



# GEOGRAPHY

Physical Geography  
World Geography  
Indian Geography

**FIRST STEP**

NCERT Based Course for CSE  
after class 12





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## **GEOGRAPHY**

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# GEOGRAPHY

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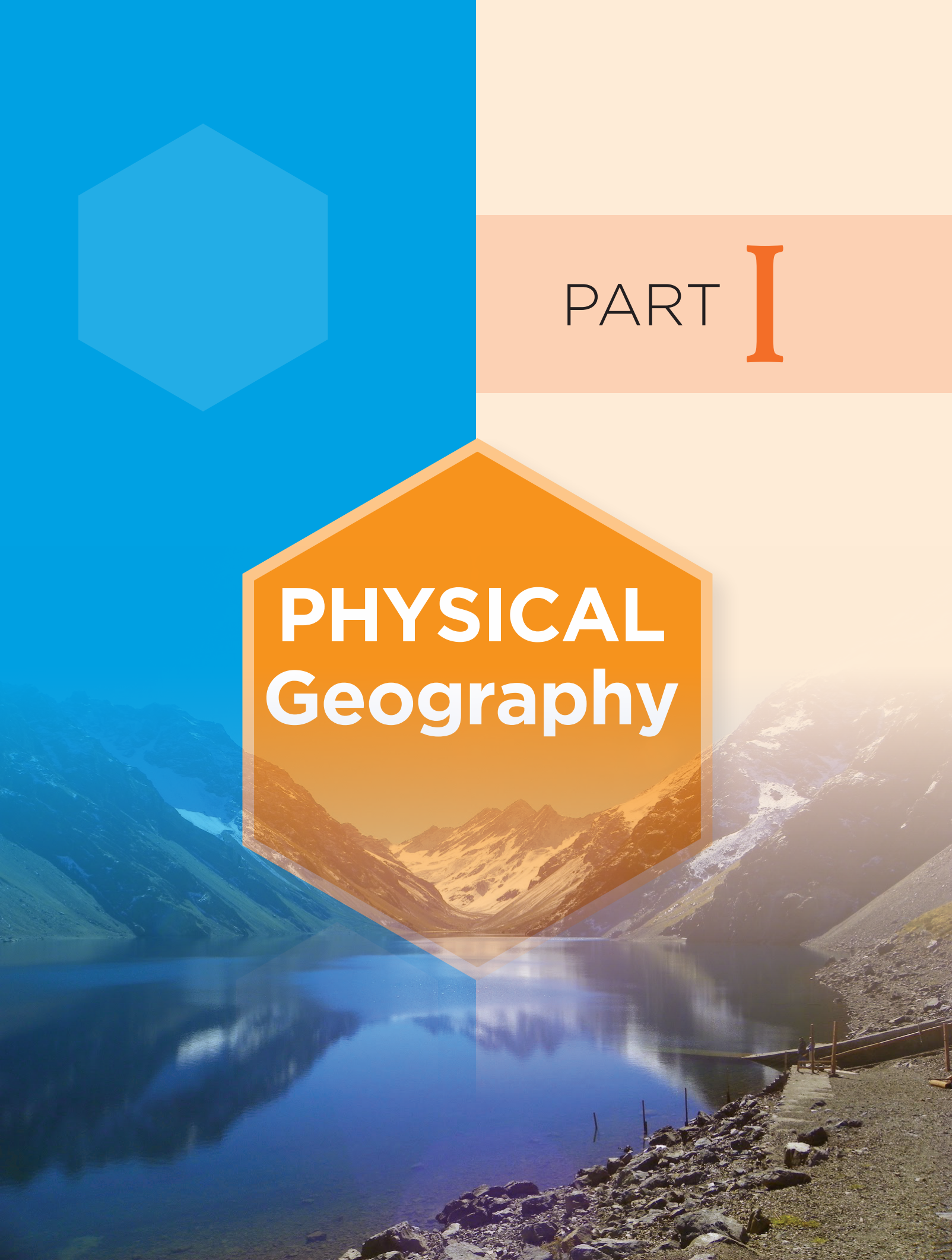
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PART I

**PHYSICAL  
Geography**



## 1.1 Introduction

The word 'geography' originates from two Greek words. The first is 'geo' which means 'the Earth' and the second Greek word is "graph" which means 'to write').

Geography is the science that deals with the description of the Earth's surface. Geography is a multidisciplinary field that studies spatial patterns and phenomena.

Geography as a discipline is related to space and takes note of spatial characteristics and attributes.

## 1.2 The Universe

Our earth, with all its diversity along with other planets and their satellites, the sun, the moon, the many galaxies (huge groups of millions of stars) form the Universe. There are also countless asteroids and comets in orbit around the Sun. All these are also part of the Universe. It extends much farther than can be seen by the most powerful telescope. No one knows where the Universe ends.

When we look up at the sky on a clear night, we see many points of light – most of which are stars. Stars are huge balls of bright, hot glowing gasses. The 'Sun' is also a star. It is the star nearest to earth – about 150 mk (million kilometers) away.

The sun, the moon and all those objects shining in the night sky are called celestial bodies. Some celestial bodies are very big and hot. They are made up of gasses.

- They have their own heat and light, which they emit in large amounts. These celestial bodies are called stars. The Sun is a star.

While watching the night sky, you may notice various patterns formed by different groups of stars. These are called constellations. Ursa Major or Big Bear is one such constellation.

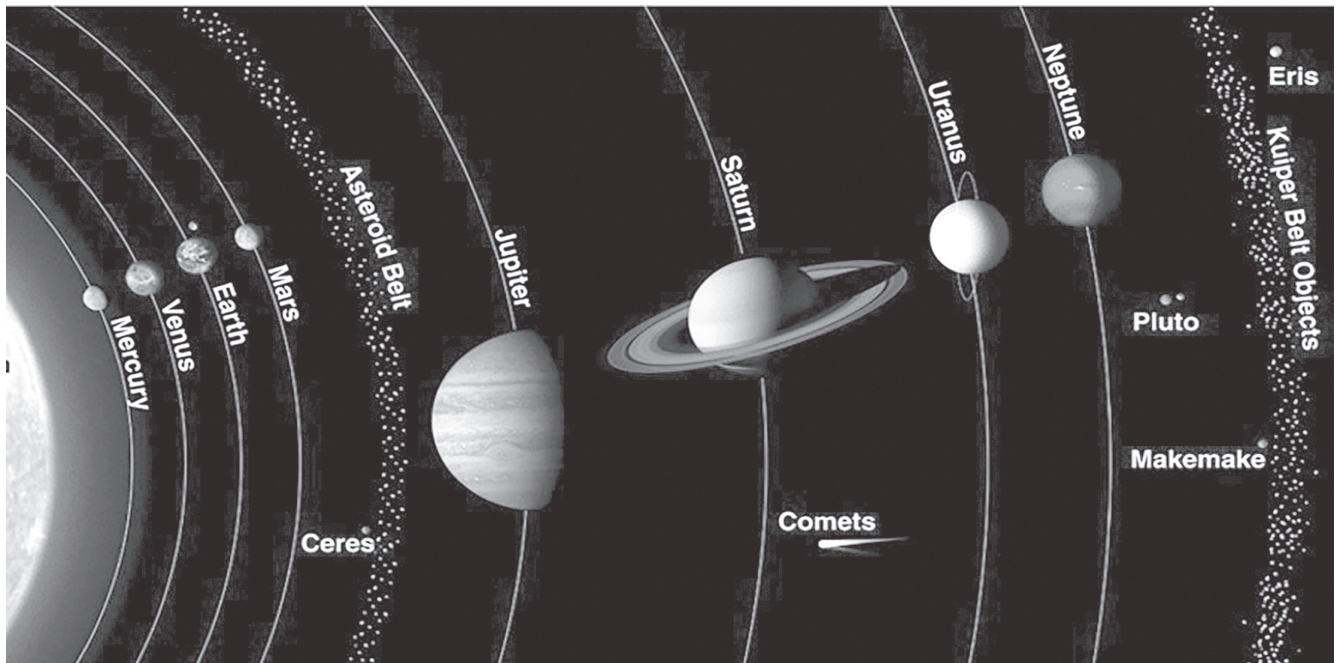
- One of the most easily recognisable constellations is the Saptarishi (Saptaseven, rishi-sages). It is a group of seven stars that forms a part of the Ursa Major Constellation.

Some celestial bodies do not have their own heat and light. They are lit by the light of the stars. Such bodies are called planets. The word 'planet' comes from the Greek word "Planetai" which means 'wanderers'.

- The earth on which we live is a planet. It gets all its heat and light from the sun, which is our nearest star.

### 1.3 The Solar System

A Solar System consists of a star in the middle with a number of planets orbiting around it. The earth is a part of its Solar System. It is one of the eight planets of the Solar System that has the Sun (a star) in the middle and the eight planets moving around it.



#### Inner Planets/ Terrestrial Planets

- The planets that are collectively thought of as belonging to the inner Solar System are Mercury, Venus, Earth, and Mars.
- These four objects are called the terrestrial planets because they resemble one another (specifically, Earth) in their structure: a metallic core, surrounded by a rocky mantle and thin crust.
- There are three moons in the terrestrial zone as well: Earth's moon, and the two moons of Mars: Phobos and Deimos.

#### Outer Planets / Gas Giants / Jovian Planets

- Gas giant planets are so named because they are much larger than the terrestrial planets and they have atmospheres so thick that the gas is a dominant part of the planets' structure. Jupiter, Saturn, Uranus, and Neptune are all categorized as gas giants.

#### The Sun

- Sun is a star with a diameter of 109 times of earth and a mass of 3.30 lakh times of Earth, roughly accounting for 99.9% of total mass of the Solar system.
- Sun is mostly made of Hydrogen and Helium and is a main sequence yellow dwarf.
- The Sun has a core at its center; a radiative zone surrounding the core; a convective zone surrounding the radiative zone; a thin photosphere at its surface; and a chromosphere and corona that extends beyond the photospheric surface.
- The sun has a surface temperature of 6000°C and it increases to 20 million°C.

## The Planets

- There are eight planets in our solar system. In order of their distance from the sun, they are: Mercury, Venus, Earth, Mars, Jupiter, Saturn, Uranus and Neptune.
- The planets of the inner circle (as they lie between the sun and the belt of asteroids) or the inner planets or the 'terrestrial planets' (meaning earth-like as they are made up of rock and metals, and have relatively high densities) and the planets of the outer circle or outer planets or the 'gas giant planets' or the Jovian planets – meaning Jupiter-like.
- Jovian planets are more like the sun than like the terrestrial planets.
- If we take Jupiter, the biggest planet, as the centre of the planets of our solar system, the size of the planets becomes smaller as we go away from either side of Jupiter (Mars being the exception).
- The orbits of the planets are nearly circular, but many comets, asteroids, and Kuiper belt objects follow highly elliptical orbits.

Do you

Know?

Till August 2006, Pluto was also considered a planet. However, in a meeting of the International Astronomical Union, a decision was taken that Pluto, like other celestial objects (Ceres, 2003 UB313) discovered in the recent past may be called 'dwarf planets.'

### 1. Mercury (Budh)

- The planet mercury is nearest to the Sun. It is the smallest planet in our solar system. Because Mercury is very close to the Sun, it is very difficult to observe it, as most of the time it is hidden in the glare of the Sun.
- Mercury can be observed just before sunrise or just after sunset, near the horizon. So it is visible only at places where trees or buildings do not obstruct the view of the horizon. Mercury has no satellite of its own.
- Mercury is smaller than the largest natural satellites in the Solar System, Ganymede (largest moon of Jupiter) and Titan (largest moon of Saturn).

### 2. Venus (Shukra)

- Venus is earth's nearest planetary neighbors. It is the brightest planet in the night sky.
- Sometimes Venus appears in the eastern sky before sunrise. Sometimes it appears in the western sky just after sunset. Therefore it is often called a morning or an evening star, although it is not a star.
- Venus is sometimes called Earth's sister planet or Earth's twin because of their similar size, mass, proximity to the Sun.
- Venus has no moon or satellite of its own. Rotation of Venus on its axis is somewhat unusual. It rotates from east to west while the Earth rotates from west to east.

### 3. The Earth

- The earth is the third nearest planet to the sun. In size, it is the fifth largest planet. It is slightly flattened at the poles. That is why its shape is described as a Geoid. Geoid means an earth-like shape.
- Conditions favorable to support life are probably found only on the earth. The earth is neither too hot nor too cold. It has water and air, which are very essential for our survival. The air has life-supporting gasses like oxygen. Because of these reasons, the earth is a unique planet in the solar system.
- From outer space, the earth appears blue because its two-thirds surface is covered by water. It is, therefore, called a blue planet.

## The Moon



Our earth has only one satellite, that is, the moon. Its diameter is only one-fourth that of the earth.

It appears so big because it is nearer to our planet than other celestial bodies.

It is about 3,84,400 km away from us. The moon moves around the earth in about 27 days. It takes exactly the same time to complete one spin. As a result, only one side of the moon is visible to us on the earth.

The moon does not have conditions favourable for life. It has mountains, plains and depressions on its surface.

#### 4. Mars (Mangal)

- Mars is often referred to as the “Red Planet” because of the reddish iron oxide prevalent on its surface.
- Mars has a thin atmosphere and has surface features ranging from impact craters of the Moon and the valleys, deserts, and polar ice caps of Earth.
- Mars is the site of Olympus Mons (shield volcano), the largest volcano and the highest known mountain (24 km) in the Solar System, and of Valles Marineris, one of the largest canyons in the Solar System.
- Mars has two irregularly shaped moons, Phobos and Deimos, which are thought to be captured asteroids.

#### 5. Jupiter (Brahspati)

- Jupiter is the largest planet in the solar system. It is composed mostly of gas and liquid swirling in complex patterns with no solid surface.
- Jupiter has four large moons (Io, Europa, Ganymede, and Callisto), called the Galilean satellites because Galileo discovered them.
- Ganymede is the largest natural satellite (5,268 km in diameter) in this solar system and is larger than Mercury, and three times larger than the earth’s Moon.
- It is the third-brightest natural object in the night sky after the Moon and Venus and the fourth brightest object in the sky after the Sun, the Moon and Venus.

#### 6. Saturn (Sani)

- Saturn is the sixth planet from the Sun and the second-largest in the Solar System, after Jupiter.

- The planet's most famous feature is its prominent ring system, which is composed mostly of ice particles, with a smaller amount of rocky debris and dust.
- Titan is the second-largest moon in the Solar System (larger than Mercury) and it is the only satellite in the Solar System with a substantial atmosphere (nitrogen-rich).

#### 7. Uranus

- Uranus is the seventh major planet in our solar system, and the third of four gas giant planets.
- Uranus consists mostly of gas. Its pale blue-green, cloudy atmosphere is made of 83 percent hydrogen, 15 percent helium, and small amounts of methane and other gasses.
- Uranus gets its color because the methane in the atmosphere absorbs reddish light and reflects bluish-greenish light.

#### 8. Neptune

- Neptune is the eighth major planet in our solar system, 17 times more massive than Earth and about four times its diameter.
- Neptune is bluish-green in color, which might seem fitting for a planet named after the Roman god of the sea.

### Some other members of the Solar System

There are some other bodies which revolve around the Sun. They are also members of the solar system.

#### Asteroids:

- There is a large gap in between the orbits of Mars and Jupiter. This gap is occupied by a large number of small objects that revolve around the Sun. These are called asteroids. Asteroids can only be seen through large telescopes.

**Comets:**

- Comets are also members of our solar system. They revolve around the Sun in highly elliptical orbits. However, their period of revolution around the Sun is usually very long.
- A Comet appears generally as a bright head with a long tail. The length of the tail grows in size as it approaches the sun. The tail of a comet is always directed away from the sun.
- Many comets are known to appear periodically. One such comet is Halley's comet, which appears after nearly every 76 years.

**Meteors and Meteorites:**

- At night, when the sky is clear and the moon is not there, you may sometimes see bright streaks of light in the sky. These are commonly known as shooting stars, although they are not stars.
- They are called meteors. A meteor is usually a small object that occasionally enters the earth's atmosphere. At that time it had a very high speed.
- The friction due to the atmosphere heats it up. It glows and evaporates quickly. That is why the bright streak lasts for a very short time.
- Some meteors are large and so they can reach the Earth before they evaporate completely. The body that reaches the Earth is called a meteorite.
- Meteorites help scientists in investigating the nature of the material from which the solar system was formed.

**Artificial Satellites:**

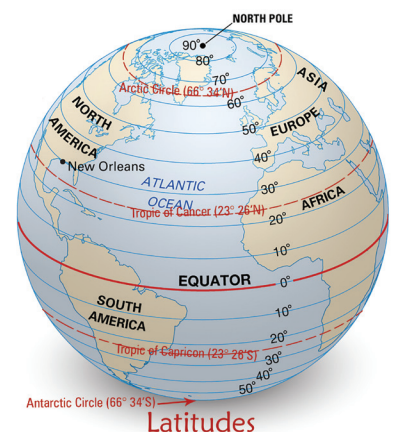
- Artificial satellites are man-made. They are launched from the Earth.
- They revolve around the Earth much closer than earth's natural satellite, the moon.
- India has built and launched several artificial satellites. Aryabhata was the first Indian satellite. Some other Indian satellites are INSAT, IRS, Kalpana-1, EDUSAT, etc.

- Artificial satellites have many practical applications. They are used for forecasting weather, transmitting television and radio signals. They are also used for telecommunication and remote sensing.

## 1.4

**Latitude, Longitude and Time Zone****Latitude**

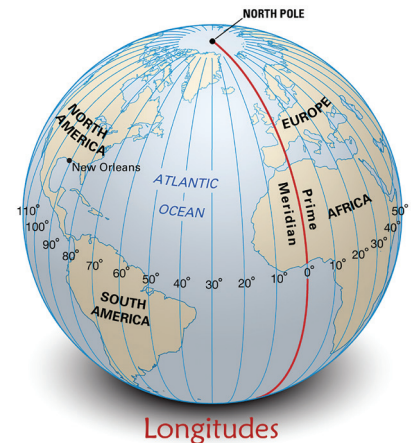
- It is the angular distance of a point on the earth's surface, measured in degrees from the centre of the earth. It varies from 0 to 90° North and 0 to 90° South.
- Latitudes are circular lines which are parallel to the equator, which lies midway between the poles. Hence, these lines are called parallels of latitude. The latitudes are also called temperature coordinates because with the increase in latitudinal distance towards the poles, the temperature reduces.
- The most important lines of latitude are the Equator (0°), the Tropic of Cancer (23½°N), the Tropic of Capricorn (23½°S), the Arctic Circle (66½°N) and the Antarctic Circle (66½°S).
- The midday sun is exactly overhead at least once a year on all latitudes in between the Tropic of Cancer and the Tropic of Capricorn. This area, therefore receives the maximum heat and is called the Torrid Zone (or Tropical Zone).
- The areas bounded by the Tropic of Cancer and the Arctic Circle in the northern hemisphere, and the Tropic of Capricorn and the Antarctic Circle in the southern hemisphere, have moderate temperature, hence called Temperate Zones (or Mild Zone).



- Areas bounded by the Arctic Circle and North Pole, and the Antarctic Circle and South pole are called Frigid Zones. These zones are very cold as the sun does not rise above the horizon.
- As the earth is flattened at the poles the linear distance of a degree of latitude at the pole is little longer than that at the equator. The average linear distance between two latitudes is approx. 69 miles (111 Kms).

## Longitude

- It is an angular distance measured in degrees along the equator east or west of the Prime Meridian (0°). It varies from 0 to 180° E and 0 to 180° W. It is also called time coordinates.
- Longitudes are also known as Great circles because they divide earth into two equal parts.
- Meridians are a series of semicircles that run from pole to pole passing through the equator.
- The Prime Meridian is at 0° and is known as the Greenwich line as it passes through Greenwich near London, where the British Royal Observatory is located.
- Longitudes have one very important function i.e. they determine Local Time in relation to Greenwich Mean Time (GMT).
- The linear distance between two longitudes at equatorial position is about 111 Kms which reduces towards poles.

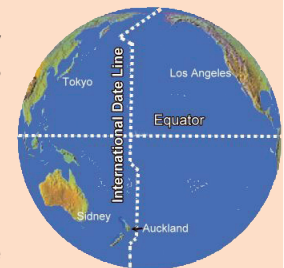


## Longitude and Time

- The earth makes one complete revolution of 360° in one day or 24 hours, it passes through 15° in one hour or 1° in 4 minutes.
- The earth rotates from west to east, so every 15° we go eastwards, local time is advanced by 1 hour. Conversely, if we go westwards, local time is retarded by 1 hour.
- The places east of Greenwich see the sun earlier and gain time, whereas places west of Greenwich see the sun later and lose time.
- If we know G.M.T., to find local time, we merely have to add or subtract the difference in the number of hours from the given longitude.
- Local Time is the time reckoned by the noon-sun at a given place and Standard Time is the Local Time of the Standard Meridian of a country.
- In India, the longitude of 82½° E is treated as the Standard Meridian. The Local Time at Meridian is taken as the Standard Time for the whole country. It is known as the Indian Standard Time (IST).

## International Date Line

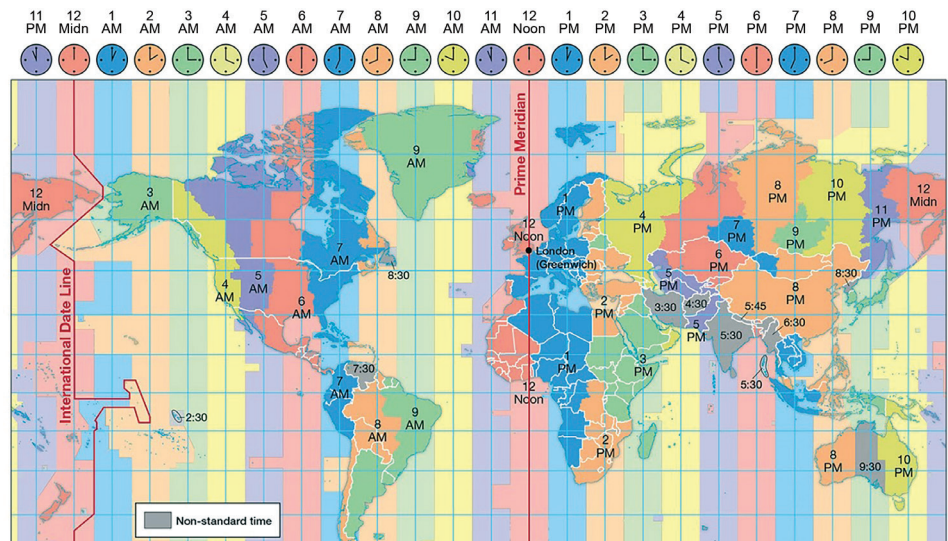
- It is an imaginary line drawn at 180° longitude, avoiding the continuous land parts.
- The International Date Line passes through the Arctic Ocean, Bering Strait, Pacific Ocean, Antarctica, Fiji, Tonga and other islands.
- It is also the longitude where the date changes by exactly one day when it is crossed. If a traveller crosses the date line from east to west, he loses a day and while crossing the date line from west to east, he gains a day.



## Standard Time and Time Zones

- If each town were to keep the time of its own meridian, there would be much difference in local time between one town and the other.
- Travelers going from one end of the country to the other would have to keep changing their watches if they wanted to keep their appointments. This is impractical and very inconvenient.
- To avoid all these difficulties, a system of standard time is observed by all countries.
- Most countries adopt their standard time from the central meridian of their countries.
- In larger countries such as Canada, U.S.A., China, and U.S.S.R, it would be inconvenient to have a single time zone. So these countries have multiple time zones.

- Both Canada and the U.S.A. have five time zones—the Atlantic, Eastern, Central, Mountain and Pacific Time Zones. The difference between the local time of the Atlantic and Pacific coasts is nearly five hours.
- U.S.S.R had eleven time zones before its disintegration. Russia now has nine time zones.



Time Zones of World

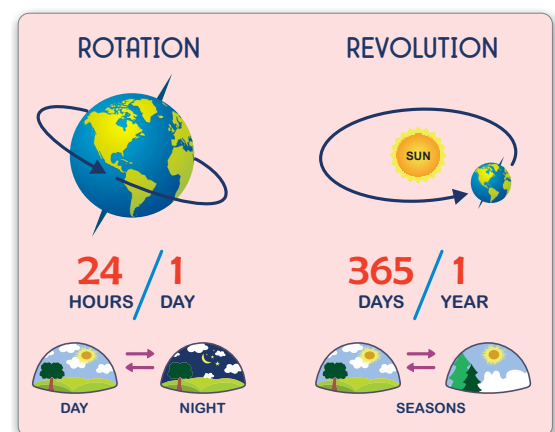
## 1.5 Motions of Earth

The earth is a planet of the solar system. It is not static but has two types of motions:

- (a) Rotational Motion      (b) Revolutinal (or Orbital) Motion

### (a) Rotation of Earth

- The earth spins (or rotates) continuously on its own axis from west to east once in every 24 hours, causing day and night. This motion is called Rotation of the Earth (also called 'Daily Motion').
- Day and Night: When the earth rotates on its own axis, only one portion of the earth's surface comes into the rays of the sun and experiences day light whereas the other portion experiences darkness (or night).

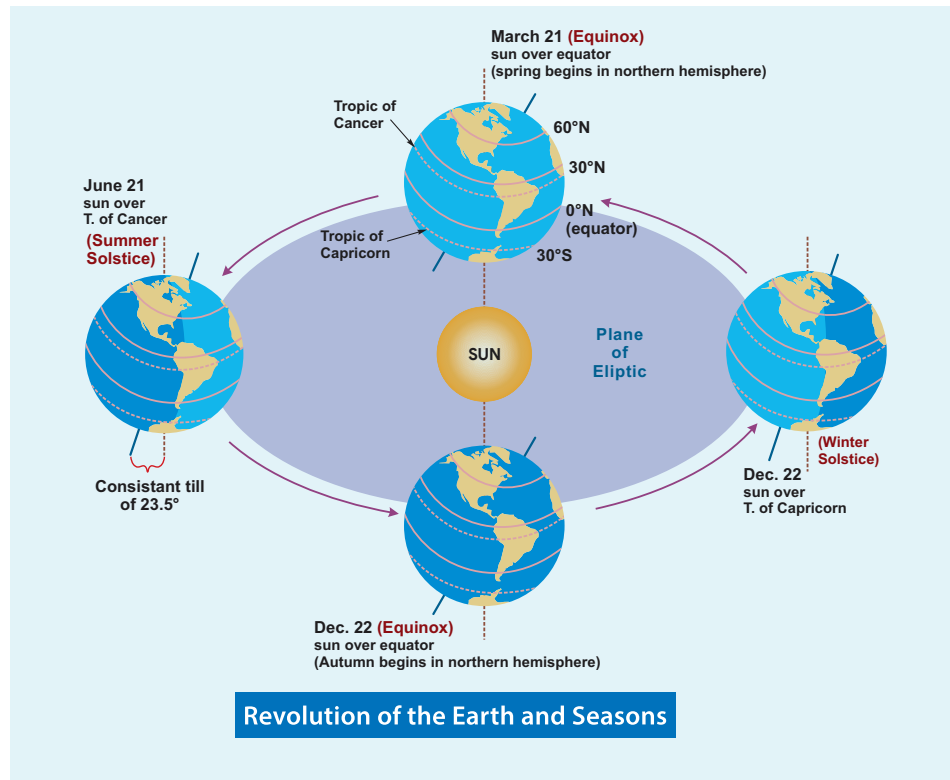


### (b) Revolution of Earth

- The earth also revolves around the sun in an orbit once in about 365 days and 6 hours, causing formation of seasons and the year. This motion is called Revolution of earth (also called annual movement).

### Varying Lengths of Day and Night

- The axis of the earth is inclined to the plane of earth's orbit at an angle of  $66\frac{1}{2}^\circ$  giving rise to different seasons and varying lengths of day & night.
- The earth's revolution around the sun with its axis inclined at  $66\frac{1}{2}^\circ$  to the plane of earth's orbit changes the apparent altitude of the midday sun.
- The sun is vertically overhead at the equator on 21 March and 21 September and these two days are termed as Equinoxes (equal length of day & night in both the hemisphere).



- On 21 June, the sun is vertically overhead at the Tropic of Cancer ( $23\frac{1}{2}^\circ$  N). This is known as the summer solstice, when the northern hemisphere will have its longest day and shortest night.
- On 22 December, the sun is vertically overhead at the Tropic of Capricorn ( $23\frac{1}{2}^\circ$  S). This is known as the winter solstice, when the southern hemisphere will have its longest day and shortest night.
- Beyond the Arctic Circle ( $66\frac{1}{2}^\circ$  N) and Antarctic Circle ( $66\frac{1}{2}^\circ$  S) darkness lasts for 6 months and daylight is continuous for the remaining 6 months.

