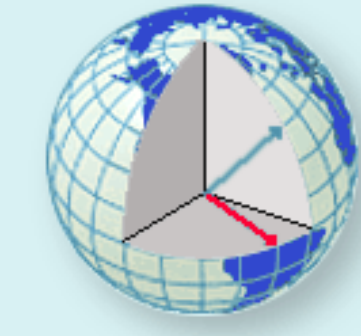
# Article

## Latitude and Longitude

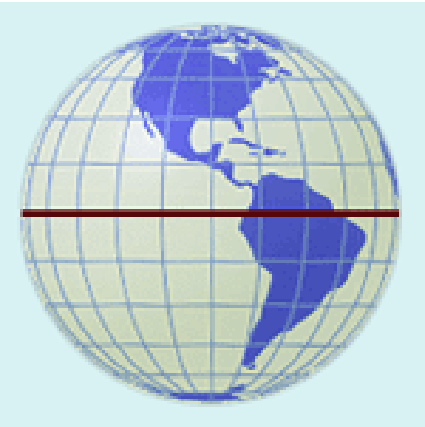
### Location on the Earth



The earth is effectively a sphere, so how do we describe where a point is on its surface?

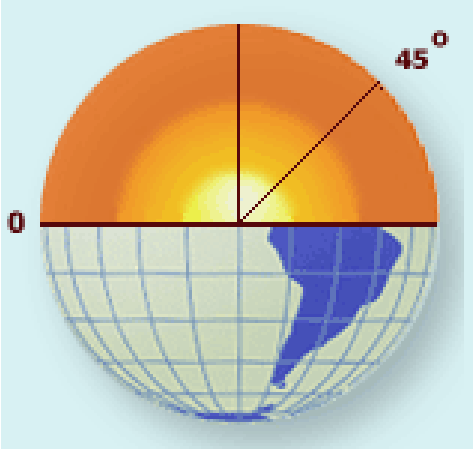
The most common way to locate points on the surface of the Earth is by standard, geographic coordinates called latitude and longitude. These coordinates values are measured in degrees, and represent angular distances calculated from the center of the Earth.

### What is latitude?



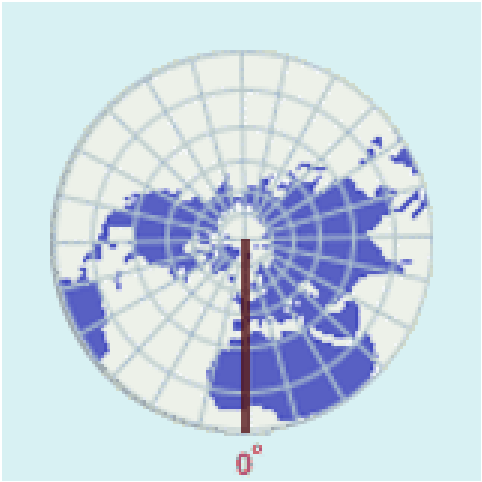
We can imagine the Earth as a sphere, with an axis around which it spins. The ends of the axis are the North and South Poles. The Equator is a line around the earth, an equal distance from both poles. The Equator is also the latitude line given the value of 0 degrees. This means it is the starting point for measuring latitude. Latitude values indicate the angular distance between the Equator and points north or south of it on the surface of the Earth.

Equator




A line connecting all the points with the same latitude value is called a line of latitude. This term is usually used to refer to the lines that represent values in whole degrees. All lines of latitude are parallel to the Equator, and they are sometimes also referred to as parallels[1]. Parallels are equally spaced. There are 90 degrees of latitude going north from the Equator, and the North Pole is at 90 degrees N. There are 90 degrees to the south of the Equator, and the South Pole is at 90 degrees S. When the directional designators are omitted, northern latitudes are given positive values and southern latitudes are given negative values.

## What is longitude?




Prime Meridian

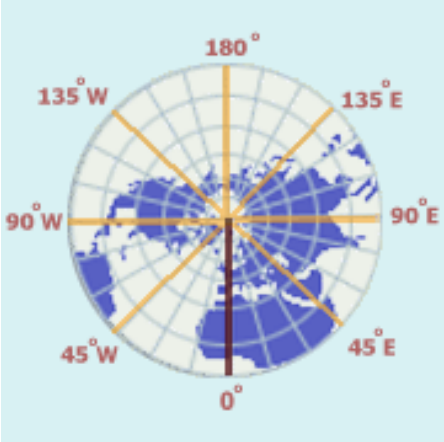
Lines of longitude, called meridians[2], run perpendicular to lines of latitude, and all pass through both poles. Each longitude line is part of a great circle[3]. There is no obvious 0-degree point for longitude, as there is for latitude. Throughout history many different starting points have been used to measure longitude. By international agreement, the meridian line through Greenwich, England, is currently given the value of 0 degrees of longitude; this meridian is referred to as the Prime

[1] **Parallel**—A circle or approximation of a circle on the surface of the Earth, parallel to the Equator and connecting points of equal latitude.

[2] **Meridian**—An imaginary arc on the Earth's surface from the North Pole to the South Pole that associates all locations running along it with a given longitude. The position of a point on the meridian is given by its intersecting latitude. Each meridian is perpendicular to all circles of latitude at the intersection points.

[3] **Great circle**—A circle formed on the surface of a sphere by a plane that passes through the center of the sphere. The Equator, each meridian, and each other full circumference of the Earth forms a great circle. The arc of a great circle shows the shortest distance between points on the surface of the Earth.

Meridian. Longitude values are used to indicate the angular distance between the Prime Meridian[4] and points east or west of it on the surface of the Earth.




The Earth is divided equally into 360 degrees of longitude. There are 180 degrees of longitude to the east of the Prime Meridian; when the directional designator is omitted these longitudes are given positive values. There are also 180 degrees of longitude to the west of the Prime Meridian; when the directional designator is omitted these longitudes are given negative values. The 180-degree longitude line is opposite the Prime Meridian on the globe, and is the same going either east or west.

## How precise can we be with latitude and longitude?

Degrees of latitude and longitude can be further subdivided into minutes and seconds: there are 60 minutes (') per degree, and 60 seconds (") per minute. For example, a coordinate might be written 65° 32' 15". Degrees can also be expressed as decimals: 65.5375, degrees and decimal minutes: 65° 32.25', or even degrees, minutes, and decimal seconds: 65° 32' 15.275". All these notations allow us to locate places on the Earth quite precisely – to within inches.

[4] **Prime Meridian**—The meridian of longitude 0 degrees, used as the origin for the measurement of longitude. The meridian of Greenwich, England, is the internationally accepted prime meridian in most cases.

A degree of latitude is approximately 69 miles, and a minute of latitude is approximately 1.15 miles. A second of latitude is approximately 0.02 miles, or just over 100 feet.

A degree of longitude varies in size. At the equator, it is approximately 69 miles, the same size as a degree of latitude. The size gradually decreases to zero as the meridians converge at the poles. At a latitude of 45 degrees, a degree of longitude is approximately 49 miles. Because a degree of longitude varies in size, minutes and seconds of longitude also vary, decreasing in size towards the poles.

## Commonly Used Terms

**Equator**—The line which encircles the Earth at an equal distance from the North and South Poles.

**Geographic coordinates**—Coordinate values given as latitude and longitude.

**Great circle**—A circle formed on the surface of a sphere by a plane that passes through the center of the sphere. The Equator, each meridian, and each other full circumference of the Earth forms a great circle. The arc of a great circle shows the shortest distance between points on the surface of the Earth.

**Meridian**—An imaginary arc on the Earth's surface from the North Pole to the South Pole that associates all locations running along it with a given longitude. The position of a point on the meridian is given by its intersecting latitude. Each meridian is perpendicular to all circles of latitude at the intersection points.

**Parallel**—A circle or approximation of a circle on the surface of the Earth, parallel to the Equator and connecting points of equal latitude.

**Prime Meridian**—The meridian of longitude 0 degrees, used as the origin for the measurement of longitude. The meridian of Greenwich, England, is the internationally accepted prime meridian in most cases.