



# Watts On Your Mind?

Solar energy educational activities for schools

## Activity Overview

Grade Level: K-2

Activity: LE-3

## General Description

Students measure the temperature change in different colored containers.

## Learning Outcome

Students will recognize that solar energy creates heat, recognize that different materials absorb different amounts of solar energy (heat), and recognize that colors affect the absorption of heat.

## Subjects

Science, math

## Process Skills Used

Observation, measurement with thermometers

## Duration

30-60 minutes

## Key Vocabulary

Absorption

## Curriculum Standards Addressed

Texas (TEKS)

122.2.b.K.7, 122.3.a.2

Louisiana (LSCS)

ESS-E-B5, PS-E-C6

Arkansas (ASCF)

3.1.4

National (AAAS Project 2061)

The Physical Setting

## Hot and Cold Colors

### Materials

- thermometer
- work sheet (attached)
- class data sheet, chart, or board
- container for each group or pair (students can bring in soup cans) that are the same size and shape
- paints and brushes or construction paper and tape

### Method

1. Discuss appropriate safety issues.
2. Discuss background information.
3. Begin with the discussion question, "What color t-shirt would you wear on a hot day to keep cool?"
4. Divide students into pairs or groups.
5. Each pair or group will cover the container with a different color.
6. Provide one thermometer to be placed in each container.
7. Place containers in sunny spot with no wind or draft.
8. Students will observe and record temperature change for each cup at 1-minute intervals up to 10 minutes. Students should record beginning temperature and prediction of ending temperature. Give an audible signal at each minute interval.



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9. Teacher will create a chart or graph with class results using high temperature for each color. Record colors and temperatures from highest to lowest.
10. Teacher will lead a discussion comparing the results. Sample questions might be:
  - Are there patterns?
  - Did the dark colors result in higher temperatures?
  - What effect did light colors have on temperature?
  - Students can classify colors into groups using temperatures.
  - "The Best Color" worksheet and discussion.
11. Extension: cover cans with tin foil, clear wrap, colored paper. Cut a slit for the thermometer so that it does not need to be removed during the activity.

## Discussion

This activity is an extension of the previous activity on absorption of solar energy. The key concept here is that colors have varying abilities to absorb or reflect solar energy (heat and light). Black absorbs solar energy very well and white reflects solar energy. But other colors, such as red, blue, yellow, and green, also have varying abilities to absorb or reflect solar energy.

In this activity, the students conduct an experiment. Ideally, the only variable in the experiment will be the colors of the containers. However, students may wish to record other test conditions, such as the time of day or the time of year, and may devise experiments to test for variations in the dependent variable (temperature change) based on changes in these variables as well.

## Assessment

Students record temperature changes on data sheets. Students analyze and communicate absorption differences in colors. In order to promote further student analyzing, questioning, and investigating, the following teacher questions and comments may be useful at the conclusion of any activities/investigations. These questions can be used for small/large group discussions, science log/journal entries, or as writing prompts.

- How do you feel about your results? Are they valid?
- What, if anything, would you change to make your results more valid?
- Did you control your variables?
- Did your results cause you to think of more questions to explore?

Source: This activity adapted from "Getting Energized", National Renewable Energy Laboratory, Energy Programs Office, Golden, CO.



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## Hot and Cold Colors Worksheet

### Problem

Which Color Gets Warmest Fastest? (Which color will absorb the most solar energy?)

### Hypothesis

I think \_\_\_\_\_

because \_\_\_\_\_

### Materials

- container
- paint and brush or construction paper and tape
- thermometer
- data sheet

### Procedure

1. Cover the outside of your container with **one** color.
2. Place your thermometer in the container.
3. Place your container in a sunny spot with no wind or draft.
4. Record the temperature and predict what the temperature will be at the end of the activity.
5. Monitor and record the temperature on your data sheet every minute.

### Data/Results

1. What color did you select?
2. Did the temperature change?
3. How did the temperature change?

### Conclusion

My hypothesis was \_\_\_\_\_

because \_\_\_\_\_

### Questions for Discussion

1. Which colors would be best for painting homes, schools, and other buildings to help keep them cool? Why?
2. Which colors of clothes would be cooler? Why?
3. Which colors of cars would be hotter? Why?
4. How can choosing the best color save energy?
5. "Color can affect the absorption of heat energy." Explain what this means or explain how you know it is true.