



Geography:		Grade 10	
TERM 1		Week 1 Lesson 1	
TOPIC	<b>CLIMATOLOGY: Composition and structure of the atmosphere</b>		
AIMS OF LESSON	What is the atmosphere; Why is atmosphere important and; What is the composition and structure of the atmosphere; How do human activities affect the atmosphere?		
RESOURCES	<b>Paper based resources</b>	<b>Digital resources</b>	
	Refer to your textbook: Read the topic: The composition and structure of the atmosphere.	<a href="https://www.youtube.com/watch?v=LPHF323XIWw">https://www.youtube.com/watch?v=LPHF323XIWw</a> <a href="https://www.youtube.com/watch?v=LGvcwk5d-zM">https://www.youtube.com/watch?v=LGvcwk5d-zM</a> <a href="http://www.geography4kids.com/files/atm_composition.html">http://www.geography4kids.com/files/atm_composition.html</a> <a href="https://www.youtube.com/watch?v=aU6pxSNDPhs">https://www.youtube.com/watch?v=aU6pxSNDPhs</a>	
INTRODUCTION	<ul style="list-style-type: none"> <li>• What is the atmosphere?</li> <li>• <i>What does it consist of?</i></li> <li>• <i>What is the function of each layer in the atmosphere?</i></li> <li>• <i>How important is the atmosphere for us?</i></li> </ul>		
CONCEPTS AND SKILLS	<ul style="list-style-type: none"> <li>• The composition of the atmosphere</li> <li>• The structure of the atmosphere</li> <li>• <i>The different function of each layer</i></li> </ul>	<b>CAN YOU?</b> Distinguish between structure and composition? Distinguish between different layers of the atmosphere? Give reasons why the pollution of the atmosphere is negatively affecting all life on earth?	
ACTIVITIES/ ASSESSMENT	<i>Complete the attached activities as well as those in your textbook.</i>		
CONSOLIDATION	<ul style="list-style-type: none"> <li>• <i>Complete the activities.</i></li> <li>• <i>Study the diagrams to understand the composition and structure of the atmosphere</i></li> <li>• <i>It is important to know and to understand where climatological processes take place and how the atmosphere preserve life on Earth.</i></li> <li>• <i>This information is important to show how to take care of the environment in order to provide sustainable living conditions.</i></li> </ul>		
VALUES	<i>It is important to understand the preservation of the atmosphere of the earth.</i> <i>It is crucial to maintain sustainable living conditions on earth.</i>		

## The Atmosphere – Composition and structure

The atmosphere is a gaseous layer of air that surround the earth's surface. The atmosphere provides the climatic processes to ensure that we receive precipitation which is needed for life on earth. It also provides oxygen to the living on earth.

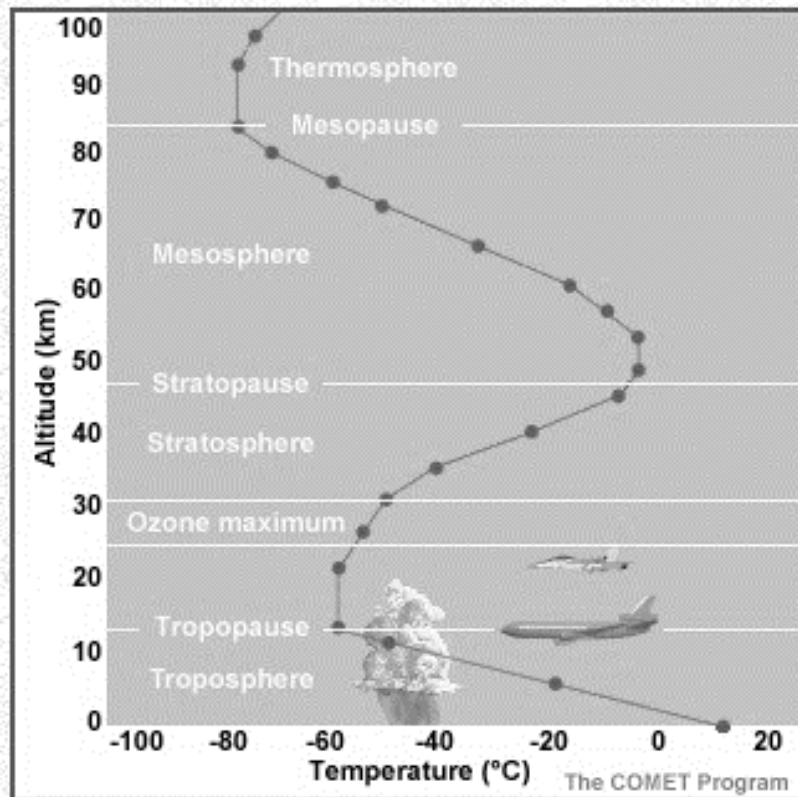
### What is it?

It is a gaseous layer above and around the earth's surface.

The layer is from 0 to 100 km above the earth's surface.

The atmosphere is made up of 78% nitrogen, 21% oxygen and 1% noble gases. Apart of the gases there are also small solid particles of dust, salt, smoke and pollutants in the atmosphere.

A diagram view of the basic structure of the atmosphere.



(Source: <https://climate.ncsu.edu/edu/Structure>)

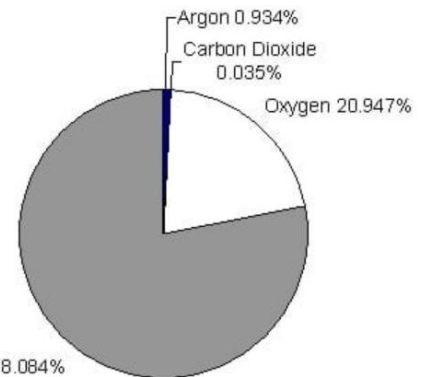
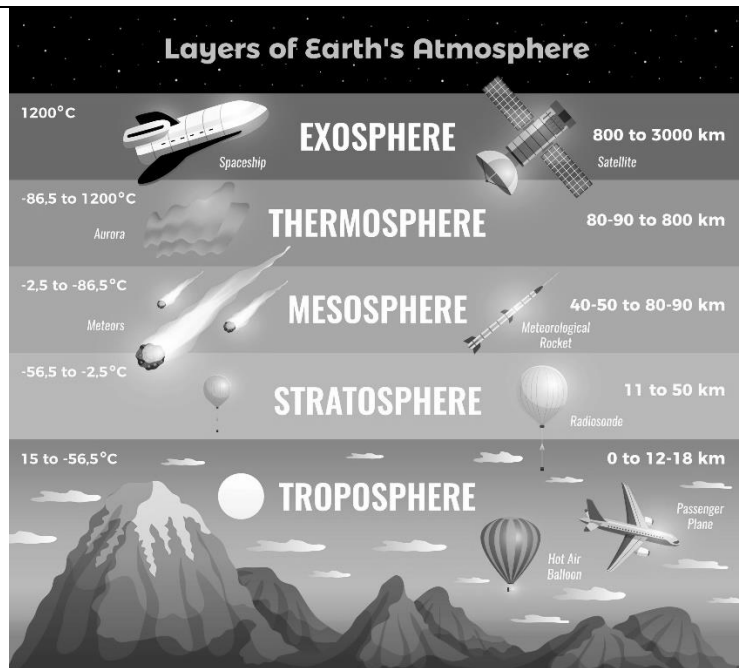


Figure 2. Gaseous composition of dry air.

(Source: [https://www.teachengineering.org/activities/view/cub\\_air\\_lesson01\\_activity1](https://www.teachengineering.org/activities/view/cub_air_lesson01_activity1))



(Source <https://www.worldatlas.com/articles/what-are-the-6-layers-of-the-earth-s-atmosphere.html>)

### The troposphere:

This is the first and the lowest layer of Earth's atmosphere. All life on this planet is affected by the changes that happen in this layer, as all the weather changes take place in the troposphere. It starts from the ground (or sea level) of our planet and expands up to 10 km up in the sky.

This layer contains the most oxygen. Every living thing on this planet needs this gas. The higher we go in this layer of the atmosphere, the "thinner" the air gets, meaning it is significantly harder for us humans to breathe. (This is when we talk about the levels of oxygen). That is why climbing high mountain peaks is so challenging!

### The stratosphere:

If we start from the top of the troposphere and go further into the sky, we reach the layer known as the stratosphere. This layer extends from 10 km and goes up around 50 km above the Earth's ground. In this layer, the temperature (increase with height) rises as you go further up, and it has something to do with the ozone layer that is found inside the stratosphere.

The ozone layer serves a vital role in the protection of our planet, as the molecules of ozone prevent ultraviolet (UV) light from the sun to hit our planet without stopping. The UV light is not technically stopped, but the conversion from UV light to heat happens (which is why holes in the ozone layer are so dangerous).

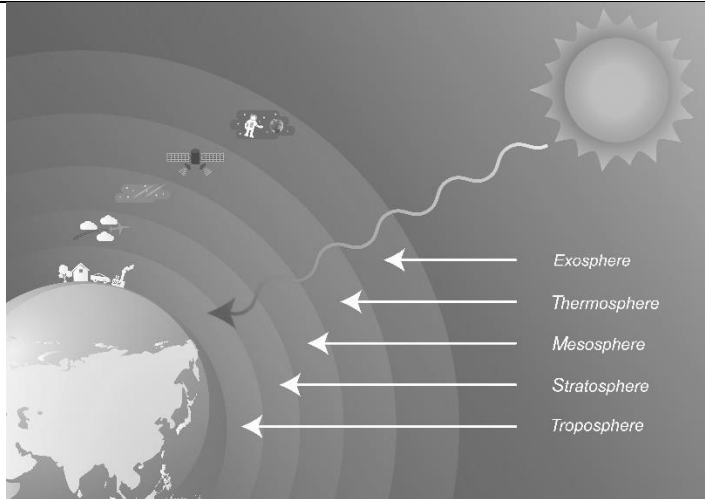
### The mesosphere:

As the name suggests, we are halfway up our atmosphere layers when we reach this part. The mesosphere goes up to 85 km above the surface of our planet, and the temperatures here behave as they do in the troposphere. The higher you go, the colder it gets. This layer of the atmosphere has the lowest temperature of all layers and they drop down to -90° C. it would also be impossible to breathe in the mesosphere because of too low oxygen levels. This layer is not human friendly.

### **The thermosphere:**

The layer that is located between 500 and 1000 km above the Earth's level is known as the thermosphere. You have guessed it! High temperatures are the name of the game here. This layer is under constant attack from the X-rays and UV radiation coming from the Sun and the space around us. Because of this, the temperatures in this layer can even reach up to 2,000° C!

### **Where is it?**



(Source: <https://www.worldatlas.com/articles/what-are-the-6-layers-of-the-earth-s-atmosphere.html>)

### **Why is it there? –The purpose of some layers.**

#### **The troposphere:**

All life on this planet is affected by the changes that happen in this layer, as all the weather changes take place in the troposphere and it provides oxygen. Traveling at high altitudes also means that airplanes can avoid bad weather that is typically found in the lower regions of the atmosphere.

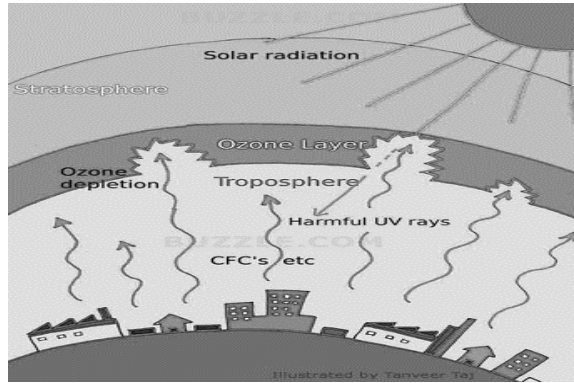
#### **The stratosphere:**

In this layer, the temperature rises as you go further up, and it has something to do with the ozone layer that is found inside the stratosphere. The ozone layer serves a vital role in the protection of our planet, as the molecules of ozone prevent ultraviolet light from the sun to reach our planet.

The Earth's ozone layer protects all life from the sun's harmful radiation, but human activities have damaged this shield. Less ozone-layer protection from ultraviolet (UV) light will, over time, damage crops and lead to higher skin cancer, cataract rates and harm to some crops and marine life.

Beginning in the 1970s, however, scientific evidence showed that the ozone shield was being depleted well beyond natural processes, a direct consequence of human activities.

**Some issues of Ozone depletion summarized below:**



**Causes**

- CFC in spray cans, refrigerators and air-conditioners.
- Halons in fire extinguishers.
- Carbon tetrachloride used in solvents and cleaning agents.
- Methyl bromide used in pesticides.

**Effects**

- Increase occurrence of skin cancer.
- Increasing occurrence of eye diseases - cataracts.
- Weakened immune systems
- Disruption of marine food chain
- Declining ocean plankton and other fish populations
- Reduced photosynthesis.
- Reduced water use efficiency in plants.
- Modified flowering - in crops such as rice, oats, sorghum and soya beans.

**Measures to reduce ozone depletion**

- South Africa has achieved much by almost phasing out ozone-depleting substance.

**What is the impact of the atmosphere on people and people on the atmosphere?**

The atmosphere provides us with oxygen and rain which is vital for survival of all living organisms. The ozone layer protects earth from the harmful ultraviolet rays from the sun.

We as people tend to have or is involved in activities that may be harmful to the atmosphere by polluting the atmosphere, releasing chemicals into the atmosphere that cause ozone depletion and releasing too many particles e.g. smoke and dust that impacts negatively on rainfall figures.

**How can we contribute positively?**

All the people in the world must take responsibility for our actions in protecting the atmosphere. We must ensure that our children live in a world where they can sustain themselves with food, land and water.

**Climatology:  
Consolidation Activity 1 Term 1 Week 1 Lesson 1**

**1. Complete the idea-clouds below. Give at least three thoughts per cloud.**

I used to think about the  
atmosphere ...



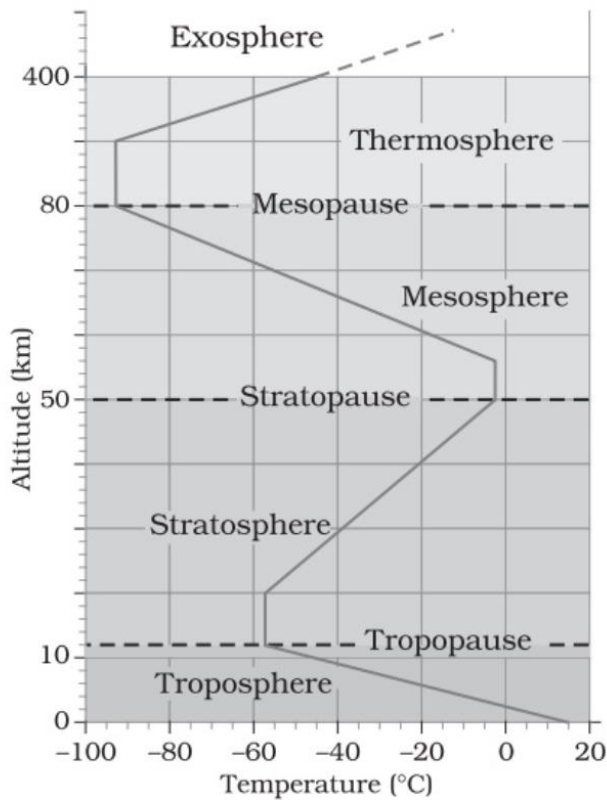
Now I think about the  
atmosphere....



**Climatology:**

**Consolidation Activity 2 Term 1 Week 1 Lesson 1**

**2. Study the diagram below and answer the question that follows:**



Source: <https://byjus.com/free-igs-prep/ncert-notes-structure-of-atmosphere/>

2.1	Answer the questions below.	
2.1.1	Name the upper limit of the troposphere.	
2.1.2	Which layer of the atmosphere provide rainwater to the planet?	
2.1.3	Use the graph to determine the temperature of the atmosphere at the tropopause.	
2.1.4	Explain why the temperature changes as you move further away from the earth in the troposphere.	
2.1.5	What is the importance of the composition of the atmosphere for living organisms?	
2.1.6	State the main gases that the atmosphere consists off.	
2.1.7	In which layer of the atmosphere to we find the ozone layer?	
2.1.8	What is the function of the ozone layer?	
2.1.9	Why is the temperature in the stratosphere increasing?	
2.1.10	In which layer do we find meteors?	
2.1.11	Why is the mesosphere an unfriendly environment for humans?	
2.2	How can we protect the atmosphere in our everyday actions?	
2.3	Read the label on the personal spray can you or a family member use. Does it indicate that it is ozone friendly?	