



Standard: Understands energy types, sources, and conversions, and their relationship to heat and temperature

Benchmark: Knows that heat can be transferred through conduction, convection, and radiation; heat flows from warmer objects to cooler ones until both objects reach the same temperature

How Heat Energy Moves

There are three modes—radiation, convection, and conduction—in which heat energy travels.

Introduction

Begin a discussion by soliciting your students' ideas on things that are hot and how they know they are hot or how they feel the heat. Ask how the energy we need from the sun gets to us. Ask how we get energy from one place to another.

Write down their ideas. The intent is to get a list of ways heat travels, which at the end of the lesson will be classified as radiation, convection, or conduction (or some combination).

Procedure

This lesson consists of three experiments. To keep the size of the groups to about five, there may be duplicates of each experiment. The experiments should take about ten minutes. After all groups answer their questions, they rotate to a different experiment station. At each station, each student takes one page of questions and answers the questions. Encourage your students to discuss their ideas with their group.

Materials

- 4 light bulbs (two 25-watt bulbs and two 100-watt bulbs) (The radiation experiments use light bulbs (lamps), which get hot and use electricity.)
- 2 foam pads
- 2 wooden pads
- Science Work Sheets 1, 2, and 3 for each student
- at least 2 thermometers
- light bulb base



Experiment Station #1: Radiation

At this station, set up two light bulbs. One is a 25-watt bulb, while the other is a 100-watt bulb. Point out that a bulb's wattage is written on the top of the bulb. Have each student do Science Work Sheet 1.

Important Ideas Learned

1. The radiation from the lamp does not significantly heat the air. Block the light with the paper and you will notice that the heat your hand feels goes away. If the air were heated, the heat would still be there. It might be necessary to use several sheets of paper or cardboard in order to totally block the radiation. Make sure your students do not hold the paper against the light bulb and then touch the paper. They would feel the heat, but it would be by conduction, not by radiation.