
LAB 4

Earth Coordinates—Latitude and Longitude

Purpose

The purpose of this lab is to have you become familiar with the use of the latitude and longitude coordinate system to locate exact positions on the Earth. This lab will also introduce you to the relationship between longitude location and time.

Materials

world maps or globes

Procedure A—Flight of Scientific Discovery

Imagine you are the leader of a scientific expedition that has chartered its own airplane to travel the world in search of scientific discovery. Your starting point can be anywhere in the United States, and you must travel the world in search of the scientific places of interest listed in Table 4–1. From your starting point, you must fly to a destination where you can observe the place of interest listed. You must record the distance you flew to get there, the latitude and longitude location of the place, and the name of the location. You must also plot your course on the map of the world (Figure 4–1) provided in the lab in colored pencil.

Procedure B—Longitude and Time

Complete the following steps.

1. Calculate the number of degrees of longitude the Earth moves in one hour by using the following information. Show your work.
The Earth makes one complete rotation on its axis (360 degrees) in 24 hours.

TABLE 4-1 Latitude and Longitude Flight of Scientific Discovery

Place of Interest	Latitude/Longitude Location	Location Name	Distance Traveled
A Glacier			
A Tropical Volcano			
The Highest Mountain in the World			
Greenwich, England			
A Coral Reef			
A Mid-latitude Volcano			
A Large Lake			
A Canal			
An Island			
A River Delta			

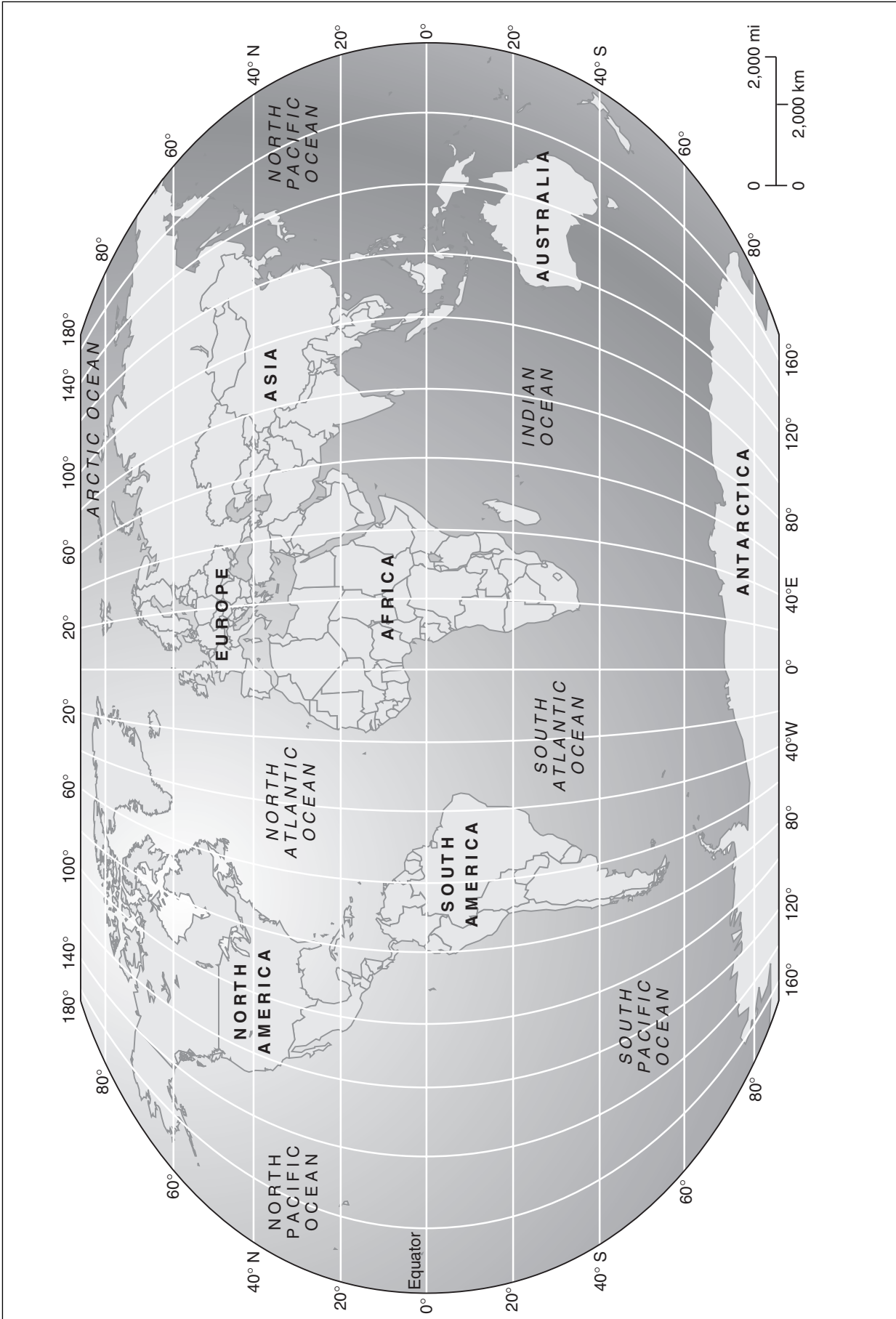


FIGURE 4-1 Map of the World

2. Using your answer from the above question, calculate the following longitude locations. (Hint: if your local time is behind Greenwich Mean Time (GMT), you are west longitude; if your local time is ahead of GMT, you are east longitude.)
 - a. It is 12:00 noon GMT and 11:00 A.M. local time. What is your longitude location?
 - b. It is 12:00 noon GMT and 1:00 P.M. local time. What is your longitude location?
 - c. It is 7:00 A.M. local time and 12:00 noon GMT. What is your longitude location?
 - d. It is 4:00 P.M. local time and 1:00 P.M. GMT. What is your longitude location?
 - e. It is 12:00 midnight GMT and 6:00 P.M. local time. What is your longitude location?

Procedure C

Use the diagram in Figure 4–2 showing longitude lines spaced 15 degrees apart to determine the time of day for each location.

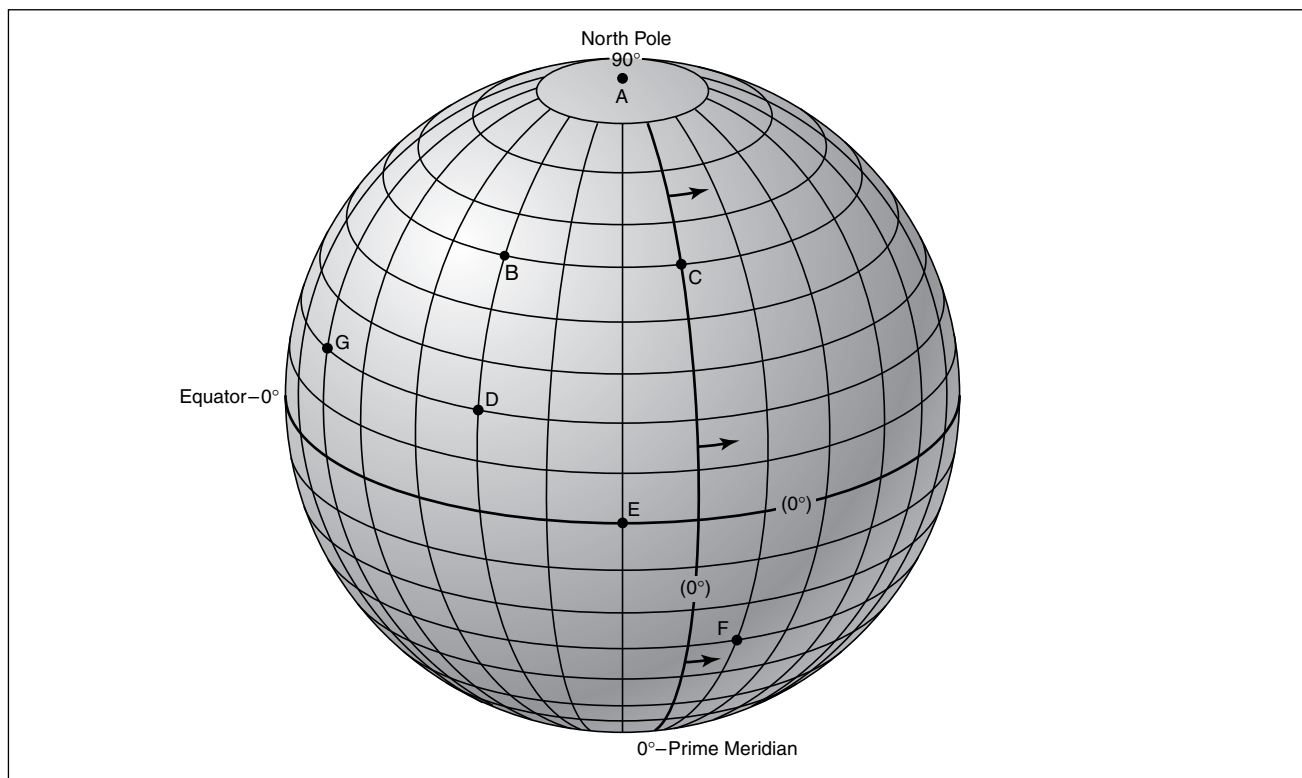


FIGURE 4–2 Longitude Line Diagram

1. If GMT is 12:00 noon, what time is it at location B?
2. If it is 6:00 P.M. at location D, what time is it at location F?
3. How many hours time difference exist between locations G and E?
4. If it is 11:00 A.M. at location G, what time is it at location F?
5. If it is 3:00 P.M. at location D, what time is it at location B?

Conclusions

1. What do lines of latitude measure on the Earth?
2. What do lines of longitude measure on the Earth?
3. How far does the Earth travel in degrees of longitude each hour?
4. What information do you need to determine your longitude location on the Earth?
5. Explain how you can determine if your location is east or west longitude.
6. Explain why it took a long time for an accurate method of determining longitude location on the Earth to be developed.