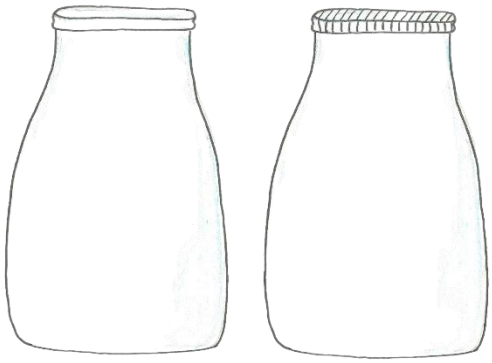
# Activity Guide

This practical is designed to be a simple way of helping students visualize what the Greenhouse Effect is and to understand how heat is trapped by the atmosphere and subsequently driving climate change.

Materials Required:

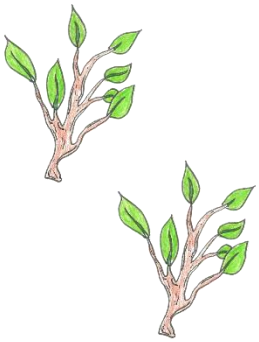
- 2 jars or containers that have optional lids. You can also use clingwrap over the top of one container if there is no lid, just ensure you can create an airtight seal with a rubber band.
- 2 plants with green leaves, as fresh as possible.
- 2 thermometers small enough to fit inside your container.



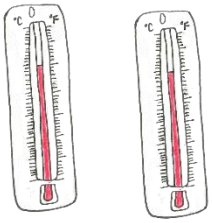
Jar without lid



Jar with lid



2 branch cuts



2 thermometers

**Step 1:**

Start by deciding if you are going to run this practical in one class period or over the course of the day, with consistent measuring throughout the day, or done in secret over the course of the day, with a final reveal at the end of the day.

You may also want to consider if you want to set up this practical yourself in front of the class or provide students an opportunity to set it up themselves.

**Step 2:**

You will have two experiment jars: ***One without (A)*** a lid and ***one with (B)*** a lid***.***

**Jar A**: place plant inside container and place the thermometer next to it so that it is not blocked by leaves and is easy to read at all times. **NO NOT** put a lid on this jar and leave it open to the air. This jar will act as your 'control'.

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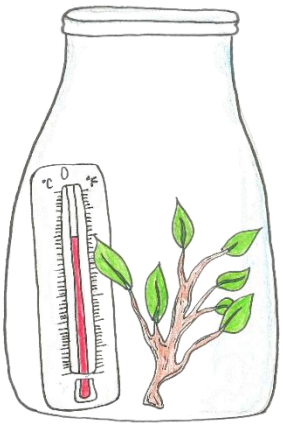
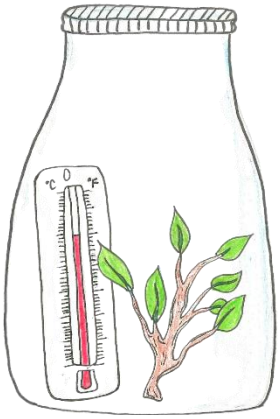
**Jar B:** place plant inside container and place the thermometer next to it so that it is not blocked by the leaves and is easy to read at all times. **ADD A LID** to the top of the container and seal tightly. This is your 'experimental' jar.



Jar A



Jar B

**Step 3:**

Take the initial measurements for both of the containers after they have had time to stabilize to room temperature and have students write it down. Before any of the jars go into the light, the procedure of the experiment should be explained to the students, and they should be asked to identify what is being tested - i.e., what is different and what stays the same.

They should be asked to make predictions as to what might happen. They should also be asked to write down reasons for their prediction. It should be stressed that 'getting it wrong' is not an issue - this is to make you think. Teachers should ask for some predictions and reasons to be shared with the whole class.

Then either keep the jars inside near the window or outside to have access to direct sunlight.

**Step 4:**

This lesson will take some time to set up and to do the measurements. Once the experiment is running, the children can get involved in other activities, with groups of children checking and recording the temperature every ten minutes in the jars.

It would be helpful if this happened over an extended period of time (say in the morning before break, or after lunch), so that a decent amount of time can elapse, and a number of measurements taken. Children should be doing some independent work which won't be too affected by small groups doing some measurements every ten minutes. It might be helpful to keep the recordings secret, so that those taking the measurements hand them to the teacher who can then log them. This gives an opportunity for there to be a

'reveal', which creates drama, hypotheses, discussion of predictions and crucially it is memorable. If it was done at the end of the day, there could also be a 'reveal' the next day with instructions to the children to go home and talk about the experiment with their parents / carers and ask them what they think might have happened. This will give many of the children more talking and thinking time before the results are shown the next morning. Again, more dialogue, drama, discussion, and conjecture.

**Step 6:**

Once you have collected all of your data and share it with the children (probably at this stage modelled by the teacher into 2 simple graphs to help visualize), there is opportunity to discuss:

**Temperature Difference:** As the experiment progresses, the jars with the plastic wrap will show a higher temperature compared to the uncovered jars. Why might that be the case?

**Ask the children what might be going on with the wrapping?** Encourage them to compare the temperatures recorded in both jars. Discuss why the covered jar shows a higher temperature than the uncovered jar, which allows heat to escape freely.

They might come up with something along the lines of insulation: that the plastic wrap acts as an insulating layer, preventing the escape of heat from the water in the jar. This is partially right, and at that stage you **might** want to talk about radiation and reflected heat.

*'As the sunlight passes through the plastic wrap, it traps some of the heat, creating a warmer environment'. It allows sunlight to enter but traps some of the heat radiated back (because of the longer wavelength of the reflected light).*

**Other applications for activity:**

In conclusion, although this might seem to be a long activity, there is plenty of opportunity for this to extend into math's and data handling. It would be very helpful for the students to plot the graphs of temperature change on a graph with time on the x-axis and temperature on the y-axis. Therefore, the data could be handled in math's class and the conclusion of why it happens and what we can learn from it can be handled in the next atmosphere lesson.