Heat Loss and Cool Gains

Purpose

Students will investigate, observe, and describe that when warmer things are put with cooler ones, the warm ones lose heat and the cool ones gain it until they are all the same temperature.

Materials

For the teacher: 2 50-ml beakers, 100-ml beaker, cold water and hot water sources, yellow food coloring, blue food coloring, 3 thermometers, chalk, chalkboard
For each student: science journal, pencil, colored pencils or crayons

Activity

A. Pre-Activity Preparation

1. Set up a beaker filled with 50 ml of hot water, a beaker filled with 50 ml of cold water, and a beaker filled with 100 ml of room temperature water.
2. Put eight drops of yellow food coloring into the hot water, and eight drops of blue food coloring into the cold water.
3. Display the beakers where they will be easily seen by students.

B. Pre-Activity Discussion

1. Tell students you have a question for them to consider.
2. Say to them: "If you had a bowl of soup that was so hot you could not eat it, what could you do to cool it?" Explain that this will be discussed at a later time.

C. Activity

1. Tell students the contents of each beaker, and have them record the information in their science journals.
2. Select three volunteers and give each a thermometer. Assign each volunteer to measure the temperature of the water in one of the beakers and record the temperature on the chalkboard.
3. Instruct students to record the temperatures in their science journals.
4. Ask students: "What do you think will happen when I put some hot yellow water and some cold blue water into the beaker of room temperature water?"
5. Discuss students' predictions and have them record their predictions in their science journals.

(continued)

INCORPORATING TECHNOLOGY

Use a thermometer probe that interacts with a computer software program to record the temperature of the water in the beakers. Students will be able to monitor the change in water temperature on the computer screen.

MEETING INDIVIDUAL NEEDS

Some students may have difficulties grasping the change occurring in the beakers. Graph the results for these students so they can visually see the change.

**Standards Links
5.2.4, 5.2.5**

Standard 3

Activity (continued)

6. Place six drops of hot yellow water and six drops of cold blue water into the beaker filled with room temperature water.
7. Have students observe where the colors drift in the beaker and sketch their observations in their science journals.
8. Ask the students: "Where is the hot water now? Where is the cold water? How do you know that?"
9. Allow students to observe until the water is uniformly green.
10. Ask students to give an explanation of what they observed, and have them write their explanations in their science journals.

D. Post-Activity Discussion

1. Discuss students' observations and explanations. Ask: "What happened to the yellow water? What happened to the blue water?"
2. Discuss student responses and say: "Based on your observations and data, predict the temperature of the water now."
3. Have students share their predictions and use a thermometer to measure the temperature of the water in the beaker. Ask: "Why is the water now the same temperature throughout the beaker?"
4. Explain to students how when warmer objects are put with cooler ones, the warm ones lose heat and the cool ones gain it until they are the same temperature. Tell students that when the yellow water came into contact with the blue water and the water at room temperature, the yellow water lost heat, and the blue water gained heat.
5. Ask students: "Based on what you have observed and what you know, can you think of ways to cool hot soup?"
6. Discuss how inserting a cool object, such as an ice cube or cool metal spoon, into the soup might work.

Questions for Review

Basic Concepts and Processes

At the conclusion of the activity, ask questions such as:

📖 What happens when warmer objects are put with cooler ones?

📖 If you put a cool metal spoon in hot soup would the soup cool?

📖 Would the spoon get warm?

💡 How do you know that will happen?

💡 How could you test to see whether a cool object gained heat from a warmer object?