Solar Ovens

Solar Ovens Lesson 10: Heat Conduction of Different Materials

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DESCRIPTION: After a demonstration using Amazing Ice Melting Blocks, students will conduct small temperature experiments using different types of materials. They will use what they learn to build their solar ovens and additionally answer discussion questions in their notebooks.

GRADE LEVEL(S): 4 and 5

SUBJECT AREA(S): Science

ACTIVITY LENGTH: 00 hours, 45 minutes

LEARNING GOAL(S): Students will learn that the material of the item that they choose to cook their egg in matters because different materials conduct heat differently. Students will compare insulators with conductors. Students will determine the purpose of conductors within a solar oven.

STANDARDS MET:

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.
4-PS3-4. Apply scientific ideas to design, test, and refine a device that converts energy from one form to another.
3-5-ETS1-1. Define a simple design problem reflecting a need or a want that includes specified criteria for success and constraints on materials, time, or cost.
3-5-ETS1-2. Generate and compare multiple possible solutions to a problem based on how well each is likely to meet the criteria and constraints of the problem.
3-5-ETS1-3. Plan and carry out fair tests in which variables are controlled and failure points are considered to identify aspects of a model or prototype that can be improved.

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Student Background:

Prior observations of solar ovens and their functionality as it relates to insulation.

Educator Background:

The Amazing Ice Melting Blocks come with educator background information. It is highly recommended that you read the information. For more information on heat conduction visit this website:
http://www.bbc.co.uk/schools/gcsebitesize/science/aqa_pre_2011/energy/heatrev1.shtml

Materials List:

- 6 no touch thermometers (aka infrared temperature guns)
- Amazing Ice Melting Blocks
- At least 4 ice cubes
- Solar Energy Student Workbooks

Vocabulary:

- heat conduction: When heat is transferred from one object to another. Metals are good conductors of heat. Poor conductors of heat are called insulators.

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Lesson Details:

- Question of the Day/Exit Slip: Does the type of material that your food cooks on or in matter? Why?
- STEP 1: As a class, do a vocabulary web for heat conduction. (Use one of the blank pages in the back of the Solar Energy Student Workbook
- STEP 2: Demonstrate with the Amazing Ice Melting Blocks.
- STEP 3: Break the students into 6 equal groups and have them fill out the chart on page 15 in their Solar Energy Student Workbooks. Students will choose their own items from around the classroom or outside. They will compare how the items feel to the touch in the ambient temperature. (EXAMPLE: Metal Bench: may feel colder or warmer to the touch depending on the ambient temperature.)
- STEP 4: Have students share items from their charts and have a discussion about how different materials conduct heat differently.
- STEP 5: Have the students answer the question at the bottom of page 15 in their Solar Energy Students Workbooks.

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