Our earth is a surrounded by a huge blanket of air called atmosphere. All living beings on this earth depend on the atmosphere for their survival. It provides us the air we breathe and protects us from the harmful effects of the sun's rays. Without this blanket of protection, we should be baked alive by the heat of the sun during day and get frozen during night. So it is this mass of air that has made the temperature on the earth livable.

Composition of the Atmosphere

- Nitrogen and oxygen are two gasses which make up the bulk of the atmosphere. Carbon dioxide, helium, ozone, argon and hydrogen are found in lesser quantities.
- Apart from these gases, tiny dust particles are also present in the air. Nitrogen is the most plentiful gas in the air. When we inhale, we take some amount of nitrogen into our lungs and exhale it.
- But plants need nitrogen for their survival. They cannot take nitrogen directly from the air. Bacteria, which live in the soil and roots of some plants, take nitrogen from the air and change its form so that plants can use it. Oxygen is the second most plentiful gas in the air.
- Humans and animals take oxygen from the air as they breathe. Green plants produce oxygen during photosynthesis. Carbon dioxide is another important gas. 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. However, the balance is upset by burning of fuels, such as coal and oil.
- They add billions of tons of carbon dioxide into the atmosphere each year. As a result, the increased volume of carbon dioxide is affecting the earth's weather and climate.

Structure of the Atmosphere: Our atmosphere is divided into five layers starting from the earth's surface. These are troposphere, stratosphere, mesosphere, thermosphere and exosphere.

Troposphere: this layer is the most important layer of the atmosphere. Its average height is 13 km. The air we breathe exists here, phenomena like rainfall, fog and hailstorm occur in this layer.

Stratosphere: above the troposphere lies the stratosphere. It extends up to a height of 50 Km. this layer is almost free from clouds and associated weather and phenomenon, making conditions most ideal for flying aero planes. One important feature of stratosphere is that it contains a layer of ozone gas. It protects us from the harmful effect of the sun rays.

Mesosphere: this is the third layer of the atmosphere. It lies above the stratosphere. It extends up to the height of 80 Km. meteorites burn up in this layer on entering from the space.

Thermosphere: in thermosphere temperature rises very rapidly with increasing height. Ionosphere is a part of this layer. It extends between 80-400 km. this layer helps in radio transmission. In fact, radio waves transmitted from the earth are reflected back to the earth by this layer.

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Exosphere: the upper most layer of the atmosphere is known as exosphere. This layer has very thin air. Light gases like helium and hydrogen float into the space from here.

Significance of Atmosphere

- The lower layer of the atmosphere consists of life-giving oxygen which is require for breathing.
- Nitrogen and carbon dioxide are required by plants for growth and for preparing food
- The atmosphere (Ozone layer in stratosphere prevents the harmful ultraviolet rays of the sun from reaching the earth's surface.
- The atmosphere acts like a **greenhouse**. It controls the temperature on the earth. **Greenhouse effect** is the effect produced by carbon dioxide and water vapour in the upper atmosphere which raises the atmospheric temperature by trapping the heat radiated from the Earth's surface. Carbon dioxide is, therefore, called a greenhouse gas. Other greenhouse gases are methane, chlorofluorocarbons and nitrogen oxides.
- The change of weather and climate is due to the presence of the atmosphere.
- The presence of water vapours in the atmosphere causes condensation and precipitation. The dust particles form the nucleus for condensation which results in the formation of clouds that cause rainfall and snowfall.
- It shields us from meteors.
- It protects us against falling debris from space
- It helps in communication as sound waves can travel through air.
- Nitrogen is required to maintain the fertility of the soil and is vital for plants.

Weather and Climate: Weather is hour-to-hour, day to day condition of the atmosphere. A hot or humid weather may make one irritable. A pleasant, breezy weather may make one cheerful and even plan for an outing. However, the average weather condition of a place for a longer period of time represents the climate of a place. Climate is defined as the average overall condition of temperature, atmospheric pressure, winds, humidity, precipitation, etc. over a large area for a longer period of time. Climate should not be confused with weather. Climate is the regular pattern of weather condition at a place over a period of time.

Temperature: The degree of hotness and coldness of the air is known as temperature. The temperature of the atmosphere changes not only between day and night but also from season to season. Summers are hotter than winters.

- An important factor that influences the distribution of temperature is insolation. Insolation is the incoming solar energy intercepted by the earth.
- The amount of heat depend on latitudinal location of any place.
- The temperature at any place also depends upon the height above sea level and distance from the sea. The amount of insolation decreases from the equator towards the poles. Therefore, the temperature decreases in the same manner. If the earth's temperature rises too high, it would become too warm for some crops to grow.

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Factors Influencing Atmospheric Temperature:

Latitude: The higher the latitude, the lower the temperature. It happens because the sun's rays fall vertically on the equator, while they slant increasingly with the increasing distance from the equator.

Altitude: The higher the altitude, the lower the temperature.

Distance from the sea: Water always takes longer to heat or cool. Thus, places near the sea have a mild climate while places away from the sea have an extreme climate.

Prevailing winds: A cooler wind would lower the temperatures and vice versa.

Distribution Of Temperature: On the basis of the amount of heat received on the earth's surface the earth has been divided into three distinct Hot Zones.

1.Torrid Zone: This zone lies between the two tropics—the Tropic of Cancer (23½°N) and the Tropic of Capricorn (23½° S). This is the hottest part of the earth as this region receives the maximum insolation.

2.Temperate Zones: North temperate Zone that lies between the Tropic of Cancer ($23^1/_2$N) and the Arctic Circle ($66^1/_2$N) and the South Temperate Zone that lies between the Tropic of Capricorn ($23^1/_2$S) and the Antarctic Circle ($66^1/_2$ S). These zones receive less insolation than the Torrid Zone and enjoy a moderate temperature which is neither too cold nor too hot.

3.Frigid Zones: The North Frigid Zone lies between the Arctic Circle (661/ 2° N) and the North Pole (90°N) while the South Frigid Zone lies between the Antarctic Circle ($66^1/_2$° S) and the South pole (90° S) .This region receives minimum insolation.

Measuring Temperature: Temperature is measured by an instrument called thermometer. Fahrenheit and Celsius are the most common temperature scales.