



Watts On Your Mind?

Solar energy educational activities for schools

Activity Overview

Grade Level: K-2

Activity: LE-1

Description

Students place ice cubes on different colors of construction paper, set them in the sun, and see which ice cubes melt faster.

Learning Outcome

Students learn that some colors are better at absorbing or reflecting light and heat than others. This lesson can be applied to designing the roofs of homes or buildings and deciding what clothes to wear. Some colors are better at keeping things cool in the summer, while others are better at keeping things warm in the winter.

Subjects

Physical science

Process Skills Used

Observation, experimentation

Duration

About 30 minutes

Key Vocabulary

Absorb, absorption, reflect, reflection

Curriculum Standards

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, 2nd grade

What Color Absorbs the Sun's Energy Best?

Materials

- White, black, green, red, and blue construction paper, all the same size
- Timer
- Uniformly-sized ice cubes

Method

1. Ask students to predict (and record their prediction) which color will melt an ice cube first.
2. Place sheets of construction paper in a sunny window or outside in direct sunlight.
3. Place an ice cube in the center of each sheet of construction paper.
4. Start a timer.
5. Observe the rate at which each ice cube melts. Record the time it takes for each ice cube to completely melt. Students can record their observations of the experiment with a table (see below).

Color	Time to Melt

6. Discuss the activity.

Discussion

Of all the colors of the rainbow, black is the most absorbent. This is because black materials absorb light



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of all colors. When a black material absorbs light, some of the energy in the light is transferred to the molecules composing the black material. This causes the molecules composing the black material to vibrate more quickly, which leads to a rise in temperature. Therefore, some of the light energy absorbed by black materials is converted to heat energy. On the other hand, shiny or white substances reflect almost all colors of light, and therefore do not experience such a large temperature change.

This is the reason black is best worn in cold weather, since it takes in more light energy and changes it to heat, and white is best worn in hot weather, since it reflects light energy.

This phenomenon also explains the use of black in the construction of solar water heaters, which are designed to heat water using energy from the sun. The heart of a solar water heater is the solar collector, which is like a box painted black on the inside and with a transparent lid. The transparent plate of glass or plastic allows the solar radiation to get inside the box, and the black interior is made to absorb as much solar radiation as possible. Water travels through black tubes inside the box, where it is heated by the sun.

Assessment

Have students record their observations in a journal. Use the following questions to guide the discussion. Have students respond to one question with a short paragraph.

- Which colors cause the ice to melt more quickly?
- Which colors cause the ice to melt more slowly?
- Would a house with a white roof be cooler than a house with a dark roof?
- On a hot day, would you rather wear white clothes or black clothes? Why?

Credit: This activity adapted from *What Color Absorbs the Sun's Heat Best*, created by the Solar Energy Research and Education Foundation, www.seref.org.