



## Water Bottle Greenhouse

Climate change is caused by the excessive release of nasty gases called **greenhouse gases**. This is because these gases create a **greenhouse effect** around the planet. In this activity, your students will learn about the greenhouse effect while gaining a basic understanding of how to conduct their own scientific experiment! To learn more about the greenhouse effect and the causes of climate change, check out our YouTube video: "[Climate Change: How does it really work?](#)".

Before you begin the experiment, we recommend explaining how greenhouses and the greenhouse effect work.

### How a greenhouse works:

1. Greenhouses are buildings made out of glass or plastic in which we grow plants that wouldn't survive in colder outdoor temperatures.
2. During the daytime, the Sun shines on the greenhouse. Since the walls are like giant windows, they let in lots of sunlight. This warms up the plants, soil and pots.
3. The walls of the greenhouse then trap the warmth inside the greenhouse.

### The greenhouse effect:

1. The air or atmosphere acts like the glass walls of the greenhouse. It is made up of different gases.
2. The Sun's rays pass right through the atmosphere and heat up the ground, plants and oceans.
3. These gases trap this heat on the surface and keep the Earth warm just like the walls of the greenhouse.
4. Many of the things we do, like driving cars and making things in factories, produce even more of these "greenhouse gases."
5. When there is too much gas trapping all the heat, the Earth gets hotter!

### Preparation

Provide each student or group with the following:

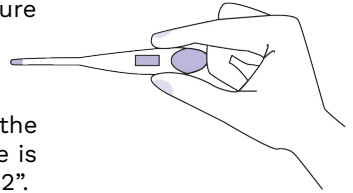
- One 1 litre water bottle
- One thermometer
  - We recommend using either [digital probe thermometers](#) or [thin thermometers](#)
  - Students may need to be given a brief introduction on thermometers so that they can read them



## Instructions

### Step 1

Have each student/group hold the thermometer up in the air and count to 60. We recommend showing your class how to hold the thermometer properly to ensure they don't measure their skin temperature.

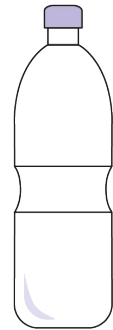


### Step 2

After a minute, have the students read the thermometer and write down the temperature. There is a space for this reading on the handout under "Step 2".

### Step 3

Have the students answer the question on their handout marked as "Step 3". This question is meant to resemble a problem statement, while their answer acts as their hypothesis.

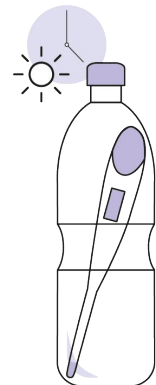


### Step 4

Have the students place the probe/thermometer inside the bottle and seal it. They should place their bottle in direct sunlight for five minutes. We recommend setting a timer. If your class is using a probe thermometer, instead of using the cap, we recommend that one of the students cover the opening of the bottle with their hand and avoid touching any other part of the bottle.

### Step 5

Have the students remove the thermometer from the bottle and read the temperature. If your class is using a digital probe thermometer, they should read the temperature on the screen without removing the probe.



### Step 6

Have the students answer the question on their activity sheet marked as "Step 6". This will be their concluding observation. The temperature inside the bottle should be higher than the temperature outside the bottle. We recommend reiterating that the conditions inside the bottle mimic those created by the greenhouse effect inside the Earth's atmosphere.



We welcome feedback and would be delighted to hear your thoughts on this activity. Feel free to send an email to [schools@climatescience.org](mailto:schools@climatescience.org) and we'll be sure to get back to you soon :)

