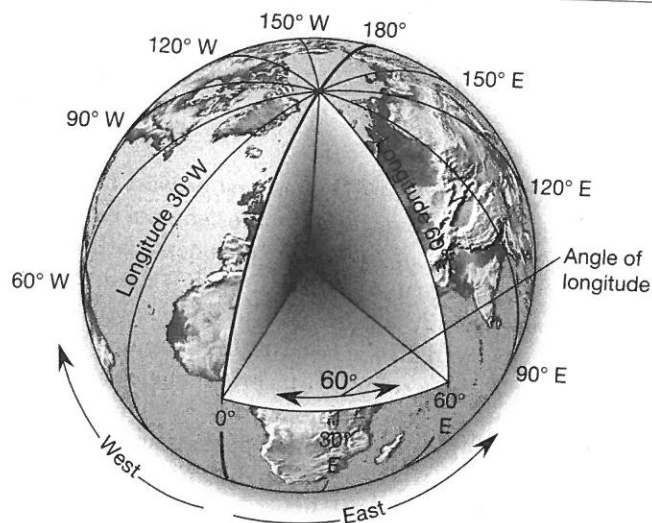
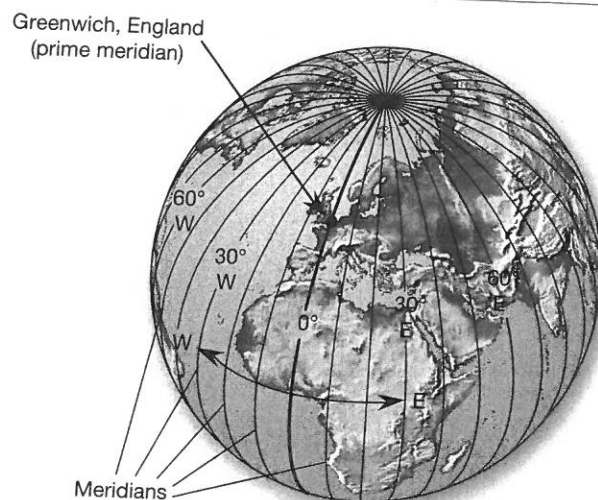




(a) Longitude is measured in degrees east or west of a 0° starting line, the prime meridian. Note the measurement of 60° E longitude.



(b) Angles of longitude measured from the prime meridian determine other meridians. North America is west of Greenwich; therefore, it is in the Western Hemisphere.

▲Figure 1.12 Meridians of longitude. Do you know your present longitude?

a degree of longitude is greatest at the equator (where meridians separate to their widest distance apart) and diminishes to zero at the poles (where meridians converge). As with latitude, longitude is expressed in degrees, minutes, and seconds or in decimal degrees. Mount Cook in Figure 1.1 is located at 170° 8' 32" east longitude, or +170.1421°; east longitude has a positive decimal value, while west longitude is negative.

Figure 1.13 combines latitude and parallels with longitude and meridians to illustrate Earth's complete coordinate grid system. Note the red dot that marks 49° N and 60° E, a location in western Kazakhstan. Next time you look at a world globe, follow the parallel and meridian that converge on your location.



▲Figure 1.13 Earth's coordinate grid system. Latitude and parallels and longitude and meridians allow us to locate all places on Earth precisely. The red dot is at 49° N latitude and 60° E longitude.

Great Circles and Small Circles

Great circles and small circles are important navigational concepts that help summarize latitude and longitude (Figure 1.14). A **great circle** is any circle of Earth's circumference whose center coincides with the center of Earth. An infinite number of great circles can be drawn on Earth. Every meridian is one-half of a great circle that passes through the poles. On flat maps, airline and shipping routes appear to arch their way across oceans and landmasses. These are *great circle routes*, tracing the shortest distances between two points on Earth (see Figure 1.20).

In contrast to meridians, only one parallel is a great circle—the *equatorial parallel*. All other parallels diminish in length toward the poles and, along with any other non-great circles that one might draw, constitute **small circles**. These circles have centers that do not coincide with Earth's center.

Meridians and Global Time

A worldwide time system is necessary to coordinate international trade, airline schedules, business and agricultural activities, and daily life. Our time system

CRITICAL thinking 1.3

Where Are You?

Select a location (for example, your campus, home, or workplace or a city) and determine its latitude and longitude—both in degrees, minutes, and seconds and as decimal degrees. Describe the resources you used to gather this geographic information, such as an atlas, website, Google Earth™, or GPS measurement.