Science
Age 11-13

The green-house effect

- Energy
- Sustainability
- Climate change

Previous learning required

- Experience of taking a reading with a thermometer.
- Familiarity with the terms **greenhouse gas**, **global warming**, and **climate change**.

Learning outcomes

- To understand the role natural greenhouse gases play in trapping warm air in the Earth's atmosphere.
- To understand that, due to human activity, an increased amount of greenhouse gases in the Earth's atmosphere is linked to global warming and climate change.

Equipment

- A kilner jar (or other lidded glass jar tall enough to fit a thermometer inside)
- 2 x thermometers
- 2 x sheets of black card
- Paper and pencils to record results
- Timer
- Sunshine

Activity

1. Identify an exposed sunny space to conduct the experiment outdoors.
2. Ensure the two thermometers start at the same temperature by placing them side by side in the shade until this is achieved.
3. Place one thermometer inside the jar and close the lid before placing the jar on a sheet of black card. If the lid is opaque, upturn the jar so the lid doesn't cast a shadow.
4. Place the second thermometer outside and next to the jar on another sheet of black card.
5. Discuss what the card is for with pupils (to control the effects of temperature change linked to the surface beneath the jar).
6. Encourage pupils to hypothesise about the likely outcome of the experiment before recording the temperature of both thermometers at regular intervals. Ask pupils to record the data in a table:

Time	Temperature in jar	Temperature of air

Check for understanding

1. Discuss the results with your pupils. Why is the temperature hotter inside the jar?
   - The air trapped inside the jar is unable to mix with the cooler air surrounding it, causing the temperature to rise.
2. How is this similar to the effect the increased amount of greenhouse gases in the Earth's atmosphere is having on our planet?
   - The gases in the Earth's atmosphere work similarly to the glass of the jar (or a greenhouse). They trap the warming rays from the sun whilst any unabsorbed or reflected UV radiation can pass back out.
   - The accumulation of additional greenhouse gases from human activity (for example, CO_2) upsets the natural balance, leading to global warming and climate change.

Learning through Landscapes

If you would like to develop your outdoor learning knowledge and skills, take a look at our range of training courses: **ltl.org.uk/outdoor-learning-training**