

## What is Latitude & Longitude?

The first person to calculate the size of the earth was **Eratosthenes**. He realized that Earth can be divided into a basic grid of lines called Longitudes and Latitudes which would help in pinpointing a location.

Latitude is a geographical coordinate that specifies a point on the Earth's surface, it tells whether a point is either north or south.

Latitude is an angle between **0° at the Equator** and **90° at the poles** (North or South).

Longitude is a geographic coordinate that specifies a point's **east-west position** on the surface of the Earth, or a celestial body's surface.

It is an angular measurement that is usually expressed in degrees and denoted by the Greek letter lambda. Meridians connect points with the same longitude (lines running from pole to pole).

### Latitude:

Latitude is the angular distance of a point measured in degrees from the center of the earth on the surface of the earth.

As the earth at the poles is slightly flattened, the linear distance at the pole of a degree of latitude is slightly longer than at the equator.

For example, it is 68,704 miles at the equator (0°), 69,054 miles at 45 ° and 69,407 miles at the poles. The average of 69 miles (**111 km**) is taken.

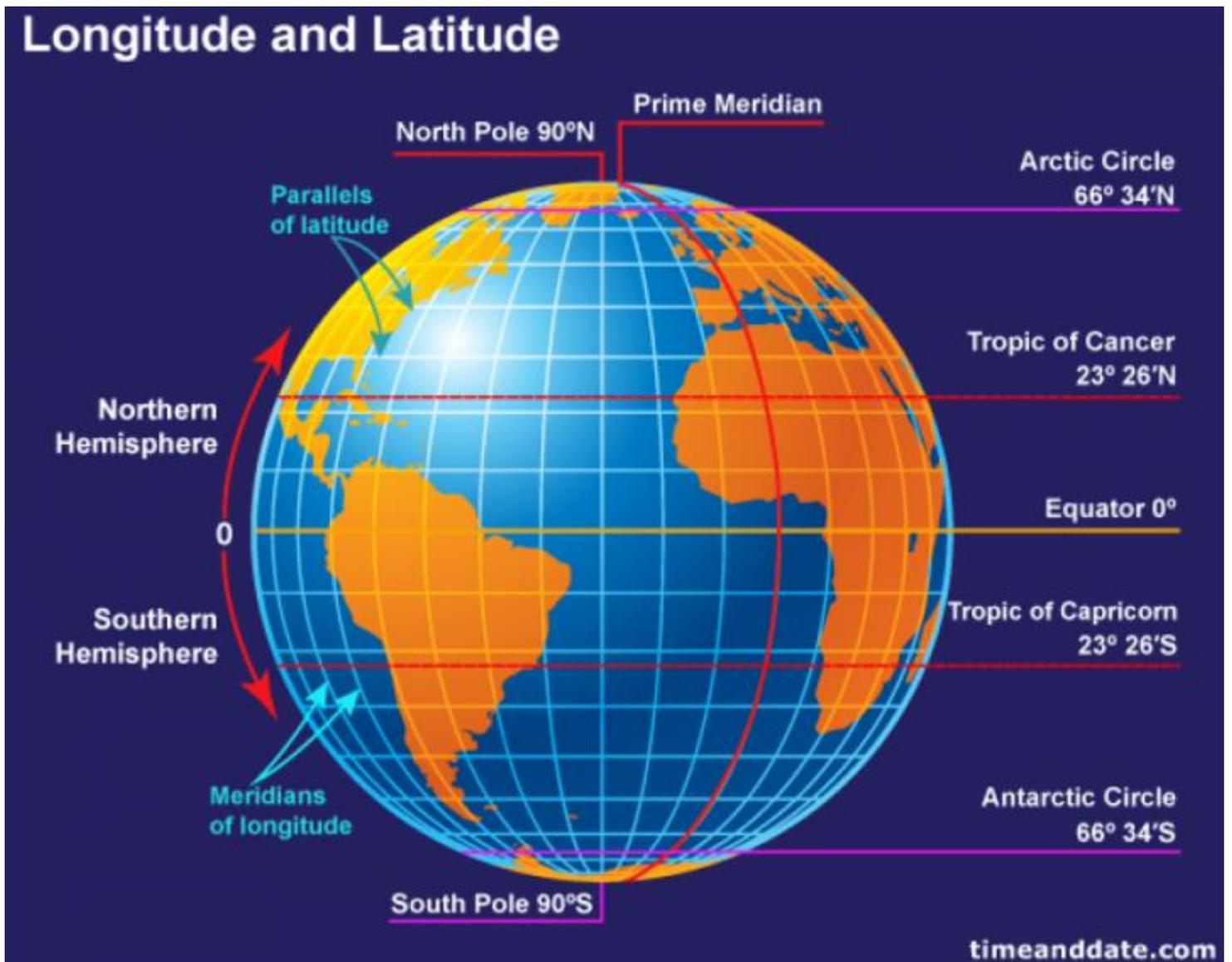
**Note: 1 mile = 1.607 km**

### Some Important Parallels of Latitudes:

There are four important parallels of latitudes besides the equator (0°), the north pole (90° N) and the south pole (90° S).

- **Tropic of Cancer (23½° N) in the northern hemisphere**
- **Tropic of Capricorn (23½° S) in the southern hemisphere**
- **The arctic circle at 66½° north of the equator**
- **The Antarctic circle at 66½° south of the equator**





Longitude:

On all latitudes between the Tropic of Cancer and the Tropic of Capricorn, the midday sun is exactly overhead at least once a year. Consequently, this area receives the maximum heat and is called the **torrid zone**.

On no latitude beyond the Tropic of Cancer and the Capricorn Tropic, the midday sun never shines overhead.



The angle of the rays of the sun continues to decline towards the poles. As such, 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 temperatures. These are called **temperate zones**.

Areas in the northern hemisphere between the Arctic circle and the north pole and the Antarctic circle and the south pole in the southern hemisphere are very cold. It's because the sun isn't raising much above the horizon here. These are called **frigid zones**.

Longitude is an angular distance, measured in degrees along the Prime (or First) Meridian east or west equator.

Longitude on the globe is shown as a series of semi-circles running through the equator from pole to pole.

This is the Prime Meridian ( $0^\circ$ ) from which all other meridians move up from  **$180^\circ$  east to west**.

They have one very important function, determining local time in relation to G.M.T. or **Greenwich Mean Time**, sometimes called **World Time**.

The relation between Longitude & Time:

Because the earth makes a complete  $360^\circ$  revolution in one day or 24 hours, it goes through  $15^\circ$  in one hour or  $1^\circ$  in four minutes.

Earth rotates from west to east, so every 15 degrees we go east, local time is 1 hour higher. If we go west, the local time will be delayed by 1 hour.

Thus, we may conclude that places east of Greenwich see the sun earlier and gain time, whereas places west of Greenwich see the sun later and lose time.

Time Zones & Standard Time:

In order to keep their appointments, travelers going from one end of the country to the other would have to keep changing their watches. This is very inconvenient and impractical.

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.

There are five time zones each in both Canada and the USA — the Atlantic, Eastern, Central, Mountain, and Pacific Time Zones.



The difference between the Atlantic and Pacific coastal local time is almost five hours.

There are a total of **11 time zones** in Russia.

International Date Line:

The **International Date Line** (IDL) is an **imaginary demarcation line** on the Earth's surface running from the North Pole to the South Pole and demarcating the change from one calendar day to the next.

A person who goes from **east to west** around the world would **gain or set his clock back one hour for every 15 degrees of longitude** crossed, and would gain **24 hours** for one circuit of the globe from east to west if they did not compensate by setting their **clock forward one day** when they crossed the IDL.

On the other hand, **west-to-east** circumnavigation of the globe **loses an hour for every 15 degrees of traversed longitude** but gains back a **day** when it crosses the IDL.

The International Date Line passes through the middle of the Pacific Ocean, approximately following the 180° longitude line but deviating to some territories and groups of islands.

Facts about International Date Line:

The IDL is a zigzag line so as to avoid division of time in smaller countries that lie around 180° E.

**Three different calendar dates** are observed simultaneously in different locations on Earth for the two hours between 10:00 and 11:59 UTC each day. For instance, it's Wednesday 23:15 in American Samoa (UTC−11:00) at 10:15 UTC Thursday, Thursday in most of the world, and Friday 00:15 in Kiribati (UTC+14:00).

The IDL stays on the meridian of 180 ° until it passes the equator. Two uninhabited atolls owned by the United States, **Howland Island and Baker Island**, just north of the central Pacific Ocean equator (and ships at sea between 172.5 ° W and 180 °), have the **latest time on Earth** (UTC−12:00).

The Indian government has accepted the **82.5° E** as the **Indian Standard Time**, which is **5hrs 30 Mins** ahead of **Greenwich Mean Time**. The 82.5° E passes through **Mirzapur** which is almost 84 km from **Allahabad**.

Day Light Saving Time:

Daylight saving time (DST), proposed by Astronomer **George Hudson** is the practice of advancing clocks in summer months so that daylight at evening will last longer while sacrificing normal sunrise times. This is generally practiced in USA, UK, EU etc.



Basically, the regions that use daylight saving time adjust clocks **one hour forward** at the beginning of the **spring** and adjust them backwards to the standard time during **Autumn season**. This leads to 1 hour of sleep loss in the spring season and an hour of extra sleep in the autumn season.

The Major purpose of **Daylight Saving Time** was to make **effective use of daylight** and reduce the dependence on **conventional electricity**.

