

## **Lesson 9 – Solar Ovens**

### **Colorado Academic Standards:**

#### **Standard 3: Earth Systems Science**

##### **Kindergarten:**

##### **Concepts and skills students master:**

1. The Sun provides heat and light to Earth

##### **1<sup>st</sup> grade:**

##### **Concepts and skills students master:**

1. Earth's materials can be compared and classified based on their properties

##### **2<sup>nd</sup> grade:**

##### **Concepts and skills students master:**

1. Weather and the changing seasons impact the environment and organisms such as humans, plants, and other animals

#### **Math Standard 4: Shape, Dimension, and Geometric Relationships**

##### **Kindergarten:**

1. Measurement is used to compare and order objects

##### **1<sup>st</sup> grade:**

1. Measurement is used to compare and order objects and events.

##### **2<sup>nd</sup> grade:**

1. Some attributes of objects are measurable and can be quantified using different tools.

### **Learning Targets:**

SC.00.01.02.01 Identifies, predicts, and extends patterns based on observations and representations of objects in the sky, daily weather, and seasonal changes.

SC.00.02.01.01 Makes simple observations, explanations, and generalizations about earth materials.

SC.00.08.01.01 Makes simple observations, predictions, explanations, and generalizations based on real-life experiences.

SC.00.10.01.01 Investigates and participates in cause and effect activities.

SC.00.11.01.01 Uses senses and tools to make and record information through discussions, drawings, and charts scientific

SC.01.13.01.03 Earth's materials can be compared and classified based on their properties.

SC.01.23.01.02 Weather and the changing seasons impact the environment and organisms such as humans, plant and other animals.

MA.01.142.02.03 Express the length of an object as a whole number of length units.

MA.02.242.01.03 Measure the length of an object by selecting and using appropriate tools such as rulers, yardsticks, meter sticks, and measuring tapes.

**Lesson Objective:** Students will learn about the characteristics of the sun, and build a small oven to learn how the energy from the sun can be used as heat.

**Time:** 2 days / 30-60 minutes each day

### **Materials:**



1 box with a pre-cut rectangle on the top (class set)

Masking tape

Scissors

Black construction paper

Clear plastic wrap or transparency paper

Aluminum foil

Black paper plate

Stopwatch

Energy Science Journal (made in lesson 1)

Books:

How to Harness Solar Power for Your Home (Tell Your Parents) (Robbie Readers) by Stephanie Bearce

Cooking in a Can: More Campfire Recipes for Kids by Kate White and Debra Dixon

Earth-Friendly Energy (Saving Our Living Earth) by Ron Fridell

**Vocabulary:** energy, heat energy, absorb

**Teacher Background:** The sun is very important to the Earth. Without it, there would be no life on our planet. We can use the energy of the sun to warm and light our homes, heat our water, and provide electricity to power our lights, stoves, refrigerators and other appliances. Almost all of the energy on Earth originated with the sun. It is the source of our weather, such as wind and rain, which we can use to make electricity with windmills and dams. Most of our electricity comes from coal, which is energy stored from the sun in plants millions of years ago.

The sun is an abundant energy resource. The simplest use of the sun is to use its warmth to heat up an object. The passive heating effect of the sun can be used successfully and economically as an energy source to heat houses and buildings, to heat water and to even cook food. Even today, many people around the world depend on the energy from the sun to cook food.

**Purpose Setting Question(s):**

- Where does most of the energy on our planet come from?
- What are three things the sun can do?
- What foods can you cook with the sun?
- How long does it take the sun to cook S'mores?
- How do these various material choices help bring in as much solar energy as possible?
  - (Black construction paper absorbs and aluminum will reflect the sunlight into the box to increase the temperature).
- How was solar energy transformed?

**Procedure:**

**Day 1:**

- Read Aloud: How to Harness Solar Power for Your Home (Tell Your Parents) (Robbie Readers) by Stephanie Bearce
- Review Solar Chants:
  - **"Sunshine energy, yes, sunshine energy!"** Make a circle with your arms over your head and as you say "Sunshine energy!" throw your hands out like rays of the sun.



- “Solar energy – sun shine bright, solar energy – give me light.” Begin with arms over head in a big circle, swaying from side to side during “Solar energy”. Spread arms out wide during “sun shine bright.” Repeat motions for second part of chant.
- Explain experiment to students and have them make predictions based on their experiences.
- Fold the cardboard box into its boxed shape by starting with the bottom corners.
- Gently fold the “pre-cut” flap on the top of the box, back along the uncut edge to form a crease.
- Wrap the underside (inside) face of this flap with aluminum foil and fold it over the outside face of the flap.
- Smooth it out so the aluminum foil is tight and tape the aluminum so that the foil is held firmly.
- Open the box and cover the entire bottom with black construction paper. You may need to cut the construction paper to make it fit (students can measure the inside of the box and the paper). Use loops of tape to keep the construction paper secured to the bottom.
- Stretch the plastic wrap across the opening on the outside portion of the box and make sure it is tight.
- Completely tape the edges of the plastic wrap keeping it tight. The plastic wrap should almost be to the edge of the opening.
- Ask the class if they have any other predictions for the S’more experiment.

### Day 2:

- Read Aloud: Cooking in a Can: More Campfire Recipes for Kids by Kate White and Debra Dixon OR Earth-Friendly Energy (Saving Our Living Earth) by Ron Fridell
- Place the oven on a sunny flat surface facing the sun and use masking tape to prop the aluminum flap open. Sunlight should reflect off the flap and into the solar oven window.
- Finally, prepare your S’more with graham crackers, chocolate, and marshmallows and place them on the black plate.
- Slide the S’more into the center of your solar box oven, close the lid tightly and adjust the aluminum flap as needed.
- Use the stopwatch to time how long it takes to cook the S’mores the way you want it. Depending on the day, your S’mores should be ready to eat in no time. Enjoy!
- Display results in classroom and discuss observations.
- Students record observations; they may write and/or draw pictures in their science journal.

### Results/Observations/Conclusions:

Students should be recording results and observations daily in their science journals. You may revisit hypothesizes and predictions and discuss why students were correct or incorrect. What was their thinking behind the predictions? How has their thought process changed throughout this unit?

### Analysis: Ask Students

- What can you learn from this?
- What further questions do you have?
- What connection does this have to my life?

### Evaluation:

- Teacher observations of student ability to record information, engage in scientific experiments, predict and explain patterns, develop problem-solving and critical thinking skills.



Name: \_\_\_\_\_ Date: \_\_\_\_\_

## Lesson 9 – Solar Ovens

Do you think you can make a solar oven that will cook your S'more?



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How long did it take your solar oven to cook your S'more? How did it work?

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Draw a picture of the results.

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