

UNIT

4

Atmosphere



Learning Objectives

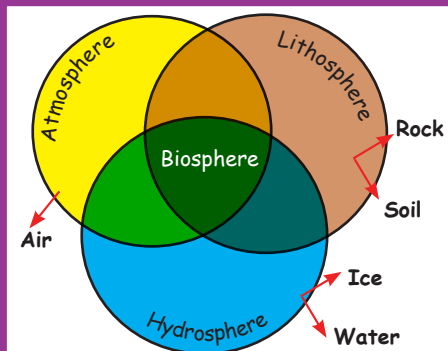
Students can:

- ❖ know about the Biosphere.
- ❖ understand the Atmosphere.
- ❖ understand the different types of wind and clouds.

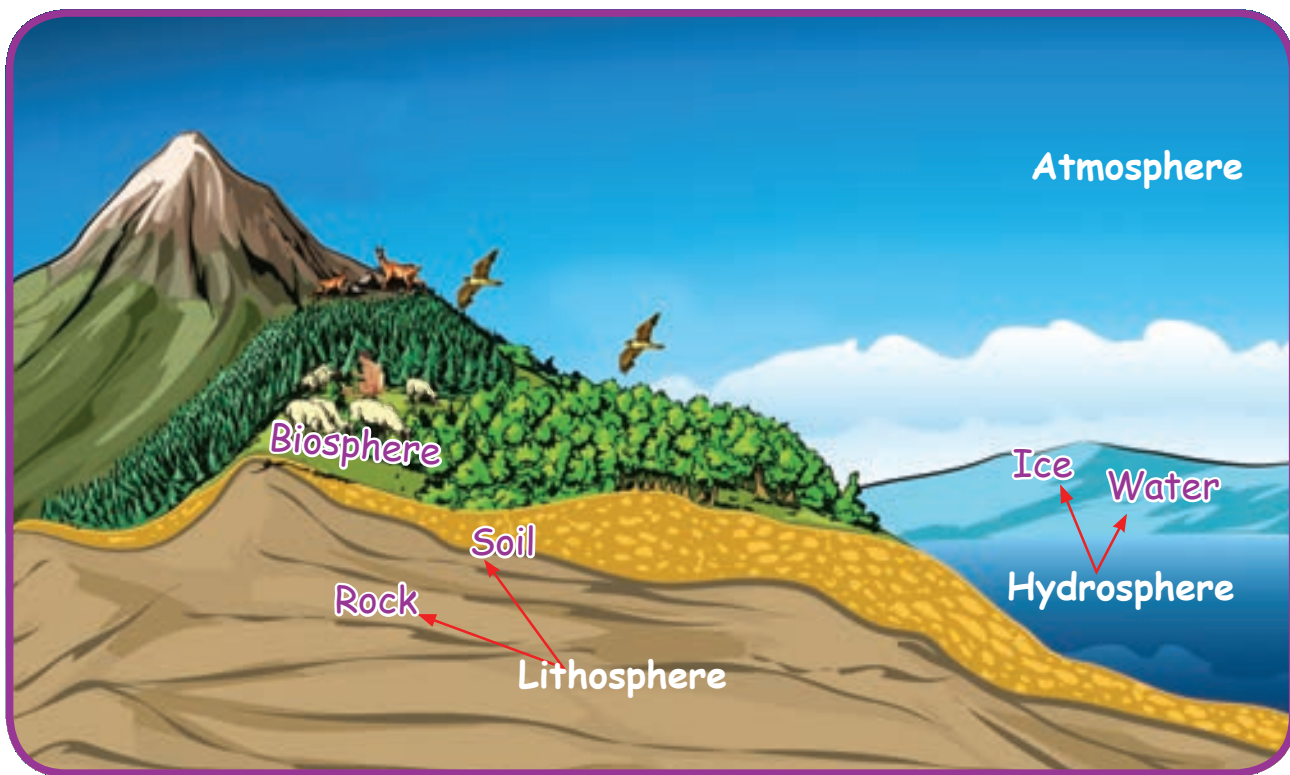


Biosphere

Biosphere is the combination of **Lithosphere**, **Hydrosphere** and **Atmosphere** that can support life.



- **Lithosphere** - Land on Earth
- **Hydrosphere** - Water on Earth
- **Atmosphere** - Air on Earth
- **Biosphere** - Life on Earth



Atmosphere




Atmosphere is the envelope of air around the Earth.


Weather



Weather is a day to day conditions of atmosphere at any place in regard to temperature, pressure, wind, humidity and rainfall.

Climate

Climate is the average weather condition of a vast area over more than 30 years.



**ACTIVITY**
Let us do



Take a ball and throw it up in the air observe the increasing speed of the ball when it comes down.





Think



When is **World Environment Day** Celebrated?

Composition of air

Oxygen 21%

Nitrogen 78%

Other gases 1%

Carbon dioxide, Ozone,
Orgon, Neon, Helium, Hydrogen, Krypton, Xenon, Methane

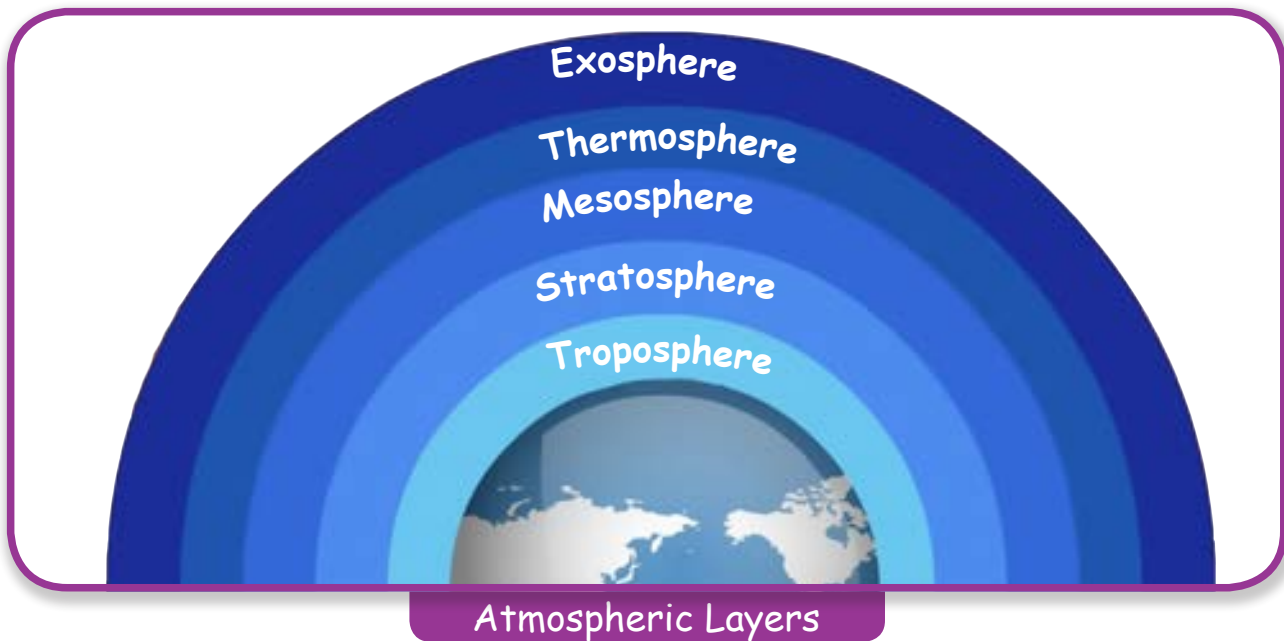
Atmospheric Layers

We know that the gravitational force increases near the Earth and decreases as we go higher. As a result the density of air also differs and can be found in five layers called **Troposphere**, **Stratosphere**, **Mesosphere**, **Thermosphere** and **Exosphere**. All weather changes occur in the **Troposphere**. The study of weather is called **Meteorology**.



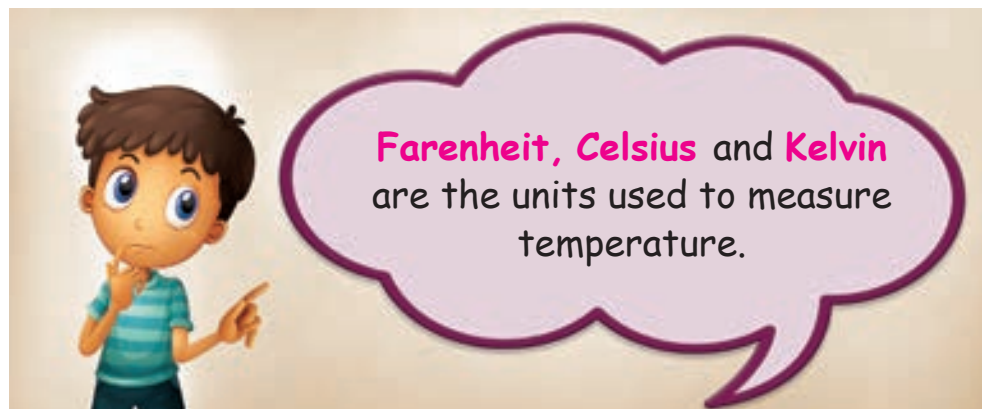
The word **climate** is derived from the Greek word called **clima**.





World Meteorological Day - March-23

World Ozone Day - September-16



ACTIVITY

Let us do

Write the significance of
the following gases.



Oxygen

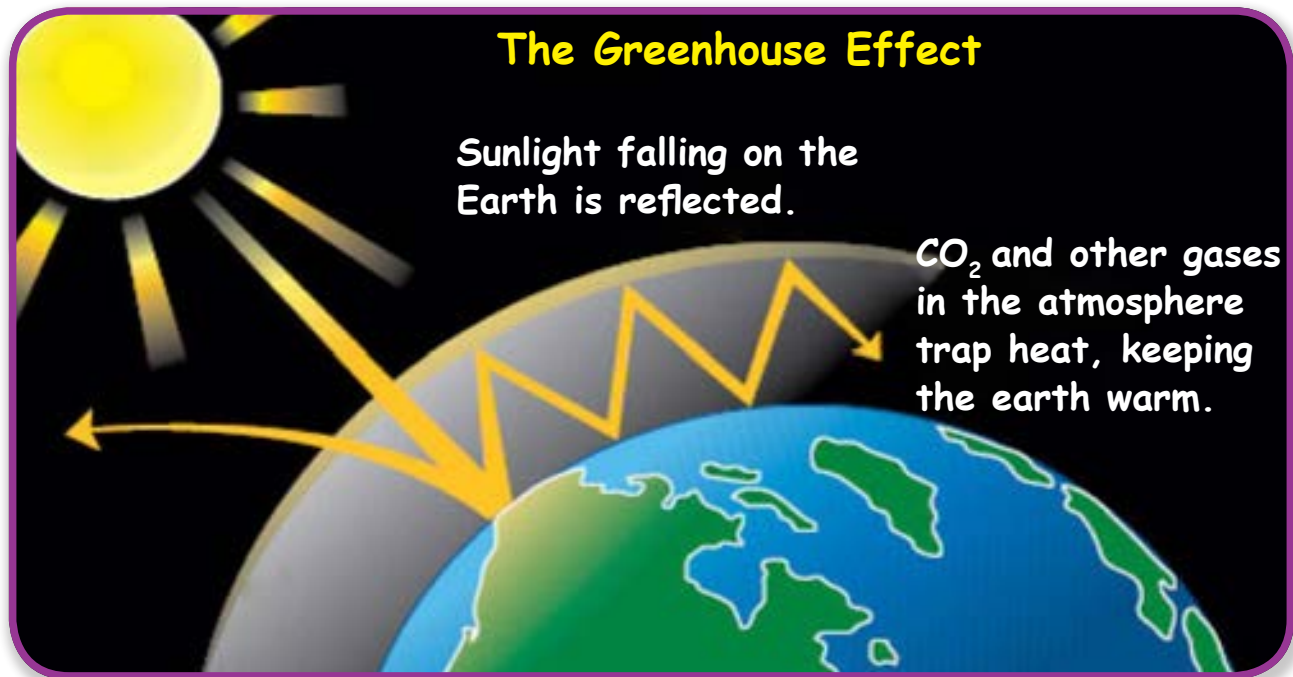
Carbon dioxide

Ozone



Solar Radiation

The sun is the only source of light to all the planets in the solar system. The land, water and air in our planets receives heat from the sun. The Earth receives heat energy from the Sun in the form of radiation. It is called **solar radiation**.



Elements of climate

1) Temperature 2) Pressure 3) Wind 4) Clouds 5) Rainfall

1) Temperature

- Land - Conduction ● Water - Convection
- Atmosphere - Terrestrial radiation

The earth has the capacity to reflect the sun's rays. The temperature is not same every where. **Latitude, altitude, distance from the sea, position of the mountains** are some of the factors that determine the temperature of a place.

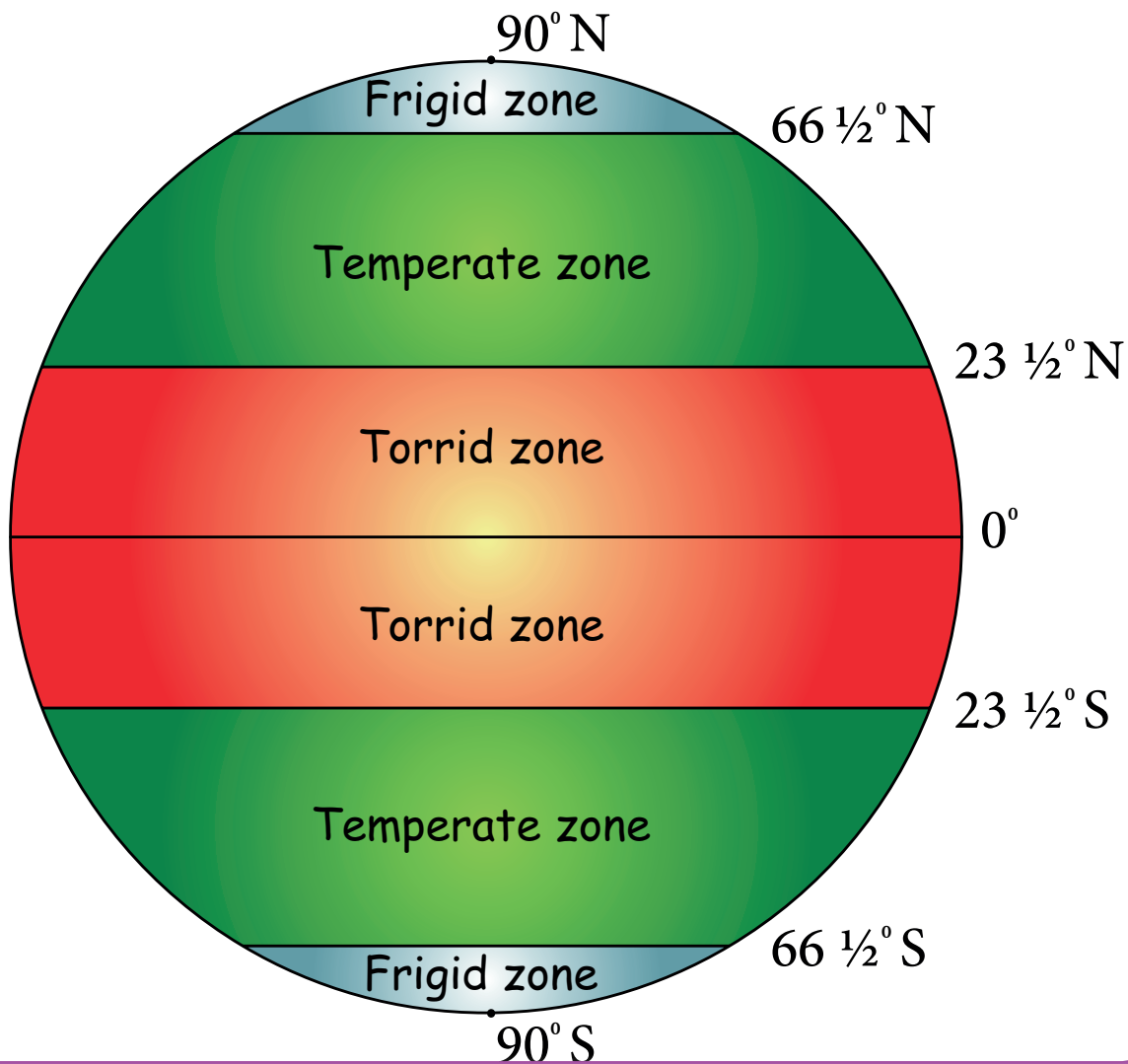


The imaginary lines drawn horizontally on the Earth surface from West to East are called **latitudes**.

The imaginary lines drawn Vertically on the Earth surface from North to South are called **Longitudes**.

Latitudes and Longitudes help us to locate a place correctly.

Heat Zones of the Earth



Why does heat vary from morning to evening?

It is because of the sun's rays.

The land is divided into various heat zones according to the fall of sun's rays on the surface of the Earth.

- The zone between Tropic of Cancer and Tropic of Capricorn is called **Tropical or Torrid zone**, where the sun's rays fall vertically.
- The zone between $23\frac{1}{2}^{\circ}$ N to $66\frac{1}{2}^{\circ}$ N latitude and $23\frac{1}{2}^{\circ}$ S to $66\frac{1}{2}^{\circ}$ S latitude which receives slanting rays of the sun is called **Temperate zone**.
- The zone which receives the extreme slanting rays of the sun and experiences extremely low temperature is called **Frigid zone**.

2) Pressure

When the temperature increases, pressure decreases and when the temperature decreases, pressure increases.

Barometre



The average pressure of wind at sea level is **1013 mb.**(milli bar)

The instrument which is used to measure the pressure of the wind - **Barometre**

Anemometre



The instrument which is used to measure the speed of the wind - **Anemometre**

Wind Vane



The instrument which is used to measure the direction of the wind is **Wind Vane**

3) Wind

The air which moves horizontally from high pressure area to low pressure area is called **wind**. Air never moves in one direction. It differs from place to place and time to time. This is due to the rotation of the earth.

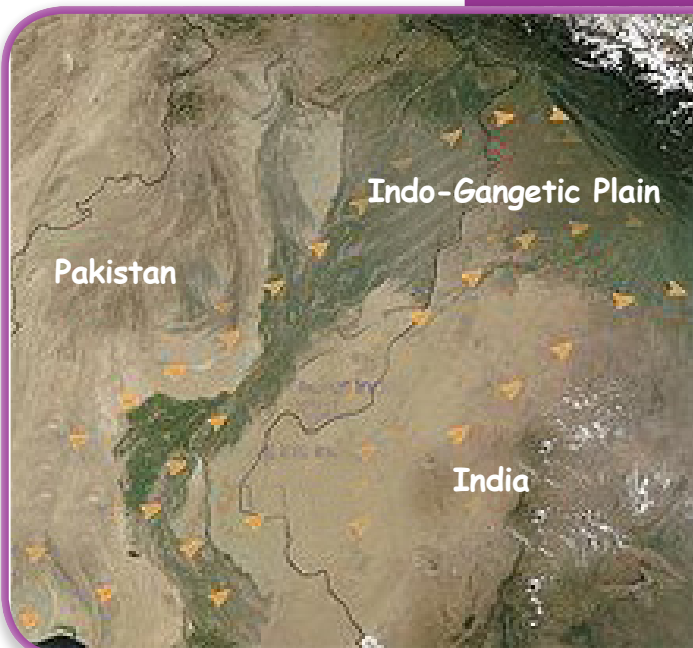


Wind energy is a form of renewable energy. Wind turbines convert the kinetic energy into **mechanical energy**. A generator can convert mechanical energy into **electrical energy**.

Wind Mill



Loo Wind



Loo Wind

Loo is a strong, dusty, hot and dry summer wind which blows over the **North Western India** during the months of May and June.

Different types of wind

Planetary wind

This wind blows in the same direction throughout the year.

Monsoon wind

The word monsoon is derived from the Arabic term 'mausim' which means season. Monsoon wind is the seasonal wind.

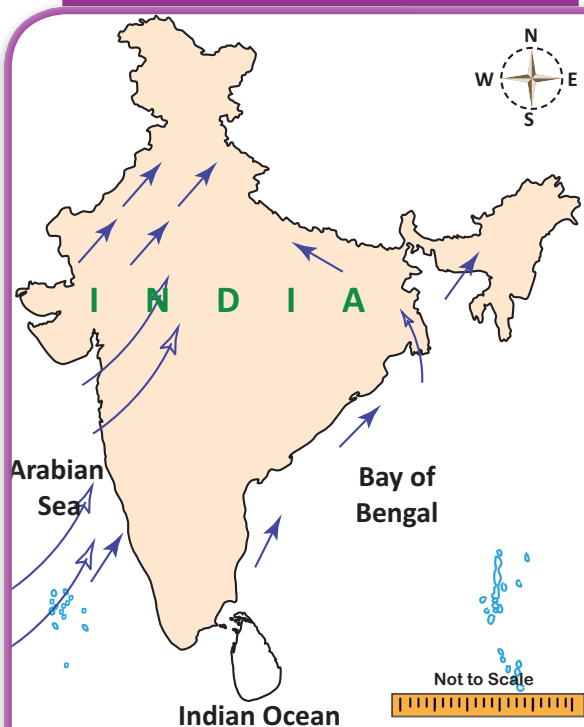
Types of Monsoon winds in India

● South West monsoon wind

● North East monsoon wind



Direction of
South West Monsoon Wind

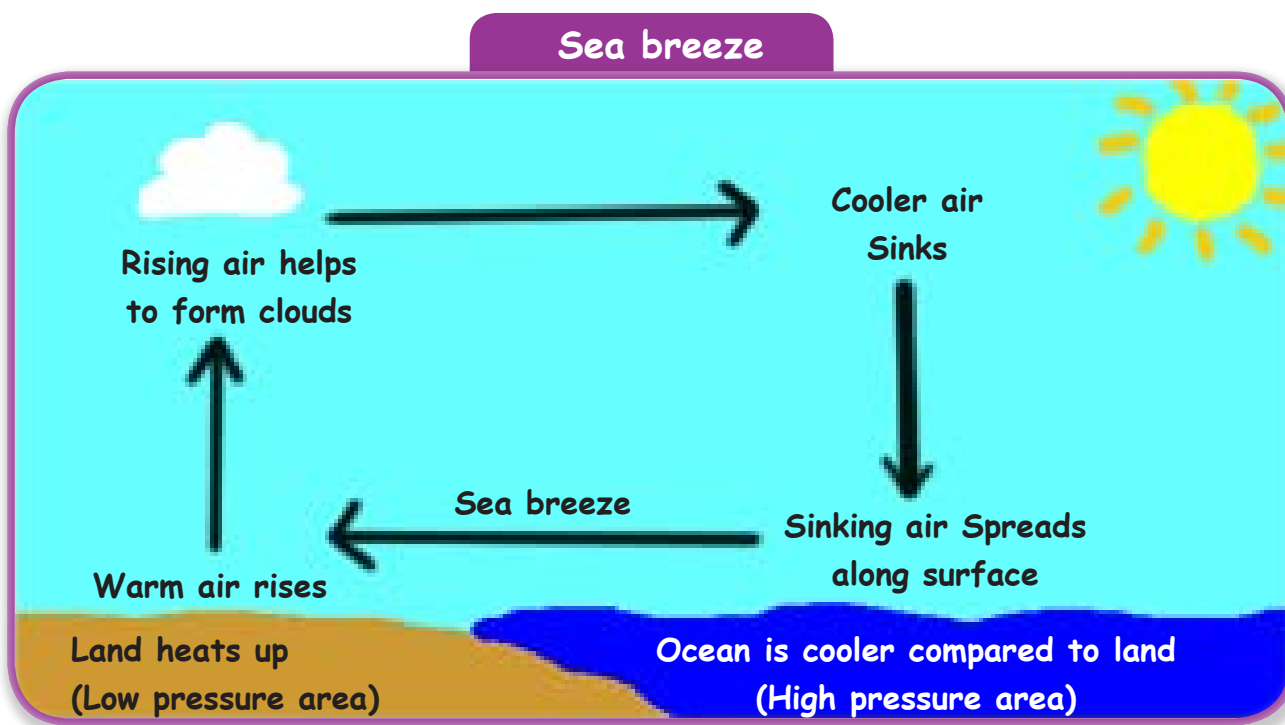


Direction of
North East Monsoon Wind



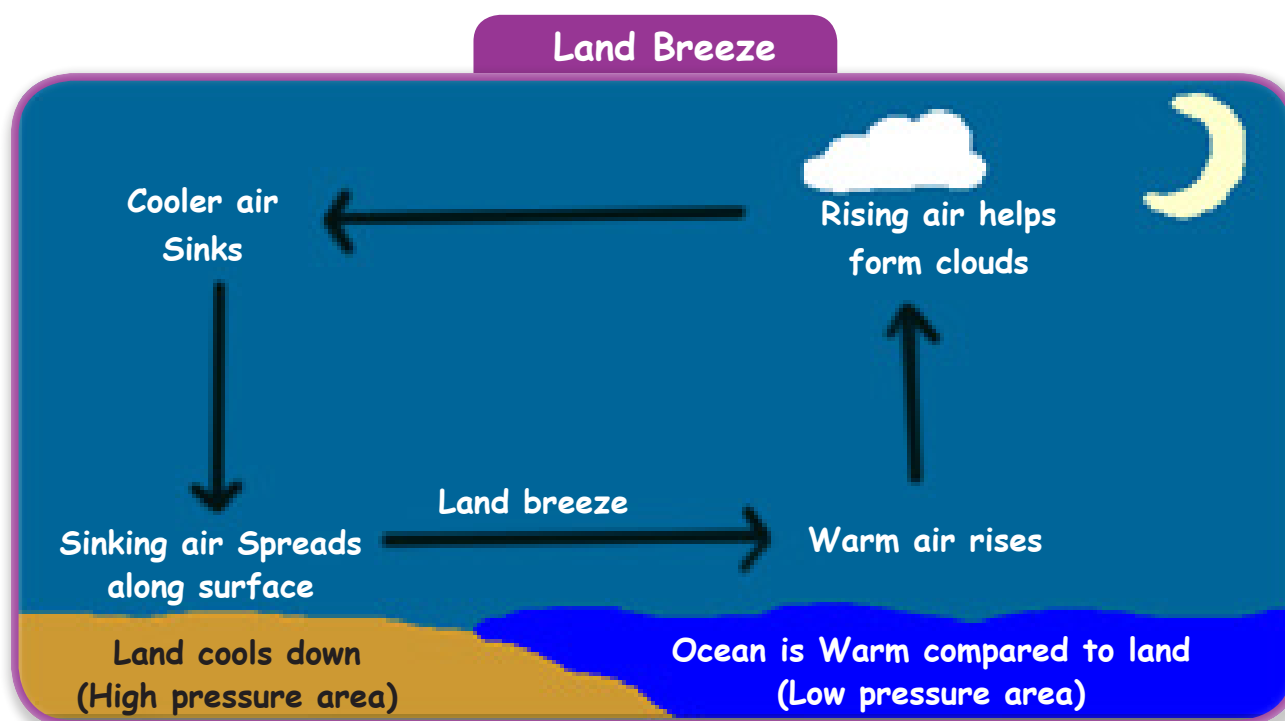
Sea breeze

Sea breeze blows from **sea to land** in the evening.



Land Breeze

Land Breeze blows from **land to sea** in the morning.



Local wind

Local wind affects the weather.

- Warm local wind - North West India. E.g. Loo
- Cool local wind - North East India E.g. Norwesters.

Jet streams

Air currents in the upper layers of atmosphere is known as **Jet streams**. It could determine the arrival and departure of monsoon winds in India.

Jet streams



Cyclone (Hurricane)

Cyclone changes its position and direction with time to time. The speed of wind also changes with time. It gives heavy rainfall.

Cyclone (Hurricane)



4) Clouds

Clouds are large collection of very tiny droplets of water . These are divided into four types on the basis of appearance and height. They are:

- Cirrus clouds ● Stratus clouds
- Cumulus clouds ● Nimbus clouds

Cirrus cloud

Cirrus cloud appears like a silver grey fish at a very high altitude in the sky. These may not give rain.

Cirrus cloud



Stratus cloud



Stratus cloud

Stratus cloud is grey in colour and are spreadout. They may give small shower.

Cumulus cloud



Cumulus cloud

Cumulus cloud looks like a Puffy White cotton and gives convectional rainfall. These clouds are associated with rainfall, lightning and thunder.

Nimbus cloud

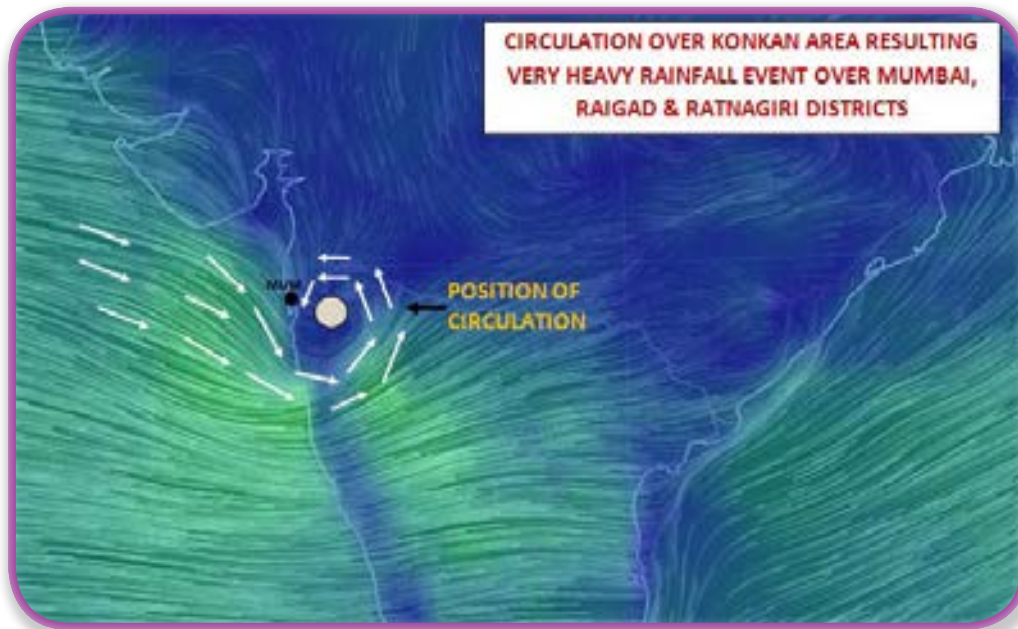


Nimbus cloud

Nimbus cloud appears as dark or grey in colour. It gives heavy rainfall. It is called vertical or rain clouds.

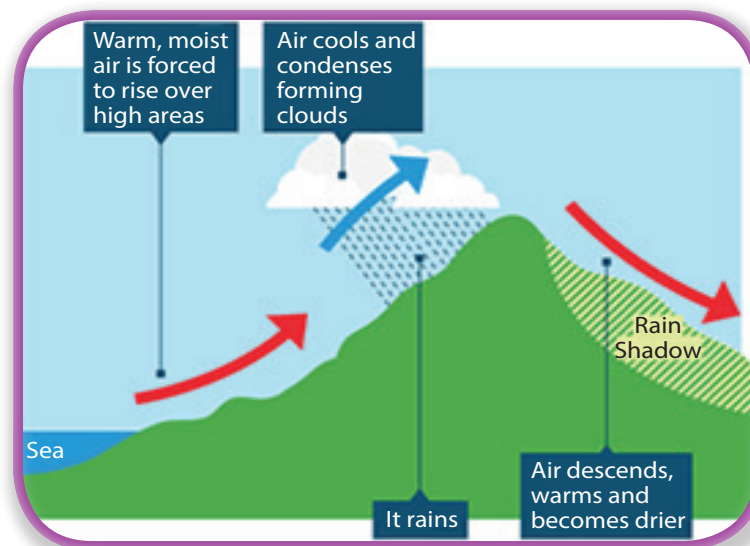
5) Rainfall

Condensation of the Water vapour causes **rainfall**. Rain water must be saved and not be wasted.



Convective Rainfall

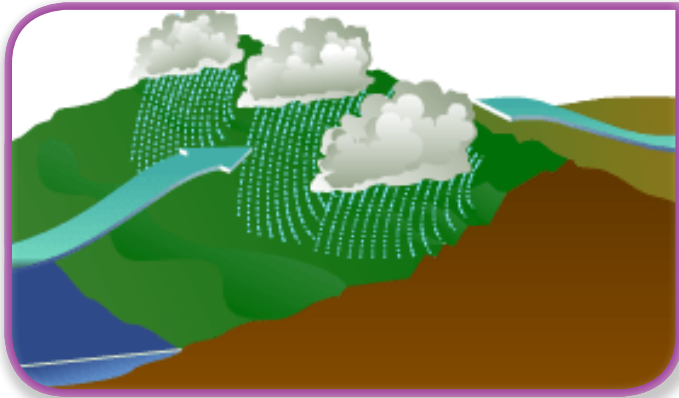
During summer solar insolation takes place in land and water evaporates from **lakes, ponds, seas, oceans** and **vegetations**. Due to this, a heavy rainfall with lightning and thunder occurs in the evening for a short period.



The natural materials and living things, including sunlight are called **natural environment**.

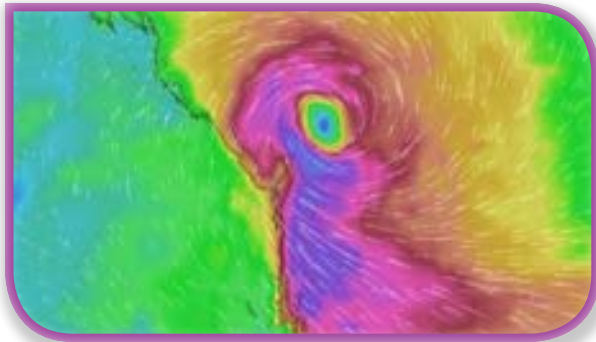
Orographic Rainfall

When the moisture laden winds from the sea rises as it moves over a mountain range, it becomes cool and causes heavy rainfall. The opposite side of the mountain is called Leeward side. It receives very little rainfall.



Cyclonic rainfall

The warm air from the hot area is heated and moves upwards. Hence a low pressure area is developed and it attracts air from high pressure area. Owing to Earth's rotation a circular motion of winds develop. It gets cooled and brings heavy rainfall.



Rain water harvesting

Rain water harvesting is a technique of collection and storage of rainwater into natural reservoirs or tanks, or the infiltration of surface water into subsurface aquifers (before it is lost as surface runoff). One method of rainwater harvesting is **Rooftop Harvesting**.



Recap

- Biosphere is the combination of lithosphere, hydrosphere and atmosphere that can support life.
- Climate is the average weather condition of a vast area over more than 30 years.



Glossary

- Condensation** : process of gas changing to liquid
- Reservoir** : large lake
- Vegetation** : plant



EVALUATION



I. Fill in the blanks.

1. The atmosphere is divided into _____ layers.
a) four b) five
c) six d) seven
2. The Earth receives heat energy from the _____.
a) Moon b) Mars
c) Sun d) Venus
3. World Meteorological Day
a) March-20 b) March -21
c) March-22 d) March-23
4. The study of weather is called _____.
a) Meteorology b) Ecology
c) Archaeology d) Sociology
5. Zone located in between Tropic of cancer and Tropic of Capricorn is _____ zone
a) Temperate b) Subtropical
c) Cold d) Torrid
6. _____ is used to measure pressure in the air.
a) Barometer b) Thermometer
c) Anemometer d) Wind vane





7. Monsoon is derived from the _____ word.

- a) Greek b) Arabian
- c) English d) Latin

8. Vertical cloud is called _____.

- a) Cirrus cloud b) Stratus clouds
- c) Cumulus clouds d) Nimbus clouds.

9. _____ clouds give convectional rainfall.

- a) Cirrus b) Stratus
- c) Cumulus d) Nimbus

10. Statement I - The instrument used to measure wind direction is wind vane.

Statement II - Light travels faster than sound.

- a) Statement I is True, II is False
- b) Statement I, II are True
- c) Statement I, II are False
- d) Statement I is False, II is True

II. Fill in the blanks.

1. The instrument used to measure heat _____.
2. The imaginary lines drawn parallel to the surface of the earth is _____.
3. Sea breeze blows from _____ in the evening.
4. _____ are rain clouds.

III. Match the following.

1	Cirrus clouds	Grey sheet
2	Stratus clouds	Storm cloud
3	Cumulus clouds	do not give rain
4	Nimbus clouds	Looks like Puffy White cotton



IV. State True/ False.




1. All weather changes occur in the Troposphere. ()
2. Latitudes and Longitudes help us to locate a country. ()
3. Atmosphere gets heated by conduction than solar radiation. ()
4. The main reason for the change of wind direction is to Earth rotation. ()
5. Cyclone moves in anti-clock-wise direction. ()

V. Answer the following.

1. What is climate?
2. Name the atmospheric layers.
3. Write a short note on the Nimbus clouds.
4. Write a short note on the orographic rainfall.

VI. Answer in detail.

1. Write about Jet Streams.
2. Explain the types of winds.



**FUN WITH
ACTIVITY**



Project

Draw **Heat Zones**.

