

# Demonstrating the Greenhouse Effect

Demonstrate how the greenhouse effect works.

## Difficulty / Time Commitment:

8 out of 10

## Coolness Factor:

5 out of 10

## Materials:

- two identical digital thermometers that are easy to read—other thermometers can be used, but digital thermometers are the easiest to read.
- small transparent drinking glass
- heat lamp

## Instructions:

1. Place the heat lamp at a fixed location and turn it on.
2. Put the two thermometers on a table, each an identical distance away from the heat lamp (about one to two feet).
3. Put the small glass upside-down over one thermometer, covering the sensor. Make sure both thermometers are still the same distance from the heat lamp.
4. Wait about 15 minutes and examine the temperatures. Although initially the uncovered thermometer was the warmer one, now the covered thermometer should be warmer by a few degrees.

**What Happened?** The heat lamp represents the sun. The glass represents the greenhouse layer, which is composed of such gases as carbon dioxide, water vapor, methane, nitrous oxide, and many others. The temperature was warmer initially for the non-greenhouse effect thermometer because of direct heat from the heat lamp. However, eventually the greenhouse effect thermometer became warmer because radiation was able to enter the glass from the heat lamp, but not able to escape. The difference in temperature may not seem too dramatic, but these small temperature changes are significant in the earth's climate system.

## **Basic Concepts Learned:**

- The greenhouse effect occurs as greenhouse gases (natural and man-made) allow radiation from the sun to reach the ground, but the greenhouse gases do not allow all of the radiation to escape. Thus, the surface of the earth is warmer than it would be without the greenhouse gases.