Solar Mitts

by Ann Wiebe

Topic
Color and temperature

Key Question
Which colors feel warmest in the sun?

Focus
Students will use their sense of touch to compare how different colors absorb the sun's heat energy.

Guiding Documents
Project 2061 Benchmarks
- *The sun warms the land, air, and water.*
- *Things that give off light often also give off heat. Heat is produced by mechanical and electrical machines, and any time one thing rubs against something else.*
- *When warmer things are put with cooler ones, the warm ones lose heat and the cool ones gain it until they are all at the same temperature. A warmer object can warm a cooler one by contact or at a distance.*

NRC Standard
- *The behavior of individual organisms is influenced by internal cues (such as hunger) and by external cues (such as a change in the environment). Humans and other organisms have senses that help them detect internal and external cues.*

Math
Ordering

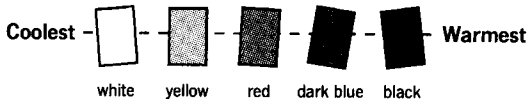
Science
Physical science
heat energy
radiation

Integrated Processes
Observing
Comparing and contrasting
Drawing conclusions

Materials
Five colors of 9" x 12" construction paper (see *Management 1* and *2)*
Tape or staplers

Background Information
The sun is the major source of heat energy on Earth. The sun's rays travel through space, striking everything on Earth exposed to them; heat is being transferred by *radiation.* When you stand in the sun, you feel the sun's warmth. In the shade, you feel cooler because you are shielded from the sun's rays.

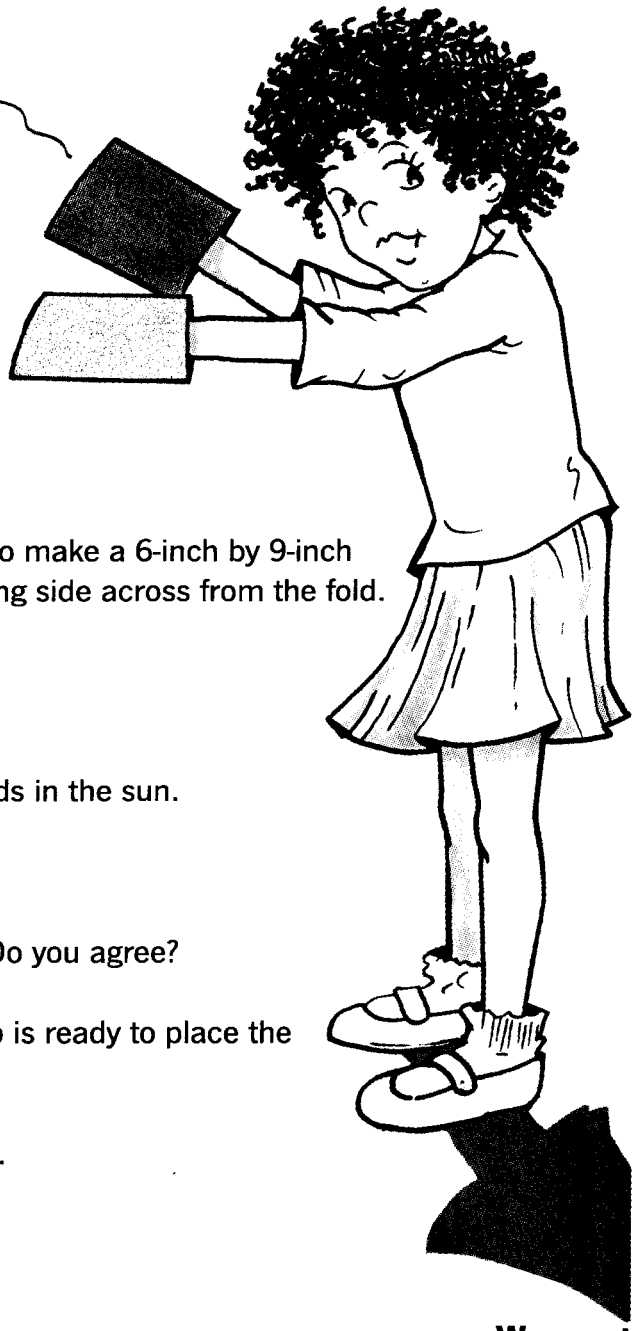
Surfaces vary in how much of the sun's heat energy they reflect or absorb, partly due to color. A white surface appears white because it reflects most of the sun's light (and heat) back into space. A black surface appears black because it reflects very little light and heat. Since black surfaces absorb more heat, they become warmer. White and black are at the two heat absorption extremes, with other colors falling somewhere between them on a continuum. In general, darker colors will be closer to black and lighter colors closer to white.



Holding their covered hands out to the sun, students will use their sense of touch to feel differences in the heat energy collected by the colored mitts. The difference between black and white is dramatic. Other colors may take several comparisons to order. This qualitative experience can easily be related to real life—how the colors of clothing, cars, and buildings affect our comfort.

Management
1. Black and white paper are mandatory for this investigation. It is suggested that the three primary colors—yellow, blue, and red—be used to complete the palette; however, other colors can be substituted or added if you wish.
2. To control variables, construction paper should be of the same weight and texture. White paper is frequently different than the others.
3. Organize the class into groups of three or four.
4. This activity can be done at any time of the year as long as sunshine is not interrupted by too many clouds.

Solar Mitts



Which colors feel warmest in the sun?

List of colors we will test:

Making the mitts

For each color, fold the construction paper in half to make a 6-inch by 9-inch rectangle. Tape or staple one short side and the long side across from the fold.

Using the mitts

- Put a colored mitt on each hand. Hold your hands in the sun.
- After about a minute, which mitt feels warmer?
- Have others in your group try the same colors. Do you agree?
- Keep comparing different colors until your group is ready to place the mitts in order from warmest to coolest.
- Draw the mitts on the line below and color them.

Coolest _____ **Warmest**