

# GEOGRAPHY

## Chapter 4: AIR



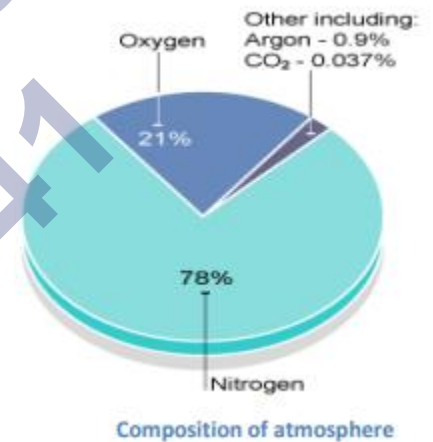
## AIR

### Atmosphere

The Earth is surrounded by a huge blanket of air called the atmosphere. The existence of the atmosphere is essential to our survival as it provides us with the air we breathe and protects us from the harmful rays of the Sun.

#### Composition of the Atmosphere :

- Nitrogen and oxygen are the two major gases present in atmosphere.
- Carbon dioxide, argon, helium, hydrogen and ozone are present in atmosphere in small quantities.
- 78% of the atmosphere is made up of nitrogen. Nitrogen is important for the survival of plants. Since plants cannot directly take in nitrogen from the atmosphere, the bacteria which live in the soil and the roots of plants convert it into a form which can be used by the plants.
- Oxygen is the second most available gas in the air and is inhaled by human beings and animals. Plants produce oxygen during the process of photosynthesis. Therefore, the level of oxygen is always maintained in atmosphere. However, this level gets disturbed due to deforestation.
- Carbon dioxide is present in atmosphere in small quantities and is used by plants for making food. The quantity of carbon dioxide remains constant in the atmosphere. However, its amount may increase due to the burning of fuels such as coal and oil. The increase in level of carbon dioxide adversely affects the weather and climate of the Earth.

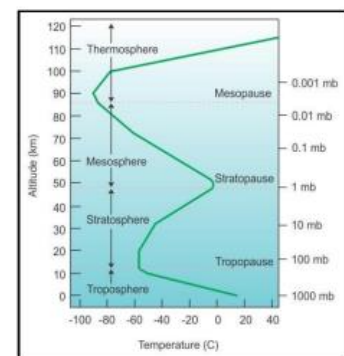


#### Structure of the Atmosphere :

The atmosphere is divided into five layers beginning from the surface of the Earth as follows:

##### Troposphere :

- This is the most important layer of the atmosphere.
- It extends up to 13 km from the surface of the Earth.



- Oxygen which we breathe exists in this layer of the atmosphere.
- All the weather phenomena such as rainfall, hail and fog occur in this layer.

### **Stratosphere :**

- This layer of the atmosphere lies above the troposphere and extends up to a height of 50 km.
- Airplanes fly in this layer, as this layer is free from clouds and other weather phenomena.
- The stratosphere contains the ozone layer which protects us from the harmful ultra violet rays of the Sun.

### **Mesosphere :**

- This is the third layer of the atmosphere and lies above the stratosphere.
- It extends up to a height of 80 km.
- It is in this layer of the atmosphere that meteorites burn when they enter in from space.

### **Thermosphere :**

- This layer extends between 80 km – 400 km above the surface of the Earth.
- Temperature increases drastically in this layer.
- The ionosphere is a part of this layer.
- The thermosphere helps in the transmission of radio waves which are reflected back to the Earth by this layer.

### **Exosphere :**

- It is the uppermost layer of the Earth's atmosphere.
- It has very thin layer of air.
- Light gases such as helium and hydrogen float into the space from this layer.

## **Weather and Climate**

Weather is the day to day condition of the atmosphere while climate is the average weather conditions which exist over 30-40 years at a given place. Following are the differences between weather and climate:

<b>Weather</b>	<b>Climate</b>
It is the day to day condition of the atmosphere.	It is the average weather conditions of a place which exist over a long period of time.

Weather of a place does not remain constant.

Climate of a place remains constant over a long period of time.

Some factors which affect the weather and climate of a place are:

### Temperature :

Temperature is the degree of hotness or coldness of air. Apart from daily variation, the temperature of the atmosphere also varies from season to season. The incoming solar energy intercepted by the Earth, known as **insolation**, influences the distribution of temperature. Insolation is maximum at the Equator and minimum towards the Poles. Hence the Equatorial Regions have a high temperature while the Polar Regions are mostly covered with snow.



Crowded high rise buildings also lead to an increase in the temperature

Generally the temperature in villages is less than that in the cities. This is because the use of metals and concrete in buildings and asphalt in the construction of roads increases the temperature of an area. Further, the construction of too many buildings traps the warm air and raises the temperature of the cities.

### Air Pressure :

- Air pressure is the pressure which is exerted by the weight of air on the Earth's surface.
- We do not feel the pressure exerted by air since air exerts pressure on us from all sides and our body also exerts a counter pressure.
- The air pressure is highest at the sea level and it decreases with altitude.
- In areas of high temperature, the air gets heated and rises creating a low pressure area. Low pressure areas are identified with cloudy skies and wet weather.
- In areas with low temperature, the air is cold and heavy. Heavy air sinks and creates a high pressure area.
- It is important to remember that air always moves from high pressure areas to low pressure areas.

### Wind :

The movement of air from high pressure areas to low pressure areas is called wind. Winds can be broadly divided into the following three types:

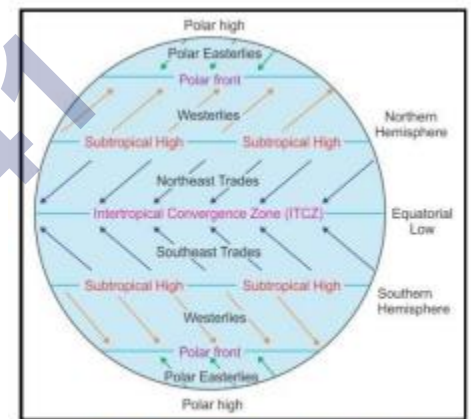
**Permanent Winds:** The trade winds, the Easterlies and the Westerlies are known as permanent winds as they continuously blow throughout the year. These winds always blow in a particular direction.

**Seasonal Winds:** These winds are known as seasonal winds as they change direction during different seasons. The monsoon winds in India are an example of seasonal winds.

**Local Winds:** These winds blow only for a particular period of time during a season or in a year. Land and sea breezes are an example of local winds. The hot and dry local winds which blow over the Northern Indian Plains called *loo* are also an example of local winds.

### Moisture :

- The moisture present in the air is known as **humidity**.
- Days when the air is full of water vapour are called humid days.
- Humidity increases when the air becomes warm as the capacity of air to hold water vapour increases when it is warm.
- Generally we feel uncomfortable on days with high humidity as the sweat from our body does not evaporate easily.
- When water vapour rises, it starts cooling. This results in condensation of water vapour which precipitates in the form of rainfall.
- Jet planes which fly in the sky leave a white trail behind them since the moisture which comes out from their engines condenses.
- Precipitation which falls on to the surface of the Earth is called rainfall.
- Rainfall is essential as the survival of living beings depends upon it. It is an important source of fresh water on the surface of the Earth. Scarcity of rainfall results in droughts. However, uninterrupted heavy downpour of rain for many days can lead to floods.
- Trees play a significant role in holding the rain water. When trees are cut, rainwater flows down the mountains without any obstruction resulting in the flooding of the low lying areas. Based on this, there are three types of rainfall- convective rainfall, orographic rainfall and cyclonic rainfall.



Major pressure belts of the Earth

### Names of Some Measuring Instruments :

Temperature	Thermometer
Atmospheric pressure	Barometer
Rainfall	Rain Gauge
Direction of winds	Wind Vane

## Carbon Dioxide and Global Warming

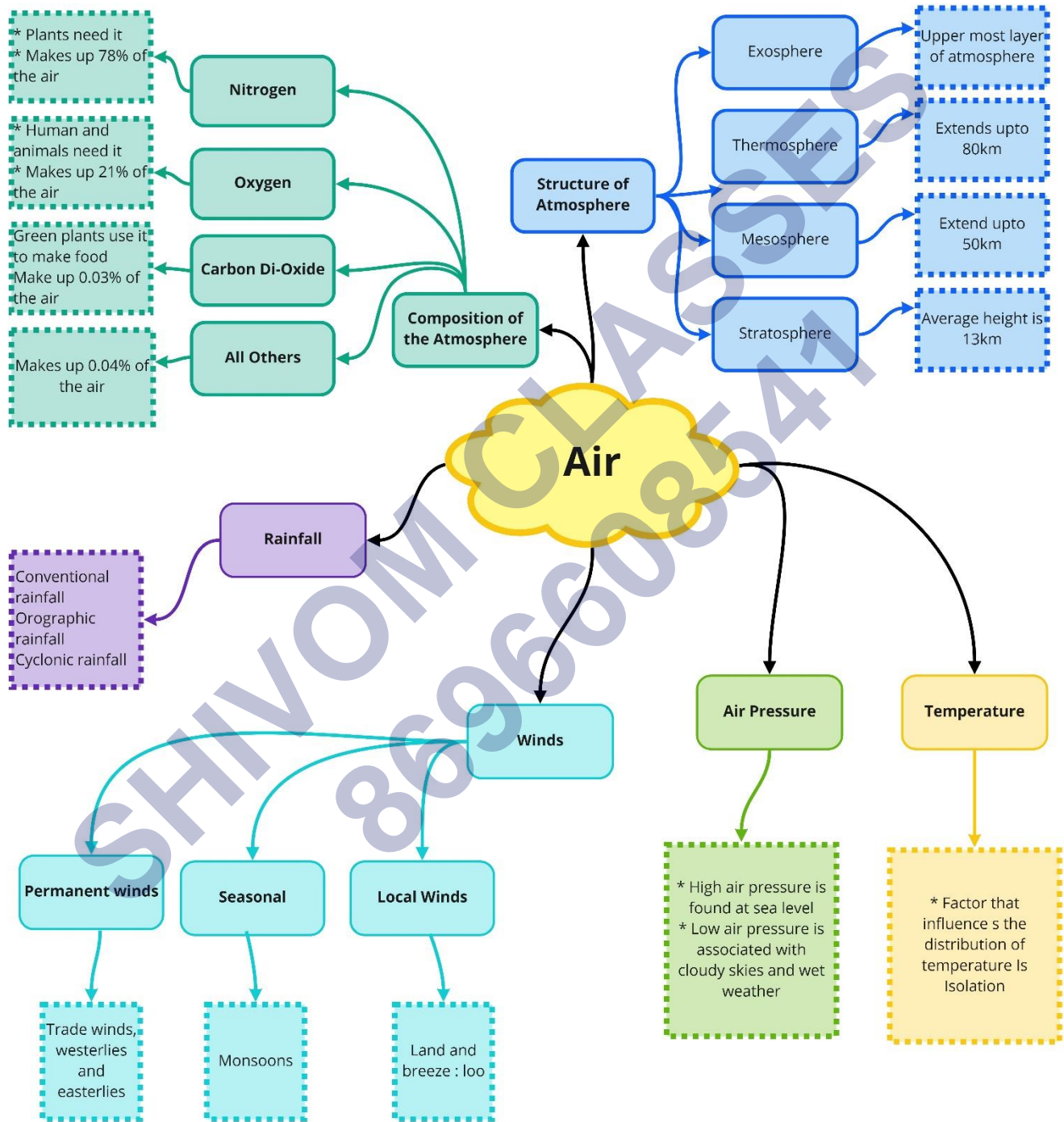
Carbon dioxide traps the heat which is radiated from the Earth. In this way it does not allow the heat to escape to into space. This is why carbon dioxide is called a **green house gas**. The Earth would have been very cold without carbon dioxide. The increased level of carbon dioxide in the atmosphere due to the smoke released by factories and vehicles can increase the temperature of the Earth as a large amount of the gas will trap more heat. This increases the temperature of the Earth and is known as **global warming**.



Global warming results in the melting of the polar snow caps, which increases the sea level resulting in flooding of the coastal

Global warming has resulted in the melting of the polar snow caps. This has led to a rise in the sea level causing floods in the coastal areas. Global warming may also lead to a change in the climate of a place. This can result in the extinction of some species of plants and animals which may not be able to survive in a very warm climate.

Class : 7th Social Studies (Geography)  
Chapter- 4 Air



## Important Questions

### ➤ Multiple Choice Questions:

Question 1. The quantity of oxygen in the air is:

- (a) 78%
- (b) 21%
- (c) 15%
- (d) 10%

Question 2. Ozone layer is found in:

- (a) Troposphere
- (b) Mesosphere
- (c) Thermosphere
- (d) Stratosphere

Question 3. Which gas creates a greenhouse effect?

- (a) Nitrogen
- (b) Oxygen
- (c) Argon
- (d) Carbon dioxide

Question 4. Ionosphere is a part of:

- (a) Troposphere
- (b) Mesosphere
- (c) Thermosphere
- (d) Stratosphere

Question 5. What was invented by Anders Celsius?

- (a) Barometer
- (b) Thermometer
- (c) Rain gauge
- (d) None of the above

Question 6. Which winds change their direction in different seasons?

- (a) Permanent winds



- (b) Seasonal winds
- (c) Local winds
- (d) None of the above

Question 7. Which layer is the upper most layer?

- (a) Troposphere
- (b) Mesosphere
- (c) Thermosphere
- (d) Exosphere

Question 8. Which gas is available most plentiful in the air?

- (a) Nitrogen
- (b) Oxygen
- (c) Argon
- (d) Carbon dioxide

Question 9. Degree of hotness and coldness of the air is called:

- (a) Humidity
- (b) Pressure
- (c) Temperature
- (d) Insolation

Question 10. Atmospheric pressure is measured by:

- (a) Barometre
- (b) Thermometer
- (c) Rain gauge
- (d) None of the above

Question 11. Which of the following gases protects us from harmful sun rays?

- (a) Carbon dioxide
- (b) Nitrogen
- (c) Ozone
- (d) All of these

Question 12. In which direction the wind blows constantly throughout the year in particular direction?

- (a) Permanent winds
- (b) Local winds
- (c) Seasonal winds
- (d) Both (a) and (b)

Question 13. In which layers all weather phenomenon occurs?

- (a) Troposphere
- (b) Stratosphere
- (c) Thermosphere
- (d) Mesosphere

Question 14. What is the result when the air is heated?

- (a) Heavier
- (b) Lighter
- (c) Colder
- (d) Warmer

Question 15. Which is the most important layer of the atmosphere?

- (a) Troposphere
- (b) Thermosphere
- (c) Mesosphere
- (d) None of these

➤ **Fill in the blanks:**

1. The quantity of nitrogen in atmosphere is \_\_\_\_\_.
2. Wind vane shows the direction of the \_\_\_\_\_.
3. In the atmosphere, percentage of oxygen is \_\_\_\_\_ %.
4. When we inhale, we take some amount of \_\_\_\_\_ into our lungs and exhale it.
5. \_\_\_\_\_ play an important role for plants to take nitrogen from air.

➤ **Write true (T) or false (F):**

1. When air is heated, it expands, becomes lighter and goes up.
2. High pressure is associated with clear and sunny skies.
3. All living beings on this earth depend on the atmosphere for their survival.

4. Carbon dioxide is the most plentiful gas in the air.
5. Green plants produce oxygen during photosynthesis.

➤ **Very Short Questions:**

1. How does carbon dioxide create green house effect?
2. What is the significance of greenhouse gas?
3. What happens when air is heated?
4. What is the nature of cold air?
5. Why do green plants use carbon dioxide?
6. What is an important feature of Stratosphere?
7. How is ozone important for us?
8. What is temperature?
9. What is insolation?
10. Why is there no air pressure on the moon?

➤ **Short Questions:**

1. Explain the term dynamic environment.
2. Atmosphere plays a dynamic role how?
3. What is air circulation?
4. Define insolation.
5. Name the instrument which measures temperature?

➤ **Long Questions:**

1. Describe the composition of atmosphere.
2. Give an account of the composition of the atmosphere.
3. How do Bacteria help plants use nitrogen?
4. How does nature balance our life? What is the result if this balance is disturbed?
5. Why is temperature in cities much higher than that of villages?

**ANSWER KEY –**

➤ **Multiple Choice Answer:**

1. (b) 21%
2. (d) Stratosphere

3. (d) Carbon dioxide
4. (c) Thermosphere
5. (b) Thermometer
6. (b) Seasonal winds
7. (d) Exosphere
8. (a) Nitrogen
9. (c) Temperature
10. (a) Barometre
11. (c) Ozone
12. (a) Permanent winds
13. (a) Troposphere
14. (b) Lighter
15. (a) Troposphere

➤ **Fill in the blanks:**

1. 78%
2. Wind
3. 21
4. Nitrogen
5. Bacteria

➤ **Write true (T) or false (F):**

1. True
2. False
3. True
4. False
5. True

➤ **Very Short Answer:**

1. Carbon dioxide creates greenhouse effect by trapping the heat radiated from the earth.
2. Without the greenhouse gas the earth would have been too cold to live in.
3. When air is heated, it expands, becomes lighter and goes up.

4. It has tendency to go down.
5. Green plants use carbon dioxide to make their food and release oxygen.
6. Stratosphere contains a layer of ozone gas.
7. It protects us from the harmful effect of the sunrays.
8. The degree of hotness and coldness of the air is known as temperature.
9. Insolation is the incoming solar energy intercepted by the earth.
10. There is no air on the moon and therefore no air pressure.

### ➤ Short Answer:

1. The physical and biological elements in the environment are dynamic in nature changes take place slowly and suddenly in the nature of landforms. The circulation air and water brings about changes in the climatic conditions in different seasons.
2. Among the four major elements of environment, the atmosphere is most dynamic as changes take place in it not only from one season to another but also over shorter periods of few hours.
3. When air is heated it becomes lighter and goes up. Cold air is denser and heavy that is why it tends to sink down. When hot air rises, cold air from surrounding area rushes there to fill the gap. This is how air circulation takes place.
4. Insolation is the incoming solar energy intercepted by the earth. The amount of insolation decreases from the equator towards poles.
5. Temperature is measured with the help of thermometer. Outdoor temperature is measured with the help of mercury thermometer.

### ➤ Long Answer:

1. The atmosphere consists of mixture of gases having a relatively uniform composition in the lower layer. An average sample of pure dry air consist of nitrogen (78 %), oxygen (21%) and argon (0.9 %), other gases such as carbon dioxide, hydrogen helium and ozone are present in minute quantities. The lower layer of atmosphere also contains water vapour in variable quantities.
2. Our atmosphere is composed of mainly two gases—nitrogen (78%) and oxygen (21%). Other gases like carbon dioxide, helium, ozone, orgon and hydrogen are found in lesser quantities. Apart from these gases, tiny dust particles are also present in the air.
3. Nitrogen is essential for the survival of plant. But plants cannot take nitrogen directly from the air. Bacteria, that live in the soil and roots of some plants, take nitrogen from the air and change its form so that plants can use it.
4. Green plants use carbon dioxide to make their food and release oxygen. Humans or

animals release carbon dioxide. The amount of carbon dioxide released by humans or animals seems to be equal to the amount used by the plants which make a perfect balance. But this balance is disturbed by burning of fuels, which add billions of tons of carbon dioxide in the atmosphere. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate.

5. In cities we find high rise buildings. The concrete and metals in these buildings and the asphalt of roads get heated up during the day. This heat is released during the night.

Another reason is that the crowded high rise buildings of the cities trap the warm air and thus raise the temperature of the cities.

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