students identify sources of energy that they are familiar with. This may include simple sources and answers such as "electricity", "plug-ins", or "gas". Propose that there are other sources of energy in the world that students know, but might not be familiar with that people can harness. For this lesson you will be demonstrating how energy from the Sun can be used to cook a simple treat like s'mores.

Using a cardboard box, tape the top securely closed and cut a flap into the box so that you can open and close the box securely. You will then need to cut a piece of aluminum foil that is the same size as the cut flap and glue it to the inside of the flap. Cut another piece of aluminum foil and place it on the inside bottom of the box. Cover the bottom piece of aluminum foil with a black piece of construction paper.

Place the box "oven" outside on a sunny, warm day. Assemble a s'more using the graham cracker, chocolate bar, and marshmallow and place it inside the box oven. Allow the s'more to cook for 30-60 minutes until the marshmallow and chocolate melt. Try propping open the lid or keeping it closed and document the cooking time difference.

Have students record their observations. Asking probing questions: What melted the marshmallow and chocolate and "cooked" the s'more? Where did that energy come from? What type of energy have we observed?

ASOL Covered in this Activity:

3S-ESS7: The student will investigate and understand different sources of energy. Key concepts include:

- a) energy from the Sun.

5S-SI 2 : The student will demonstrate an understanding of scientific reasoning, logic, and the nature of science by planning and conducting investigations in which

- d) Appropriate are selected and used to measure elapsed time.

i) inferences are made and conclusions are drawn.

Materials Needed:

- Cardboard box
- Aluminum foil
- Tape/glue
- Sharpie/Marker
- Black construction paper
- Scissors
- Graham crackers
- Marshmallows
- Chocolate bars

Instructional Setting: Classroom.

Community Connections and/or Peer Interaction:

Have students purchase ingredients needed for s'mores at a local grocery store or market.

Contact a local pizza shop (pizza boxes are wonderful for this project) and request a few pizza boxes for this experiment. Offer to have student fold boxes for the pizza business, building a potential long-term community connection.

Have students work with peers in building their solar ovens and cooking their s'mores. Students may even share s'mores cooked with heat energy from the Sun with peers when appropriate.

Functional Activity/Routine:

Students can measure and sort materials needed for the s'more recipe.

Elapsed time can be measured to determine the optimal cooking time in the solar box oven for s'mores.

Students can use their primary forms of communication to practice social skills and sharing while enjoying their cooked s'mores.

Students can use weather observation skills to identify days that would be good to use the solar over (sunny) versus those that it would not be (cloudy/rainy/cold).

Strategies to Collect Evidence:

Create a checklist for steps in the scientific method. Check off students' ability to create a hypothesis, complete an experiment, observe, collect data, and draw conclusions.

Give students a matching exercise providing students with a number of potential energy sources and ask which they could use to cook a s'more.

Give students a matching exercise asking where heat and light energy comes from, given choices including the Sun.

Specific Options for Differentiating this Activity:

Students with significant physical disabilities can participate in this activity with the support of a peer in a small group setting.

Students with significant physical disabilities can use their communication device to communicate the steps of the activity.

Students with visual impairments would be encouraged to safely feel/smell the heat and melted materials created by the solar oven.

Auditory learners can listen to previously recorded descriptions of the solar oven experiment prior to viewing it.

Have students watch a how to video on how to build that solar oven using a pizza box. <http://www.howcast.com/videos/155609-How-to-Turn-a-Pizza-Box-into-a-Solar-Oven>

Students with particular dietary restrictions would be allowed to cook a food they enjoyed or to cook/melt another preferred object.

Extension Ideas:

Using the solar cooker, try cooking other types of food such as eggs or hot dogs. Modify the solar oven as needed to cook various foods.

Use a variety of devices to determine elapsed time needed to cook a variety of food items.