Map Views

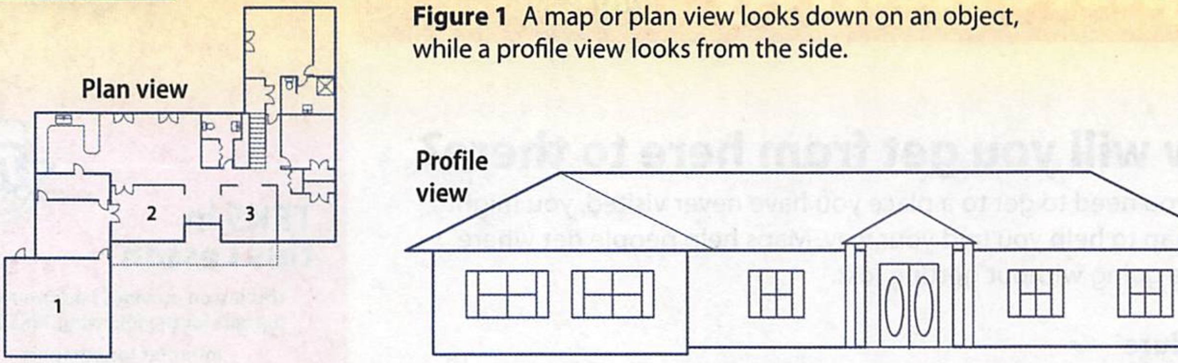


Figure 1 A map or plan view looks down on an object, while a profile view looks from the side.

Understanding Maps

When was the last time you used a map to find information? Maybe you looked at a map of your school to find all your classrooms. Or, maybe you reviewed the map of the school to practice for a fire drill or a disaster drill. A map might show all the exits or the safest room to go to if there were a tornado. There are many kinds of maps, such as road maps, trail maps, and weather maps. Each type of map contains different information and serves a different purpose.

A map is a model of Earth. To model Earth's surface, you can make a flat representation of an area of Earth on a piece of paper. To model the entire planet and its shape, you can make a globe.

Map Views

Most maps are drawn in **map view**—*drawn as if you were looking down on an area from above Earth's surface.* A map view, shown in **Figure 1,** also can be referred to as a plan view.

A **profile view** *is a drawing that shows an object as though you were looking at it from the side.* A profile view is like a side view of a house. To help you visualize this concept, a map view and a profile view of a house are shown in **Figure 1.** Map views and profile views are used to describe topographic maps and geologic maps. Also, profile views are used to study cross sections, or models of the inner structures of Earth.

Contrast

1. Describe the difference between a map view and profile view using Earth as the example. Then illustrate what each view of Earth would look like next to its description.

A map view shows ______________________

____

____

A profile view shows ______________________

____

____

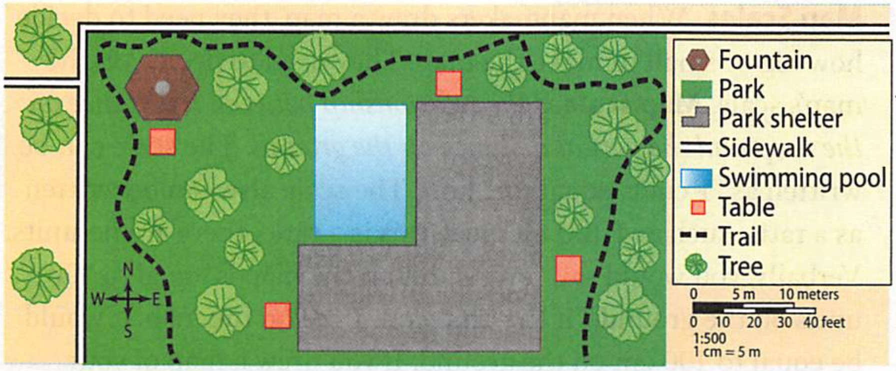


Figure 2 The legend on this map explains what the symbols mean.

Infer

2. What is the purpose of a map legend?

Map Legends and Scales

Maps have two features to help you read and understand the map. One feature is a series of symbols called a map legend. The other is a ratio, which establishes the map scale.

Map Legends Maps use specific symbols to represent certain features on Earth's surface, such as roads in a city or restrooms in a park. These symbols allow mapmakers to fit many details on a map without making it too cluttered. All maps include a **map legend**—*a key that lists all the symbols used on the map*—so you can interpret the symbols. It also explains what each symbol means. For example, in the map legend shown in **Figure 2,** a dashed line represents a trail. A map legend can be used to differentiate between artificial or natural features. It can provide valuable information about an area.

Road Map with Scale

Go Online! Tutor

Written scale

One centimeter is equal to one kilometer.

Ratio or fraction

1:100,000 or $\frac{1}{100,000}$

Graphic scale

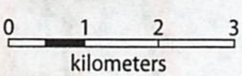


Figure 3 Different types of scales can be used with maps. For example, the graphic scale compares map distance to actual distance.

Math Skills Math TEKS 8.1(A)

Ratio Scale

A ratio is a comparison of two quantities by division. For example, a map scale is the ratio of the distance on the map to the actual distance. A map might use a scale in which **1 cm** on the map represents **5 km** of actual distance. This may be written as a ratio:

1 cm to **5 km** or

1 cm: **5 km** or

$$\frac{1\text{ cm}}{5\text{ km}}$$

This ratio is the map scale.

Practice

A map uses a scale of **1 cm**: **1 km**. If the distance between two points on the map is **3 cm**, what is the actual distance between the points?

Go Online! Check Tutor

Map Scales When mapmakers draw a map, they need to decide how big or small to make the map. They need to decide on the map's scale. **Map scale** *is the relationship between a distance on the map and the actual distance on the ground.* The scale can be written as "1 cm is equal to 1 km." The scale also can be written as a ratio, such as 1:100. Because this is a ratio, there are no units. Verbally, you would say, "every unit on the map is equal to 100 units on the ground." If the unit were 1 cm on the map, it would be equal to 100 cm on the ground. If you drew a map of your school at a scale of 1:1, your map would be as large as your school! **Figure 3** gives you a written scale, a ratio scale, and a graphic scale in the map legend. Each one can be useful in different ways. For example, the graphic scale, or scale bar, would be useful in measuring distances on the map. You would have to measure it, however, to find that 1 cm is equal to 1 km.

Figure 4 shows another way in which scales are useful. Models are built with scaled measurements that can be increased or decreased relative to the measurements of real objects. Models have the same relative proportions as the objects they represent, similar to a map scale.

Identify

3. What are the three types of map scales?

Figure 4 These images have different scales. In the photo of the girl on the left, the scale is 1:25. In the photo of the chair on the right, the scale is 12:1.

Reading Maps

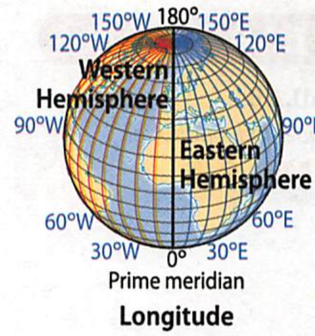
To find your way to a specific place, you need a way to determine where you are on Earth. Imagine telling someone your exact position on the snow-covered continent of Antarctica. It would be difficult to describe. Ship captains and airplane pilots experience the same problems as they plot their courses across the oceans or above a cloud-covered Earth.

A Grid System for Plotting Locations

Have you ever played a game of chess or checkers? If you have, you know that the board is set up with grid lines to help you choose your moves and the position of the pieces on the board. Long ago, mapmakers created a system for identifying locations on Earth that uses a similar grid system. This system uses two sets of imaginary lines that encircle Earth. The two sets of lines are called latitude and longitude. The intersection of a line of latitude and a line of longitude can pinpoint a location on a map or a globe.

Longitude Mapmakers started the grid system with a line that circled Earth and passed through the North Pole and the South Pole. The half of the circle from the North Pole to the South Pole passes through Greenwich, England, and is known as the prime meridian. The prime meridian is shown in **Figure 5.** The other half of the circle is the 180° meridian. Similar circles are drawn at every degree east and west of the prime meridian. **Longitude** *is the distance in degrees east or west of the prime meridian.* The prime meridian and the 180° meridian combine to divide Earth into east and west halves, or hemispheres—the eastern hemisphere and the western hemisphere. East of the prime meridian longitude is measured in degrees east, and west of the prime meridian longitude is measured in degrees west. They meet at the 180° meridian. All the meridians pass through the North Pole and the South Pole.

Latitude Mapmakers also drew lines east to west around Earth. These lines, called lines of latitude, are somewhat perpendicular to lines of longitude. The center line, called the equator, divides Earth into the northern hemisphere and the southern hemisphere. **Latitude** *is the distance in degrees north or south of the equator.* Unlike lines of longitude, lines of latitude are parallel, as shown in **Figure 5.** The equator is the largest circle. All the other circles become smaller as they get nearer to Earth's North and South Poles.



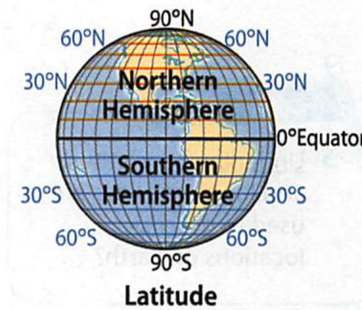


Figure 5 Longitude and latitude are imaginary lines used to pinpoint places on Earth.

Word Origin

longitude
from Latin *longitudo,* means "length"

Create

4. An analogy is a comparison of two things to show a similarity. Create an analogy for remembering the difference between latitude and longitude. Write your response in your interactive notebook.

LAB Manager

MiniLAB: *Can you find latitude and longitude?*

TEKS **8.2(A), (C), (E)**

Plotting Locations

How can you use Earth's grid system to plot locations? First, think about why longitude and latitude are measured in degrees. Earth is a sphere—a ball-shaped object. If you look straight down on a sphere, it looks like a circle. Like a circle, a sphere can be divided into 360 degrees. Look back at **Figure 5.** The latitude at the equator is 0°. All other lines of latitude are measured in degrees north and south of the equator. The North Pole is located at 90 degrees north latitude (90°N), and the South Pole is located at 90 degrees south latitude (90°S).

Express

5. Underline how latitude and longitude lines are used to describe locations on Earth?

Lines of longitude are measured in degrees east or west of the prime meridian. There are 180 degrees of east longitude and 180 degrees of west longitude. Any location on Earth can be described by the intersection of the closest line of latitude and the closest line of longitude. Latitude is always stated before longitude.

Minutes and Seconds We know the Earth is a sphere that is divided into 360 degrees. Because longitude and latitude lines are far apart, we divide each degree into 60 parts to help determine locations. These parts are called minutes ('). Each minute is split into 60 parts. These parts are called seconds ("). Degrees, minutes, and seconds allow us to accurately locate places on Earth.

Analyze

6. Write the shorthand description of each location. Remember: Latitude is always stated before longitude.

85 degrees west of the prime meridian and 45 degrees north of the equator	
5 degrees west of the prime meridian and 18 degrees south of the equator	
105 degrees east of the prime meridian and 12 degrees north of the equator	

Research the longitude and latitude of your school. Express your location on Earth in both its longhand and shorthand format.

Time Zones When it is high noon at your location, the Sun is directly overhead. But as Earth rotates, the Sun is directly above different locations at different times. Businesses in cities many miles apart would have a hard time doing business with each other if every city had its own time. Time zones were created to make travel, communicating, and doing business easier for everyone. *A* **time zone** *is the area on Earth's surface between two meridians where people use the same time.* The reference or starting point for time zones is the **prime** meridian. Earth is divided into 24 time zones, and the width of a time zone is 15° longitude. But, as shown in **Figure 6,** the time zones do not follow the meridians exactly. Their locations are sometimes altered at political boundaries. Notice how the time changes by one hour at the boundary of each time zone. What happens then when you go halfway around the globe?

International Date Line *The line of longitude 180° east or west of the prime meridian is called the* **International Date Line.** Recall that there are 24 time zones and 24 hours in a day. Because one location cannot have two different times on the same day, the day changes as you cross the date line. If you cross from east to west, it is the day before in the west. If you cross from west to east, it is the next day in the east.

Notice that the International Date Line does not follow the 180° meridian exactly. This is because some island nations would be divided by the line. It would be one day on one island and a different day for another island in the same nation. To avoid this, the International Date Line goes around them.

Academic Vocabulary

prime
(adjective) first in rank

Connect

7. Why do we need a starting point for time zones?

Time Zone Map

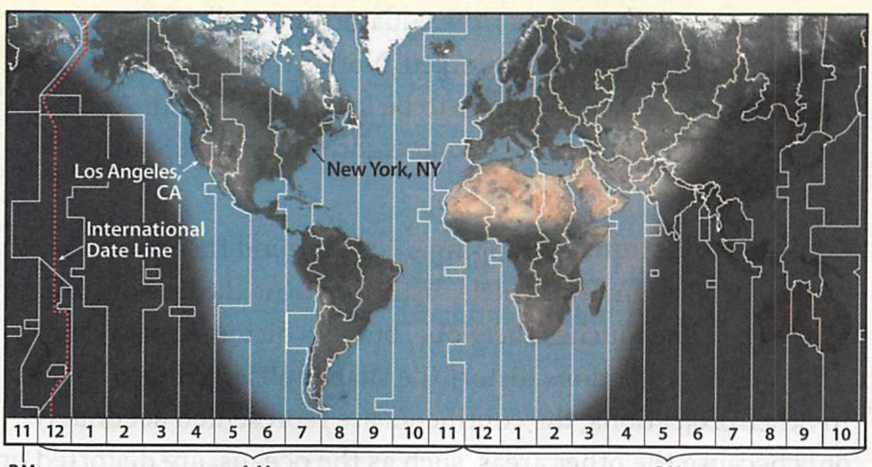


Figure 6 There are 24 time zones around the world.

Determine

8. Observe **Figure 6.** If it is 2:00 P.M. in New York City, what time is it in Los Angeles, California?

Watch

Go Online!

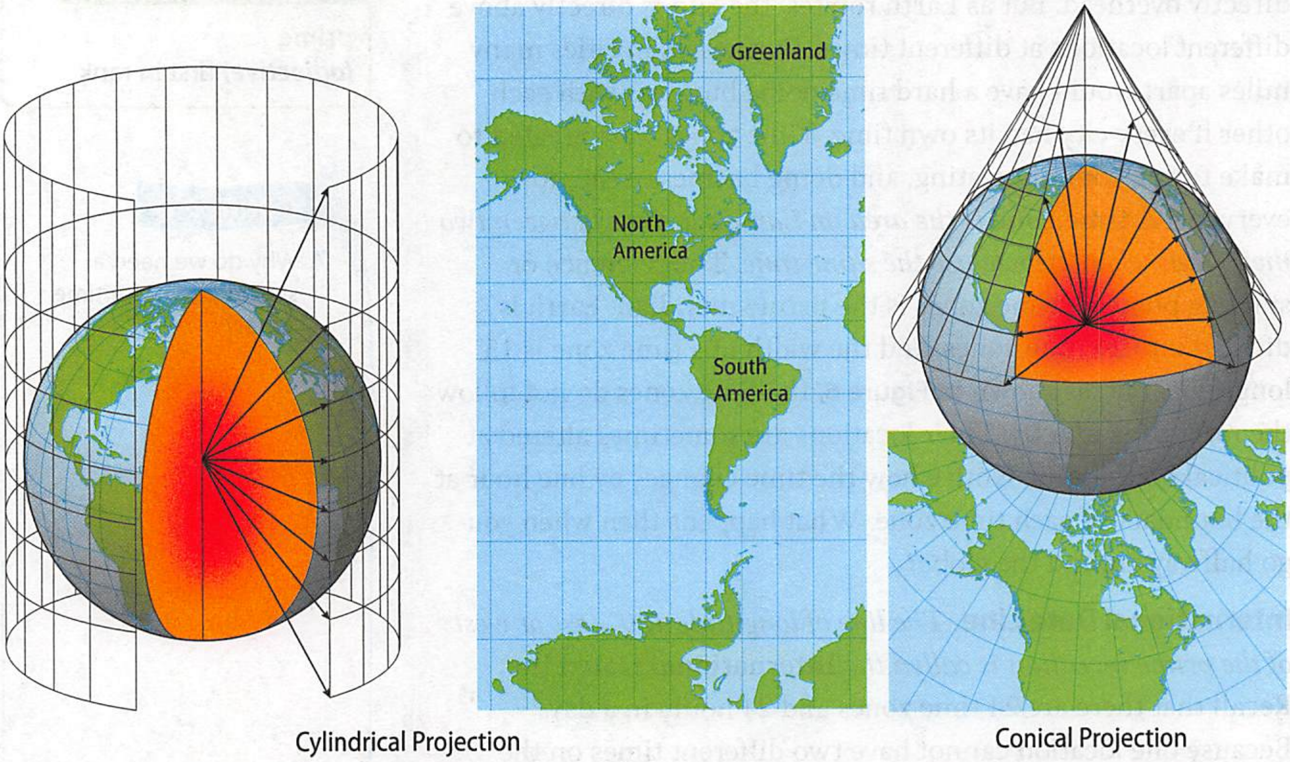


Figure 7 The cylindrical and conical projections transfer features located on a sphere to a flat map. This process always results in some distortion.

Distinguish

9. Highlight the advantages of cylindrical projections and conical projections. Then underline the disadvantages of both.

FOLDABLES®

Make a folded book from a sheet of paper. Label it as shown. Use it to record information about map projections. Label the outside of the book Map Projections.

Map Projections

Because a globe is spherical like Earth, Earth's features are not distorted on a globe. Maps, however, are flat. How can a flat map be made from a sphere? One way to transfer features from a globe to a flat map is to make a projection.

Cylindrical Projections Imagine a light at the center of a globe. It would throw shadows of the continents and the latitude and longitude lines onto a sheet of paper if it were wrapped around the globe. Because the paper is shaped like a cylinder, as shown in **Figure 7,** this is called a cylindrical projection. The resulting map represents shapes near the equator very well. However, shapes near the poles are enlarged. Notice that in the cylindrical projection, Greenland appears to be larger than South America. However, Greenland is about one-eighth the size of South America.

Conical Projections Wrapping a cone around the globe makes a conical projection. It has little distortion near the line of latitude where the cone touches the globe, but it is distorted elsewhere. All types of projections distort the shapes observed on a sphere. In other projections, the continents are represented accurately only because the other areas, such as the oceans, are distorted or cut away.