Lab Instructions for Uneven-Heating Demonstration (Teacher Master)

Use the following instructions to prepare the uneven-heating demonstration for lesson 6a:

1. It's best to set up the demonstration materials the day before the lesson and perform a trial run. This will allow you time to make any necessary adjustments before conducting the demonstration during class. Make sure to set up the demonstration in a location where all students will be able to see it.

Photo courtesy of BSCS

2. Fill two thirds of one cup with soil and two thirds of another cup with tap water. Make sure to fill the water cup the day before the demonstration to ensure the temperature will be as close to room temperature as possible.
3. Tape a thermometer to the inside of each cup with the tip extending about one inch below the surface of the material (the soil or water). Be careful not to insert the tip too deep, since it will keep the materials from absorbing enough heat to influence temperature readings.

Photo courtesy of BSCS

4. Place the heat lamp on a firm surface near an outlet. Test the lamp to ensure the bulb is working correctly and adjust the lamp arm so the light will be close enough to the cups for the materials to absorb sufficient heat to change the temperatures.

The horizontal arm of the heat lamp is positioned about 2 inches above the vertical arm.

Photo courtesy of BSCS

5. Space the cups evenly underneath the heat lamp and make sure they contain equal amounts of soil and water. The tips of both thermometers should be inserted at equal depths in each cup. Angle the thermometers away from the center of the heat lamp (toward the outside perimeter) rather than placing them directly underneath it (see image below). This not only protects the thermometers from overheating, but it also makes the temperatures easier to read.

Angle the thermometers away from the center of the lamp.

Photo courtesy of BSCS

6. After school the day before the lesson, run the demonstration for 18 minutes to test the heating and cooling phases and make any necessary adjustments. Allow the setup to sit overnight to ensure the soil and water will be about room temperature.