



## Unit: Cooking with the Sun and Solar Ovens

### Lesson #7: Heat Transfer

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**DESCRIPTION:** Students will observe that heat naturally spreads from warmer places to cooler places and that some materials spread (conduct) heat and others keep it from spreading (insulate).

**GRADE LEVEL(S):** 3-5

**SUBJECT AREA(S):** Types of energy, energy transformation, solar energy

**ACTIVITY LENGTH:** 30 minutes

**LEARNING GOAL(S):** Students will observe how some materials conduct heat and others insulate heat.

#### **STANDARDS MET:**

##### **Common Core:**

- W.4.7. Conduct short research projects that build knowledge through investigation of different aspects of a topic.
- W.4.8. Recall relevant information from experiences or gather relevant information from print and digital sources; take notes and categorize information, and provide a list of sources.
- W.5.7. Conduct short research projects that use several sources to build knowledge through investigation of different aspects of a topic.
- W.5.8. Recall relevant information from experiences or gather relevant information from print and digital sources; summarize or paraphrase information in notes and finished work, and provide a list of sources.

##### **Next Generation Science Standards:**

- 4-PS3-2. Make observations to provide evidence that energy can be transferred from place to place by sound, light, heat and electric currents.

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- 5-PS1.2. Measure and graph quantities to provide evidence that regardless of the type of change that occurs when heating, cooling, or mixing substances, the total weight of matter is conserved
- 5-PS1-3. Make observations and measurements to identify materials based on their properties.

**STUDENT BACKGROUND:**

- Basic experience in anticipating what will happen to shiny, transparent, dark and white items when placed in the sun.

**EDUCATOR BACKGROUND:**

- Basic experience in anticipating what happens to shiny, transparent, dark and white items when placed in the sun.

**OTHER MATERIALS LIST:**

- A sunny day
- Solar cooker (or another heating source) to heat a liter (quart) of water
- Four identical jars or containers with lids
- Plastic bag
- Crumpled newspaper or large cloth
- Piece of heavy paper or a hand fan
- Thermometer



**VOCABULARY:**

- Insulate
  - Conduct
- .....

**LESSON DETAILS:**

**Activity:**

1. Early in the day, set water in the solar cooker to heat or heat using another source.
2. When water is quite hot (but not hot enough to cause burns) put equal amounts of water into each of the four jars, record their temperature, and tighten the lids.
3. Put jar #1 inside a plastic bag.

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4. Wrap jar #2 in crumpled newspaper or large cloth.
5. Set jar #3 in open air.
6. Set jar #4 in open air away from the others. Take turns fanning it.
7. After 10 minutes compare and record (qualitatively by touch and/or quantitatively using a thermometer) the water temperature in each jar.
8. Discuss which things help heat escape (open air, breezes) and which things insulate (cloth, crumpled newspaper, a small layer of trapped air in a bag).

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