# Water Bottle Greenhouse

The atmospheric release of excessive amounts of **greenhouse gases** is resulting in **climate change**. This is because these gases create a **greenhouse effect**. In this activity, your students will learn about the greenhouse effect while gaining a basic understanding of how to conduct their own 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.
3. The walls of the greenhouse then trap the warmth inside the greenhouse.

### The greenhouse effect:

1. The air is made up of different gases and the sun shines on the Earth.
2. These gases trap the heat and keep the Earth warm just like the walls of the greenhouse.
3. Many of the things we do, like driving cars and making things in factories, produce even more of these gases.
4. When there is too much gas trapping all the heat, the Earth gets hotter!

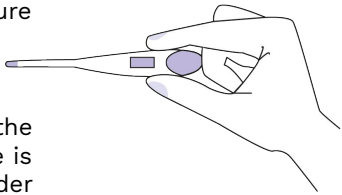
### Things you'll need

- One 1 litre water bottle per student or group
- One thermometer per student or group
    - 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.

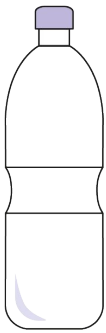


**Step 2**

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

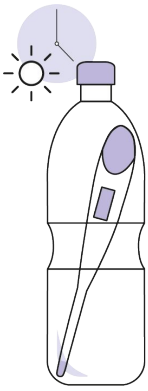
**Step 3**

Have the students answer the question on their activity sheet 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 and we'll be sure to get back to you soon :)