Seeing the Invisible

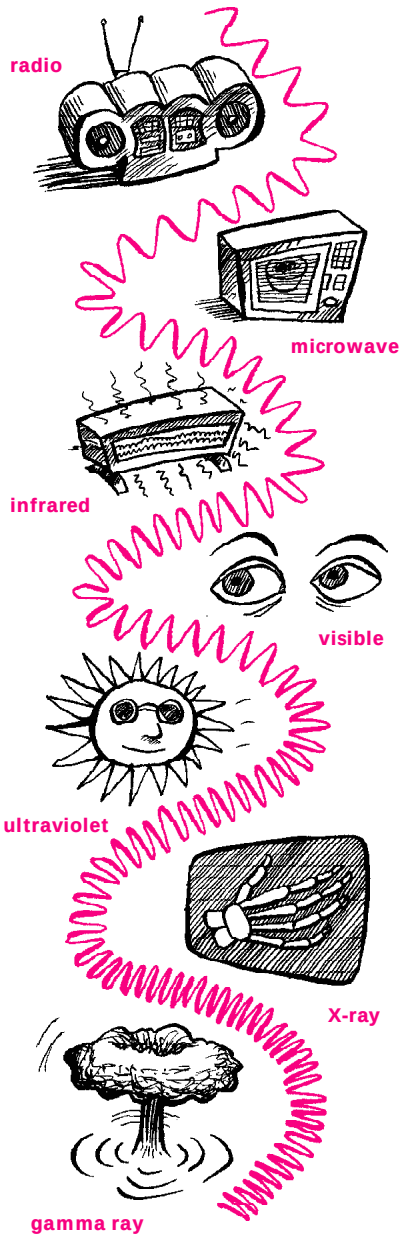
Einstein Revealed
NOVAactivity

When Einstein started thinking about the nature of light (at the age of 16), he knew that "light" is not just the visible light that comes from the sun or a bulb in a lamp. That light, he knew, was only a part of a vast spectrum of different kinds of "light", known as radiant energy.

Suppose Einstein were here in your classroom and suffering from amnesia. He remembers that visible light is a form of radiant energy, but he doesn't believe you when you tell him that it is only one of many forms. You have been charged with helping him "see" that other radiant energy exists. How do you do it? Try these and "see."

Write your answers to questions on a separate sheet of paper.

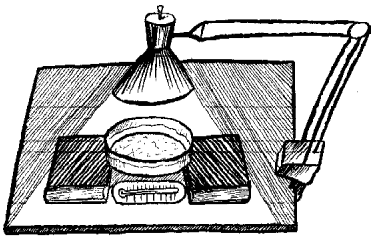
The Electromagnetic Spectrum



1 Temperature, Temperature

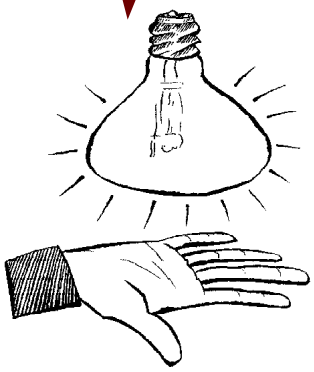
Materials:

- desk lamp with incandescent light bulb
- thermometer
- petri dish
- water
- two books



a Place the thermometer on a flat surface and adjust the lamp so that it is several inches above the thermometer. Allow the temperature to rise until it stops. Note the final temperature. What causes the change in temperature?

b Next, fill a petri dish with a thin layer of water. Use books or other objects to hold the dish just above the thermometer, making sure that the dish covers the thermometer bulb. Keep the lamp at the same height used in the first part. What happens to the temperature now? Why might this occur?



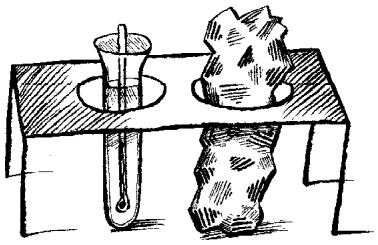
2 Feel the Heat

Materials:

- infrared light

a Hold your hand just below the light for one minute. What do you feel? Name other objects from which you have felt this sensation before.

b What you're feeling comes from a type of invisible radiant energy. Look at the chart of radiant energies on the left. Which kind of radiant energy do you think it is?



3 Wrap It Up

Materials:

- two test tubes or glass jars
- two thermometers
- aluminum foil
- water

Fill each test tube halfway with room-temperature water. Record the temperatures for each test tube. Then wrap one test tube with aluminum foil so that it's completely covered. Set both tubes in direct sunlight for about 15 minutes. Finally, uncover the tube wrapped in aluminum foil, and record the temperatures for both tubes. Which tube had the greatest change in temperature? Why?