



Watts On Your Mind?

Solar energy educational activities for schools

Activity Overview

Grade Level: 3-5

Activity: UE-1

General Description

Students will compare the amount of heat stored in different sized solar collectors.

Learning Outcome

Students will observe that some materials are able to store solar heat differently than others based upon observations and taking temperature measurements.

Subjects

Science, social studies

Process Skills

Observation, measurement

Duration

30 minutes

Key Vocabulary

Solar collector, dilute

Curriculum Standards

Texas (TEKS):

112.6.a.2, 112.7.b.5.8,

112.6.b.4.11

Louisiana (LSCS):

PS-M-C3

Arkansas (ASCF):

3.1.4

National (AAAS Project 2061):

The Designed World - 5th

In Collecting Solar Energy, Is Bigger Better?

Materials

- Large disposable pie plate
- Small disposable pie plate
- Black paint (non-water soluble spray paint is easiest)
- Thermometer
- Measuring cup
- Clear plastic food wrap
- Newspapers, styrofoam cups
- Masking tape, water
- Candle (teacher's discretion)

Method

1. Before conducting the activities, prepare the pie plates by painting their insides black. Also create a table (on paper or on the blackboard) for students to record their observations, as shown below.

	Temperature °C or °F	
	Before	After
Large Collector		
Small Collector		

2. When the paint dries, add a measured amount of water (100 ml or 1 cup) to each pie plate.
3. Record the temperature of the water in each plate.
4. Wrap plastic tightly around the top of the pie plate, and tape the plastic securely.
5. Place each pie plate on a newspaper in the sun for 10 minutes.
6. Now pour the water into styrofoam cups and measure the temperatures. Record the temperatures on the table.



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Discussion

More solar energy can be collected by increasing the size of the collector. The percentage that can be collected depends on the amount of sunlight that is available in a particular area. In central and southern Texas a solar collector with 60 to 80 square feet can provide hot water for the average family. In northern Texas more collector area is recommended.

One major problem with solar energy is that it is spread out and very dilute. In order to collect a usable amount of energy, a large area must be exposed to the sun.

Before conducting the activity, the instructor can ask students to predict the water temperatures at the end of the experiment. After the experiment, the following questions can be used to guide students' thinking:

- Why paint the plates black?
- Why use plastic wrap?
- Why use newspapers?
- Why pour the water into cups before taking the temperature?
- Which plate had the hotter water?
- How can this information help you design a solar collector?
- Is solar energy free?
- Using the materials in this experiment, can they design a better collector?
- Do bigger solar collectors collect more energy than smaller collectors?

Students also can be asked to write a paragraph describing the relationships between surface area and water temperature shown in the experiment.

Assessment

Possible assessment techniques include: quiz, writing assignment or a journal entry.

Source: This activity adapted from "Thermometers" created by the Florida Solar Energy Center.