

## The Greenhouse Effect

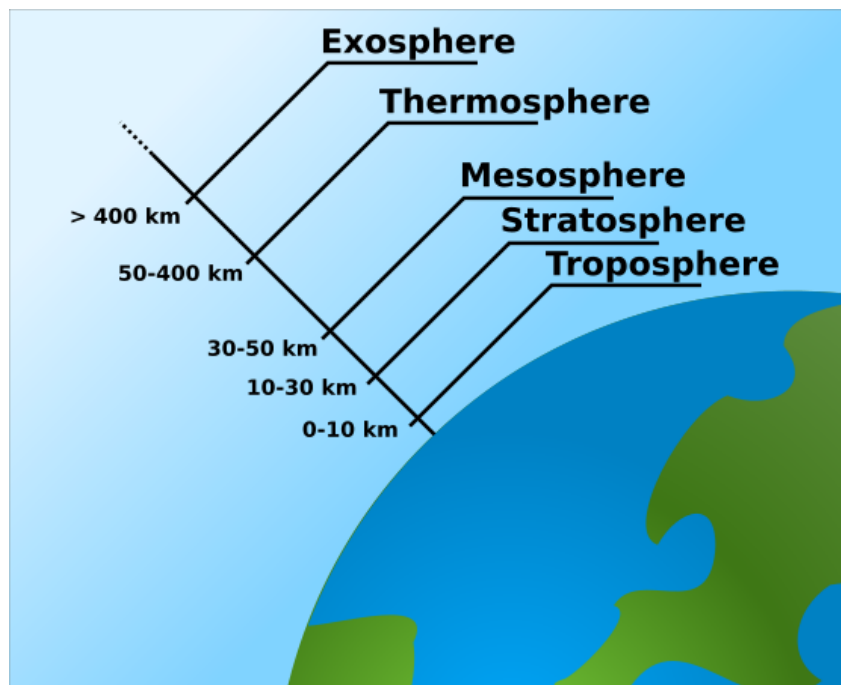
### In this lesson each student will learn:

1. The different layers of the atmosphere, including the ozone layer.
2. What the Greenhouse Effect is and how it works.

### The layers of the atmosphere

The atmosphere is divided into 5 layers.

It is thickest near the surface and thins out with height until it eventually merges with space.



The **troposphere** [0 to 10 km] is the first layer above the surface and contains half of the earth's atmosphere. Weather occurs in this layer.

The **stratosphere** [10 to 30 km] is the second layer. Many jet aircraft fly in the stratosphere because it is very stable. The stratosphere contains the **OZONE LAYER**, which absorbs harmful rays from the sun.

The **mesosphere** [30 to 50 km] is the next layer up. Rock segments burn up in this layer.

The **thermosphere** [50 to 400 km] is the fourth layer and this is where space shuttles orbit.

The **exosphere** [ $>400$  km] is the layer where the atmosphere merges into space. It is extremely thin.

## **What is the Ozone Layer?**

The ozone layer is a layer of concentrated ozone gas about 24km up in the atmosphere.

Like a good pair of sunglasses, it protects us from the sun's harmful ultra-violet rays.

This very important layer is being destroyed by CFCs (chlorofluorocarbons), which are used in industry and everyday life (e.g. aerosol cans).

The chlorine in these compounds can cause ozone destruction.

The hole in the ozone leaves humans and wildlife open to unsafe levels of UV light.

## **What is the Greenhouse Effect?**

A greenhouse is a small house made of glass that is used to grow plants.

A greenhouse traps the sun's rays and keeps the heat from escaping.

It is warm inside.

In the same way that the glass traps heat in a greenhouse, the atmosphere traps heat next to the earth.

Certain gases in the atmosphere such as carbon dioxide, methane and water vapour trap *extra* energy from the sun.

The natural greenhouse gases act like a big blanket around the earth, keeping it warm.

Humans can create extra greenhouse gases but this means that more heat gets trapped.

This causes the temperature of the earth to rise. This is called global warming.

Global warming results in higher sea levels, more rainfall and severe droughts and floods.

What effect does global warming have on humans and animals?



## **Experiment 1: Test the effect of a greenhouse on temperature**

### **Materials needed:**

- Plastic bottle
- Nail
- 2 thermometers
- Dice
- Notebook
- Pencil

### **Method:**

#### **Part 1: Making a greenhouse**

1. Make a hole near the top of the plastic bottle with the nail.
2. Insert the first thermometer into the hole.

#### **Part 2: Recording data**

1. Place the second thermometer next to the bottle.
2. Make sure that the same amount of sunlight reaches both thermometers.
3. After 10 minutes, note temperature values from both thermometers.
4. Record the data in the notebook.
5. Take the temperature records again after another 10 minutes.
6. Repeat a few times.

#### **Part 3: Analysing results**

1. Ask the following questions:
  - Do both thermometers record the same temperature?
  - If no, which one is higher?
  - Can you explain why these two temperature records are not the same?