



What You Need:

- Two clear drinking glasses or jars of the same size 


- Pencil and the investigation sheet on page 2 

- Direct sunlight or a bright lamp 

- Two mercury thermometers fitting the jar 

- Rubber band 

- Clear plastic wrap 

- Cold Water 

Instructions:

- 1 Fill the jars with cold water (approx. 3 cm high, or just over 1 inch).
- 2 Stick a thermometer in each of the jars.
- 3 Cover one of the jars as tightly as possible with clear plastic wrap and a rubber band.
- 4 Record the temperature of each thermometer.
- 5 Now place the jars in front of the lamp so that the light shines evenly on both. Alternatively, you can place the jars in direct sunlight.
- 6 Leave the jars in front of the lamp for one hour and record the temperature in each one every 10 minutes. Which glass do you think will have a higher temperature?
- 7 Look at the result after 60 minutes. **What is your conclusion?**



The Climate Lab

Investigate the **Greenhouse Effect**



| PREDICTIONS | TIME | TEMPERATURE | |
|--|--|-------------|---------------|
| | | Covered Jar | Uncovered Jar |
| What do you think will happen during your experiment? Record your predictions below. | Record the temperature every 10 minutes. | | |
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So, what happened during the experiment?

The jars each represent Earth, the light source represents our sun, and the water represents the earth's surface temperature (in fact, 71% of earth's surface is covered with water).

The plastic wrap over one of the jars represents the Earth's atmosphere – a blanket of air, made up of several layers of gases, that surrounds our planet. Our atmosphere protects us from the sun's harmful UV rays and keeps the planet from being completely scorched by the sun's heat.

And, as our experiment illustrates, the atmosphere also plays another important role. During the day, the sun shines through the atmosphere. The earth's surface absorbs the sunlight's energy. Once absorbed, this energy is sent back into the atmosphere. Some of the energy passes back into outer space, but much of it remains in the atmosphere due to an invisible layer of heat-trapping gas molecules which keep conditions on Earth just right for life to exist – not too cold, but also not too hot. This phenomenon is called the **greenhouse effect**, because the exchange of incoming and outgoing radiation that makes Earth livable works in a similar way to a greenhouse, in which the clear glass roof traps enough heat to make it possible for plants to survive indoors, even when it is freezing outdoors. The greenhouse effect explains why the water inside the plastic-covered jar is warmer. And it explains why those heat-trapping gases, like carbon and methane, are known as greenhouse gases.

The jar without plastic wrap represents what the earth would be like if it did not have a closed atmosphere. Without the greenhouse gases that hold on to some of the sun's heat energy, it would all escape into outer space... and Earth would be too frozen for anything to live on.

