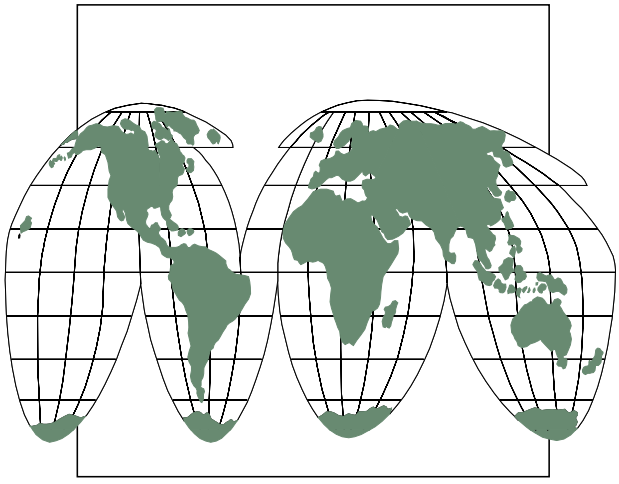
Unit 2: Map Reading



Vocabulary

Study the vocabulary words and definitions below.

contour interval ..... the difference in elevation between two contour lines

contour lines ..... lines that pass through points on a map with the same elevation

elevation ..... the height above sea level

equal-area projection map ..... a map that shows areas that are positioned correctly but whose shapes are distorted

equator ..... imaginary line halfway between the poles; it divides north and south latitude and represents 0° (zero degree) latitude

globe ..... a spherical or round model of Earth

International Date Line ..... the imaginary line at 180° longitude where east and west longitude meet; at this point, one date changes to the next

isobars ..... lines on a weather map that represent areas of equal barometric pressure

isotherms. ..... lines on a weather map that represent areas of equal temperature

latitude ..... measure of a distance north and south from the equator

legend ..... explanation of the symbols used on a map

longitude ..... measure of a distance east or west from the prime meridian

map ..... a drawing or model of the surface of Earth showing lines of longitude and latitude and positions of physical features of the land

map projection ..... a flat drawing of Earth

Mercator projection map ..... a map on which both lines of longitude and latitude are parallel; it is good for navigation but gives a distorted view of the polar areas

meridians ..... lines on a map that run from the north pole to the south pole that measure longitude

meteorologist ..... scientist who studies and predicts the weather

parallels ..... lines on a map that circle the globe in an east-west direction; these lines are used to measure latitude

polar projection ..... a map that gives an accurate view of the polar regions but a distorted view of the areas near the equator

prime meridian ..... an imaginary line that runs through Greenwich, England, that divides east and west longitude; it represents 0° longitude

relief ..... the difference in elevation between the high and low points of a land surface

scale ..... the comparison of the distance on the map to the actual distance on Earth's surface

time zones ..... the 24 longitudinal divisions of Earth that represent the 24 hours of the day; each is 15° of longitude

topographic map ..... a flat map of Earth that shows the surface features of the land

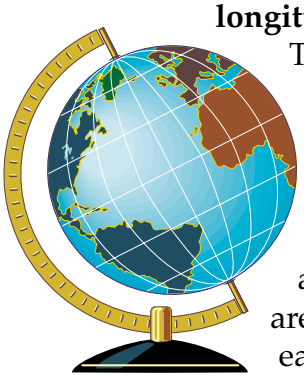
Introduction

Maps have been in existence for a very long time—for as long as human beings have wanted to go somewhere. There is evidence that prehistoric people drew maps on the walls of their caves to locate good hunting grounds or other shelters. Maps are used every day. They are now even computerized for use in large transportation systems. Eventually, this computerization will create maps for use in our cars.

Learning how to read maps, what symbols are used, and how to draw a map are important life skills. The use of three basic types of maps—road maps, **topographic map**s, and weather maps—is essential in the study of Earth/space science.

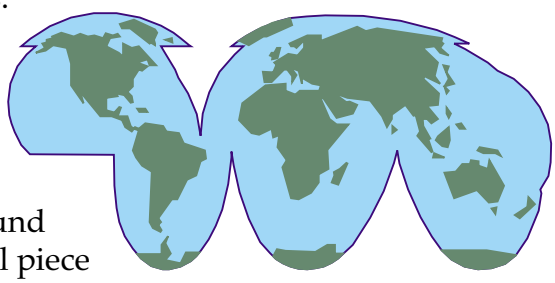
Maps

A map is a drawing or model of Earth's surface which shows lines of **longitude** and **latitude**, and positions of physical features. There are different types of maps which show different features of Earth.



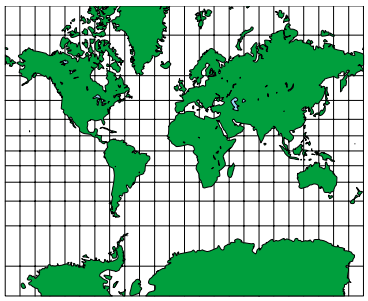
A **globe** is a spherical model of Earth. Because its shape is similar to the shape of Earth, it is very accurate. Places on a globe closely correspond to the actual places where they are located on Earth. Globes are not as convenient as maps because they are not easily carried or stored.

A **map projection** is a drawing of Earth's curved surface on a flat piece of paper. A map is much more practical than a globe because it can be put in textbooks; hung on walls; and projected on television, radar screens, and computer screens. However, a map projection also has disadvantages. When a round surface is projected on a flat surface, the shape and size of land masses and oceans are distorted.



To show how a map distorts a round surface, flatten a large and a small piece

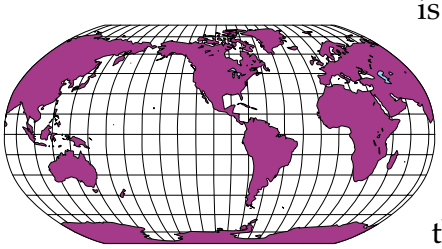
of an orange skin. The larger the piece, the more it must be torn to become flat. This is true with the earth's surface also—the larger the area being shown on the map, the greater the distortion will be of that area.



On a **Mercator projection map** both the lines of latitude and longitude are straight and parallel. To understand how a Mercator projection is made, wrap a piece of paper around the **equator** of a globe and form a cylinder. Imagine the surface of the globe transferred to the paper. This gives us a map that is fairly accurate near the equator, but the land masses and oceans near the poles are greatly distorted and appear to be much larger than they really are in that area.

A **polar projection** is formed by placing a flat piece of paper on either of the poles of a globe. The longitude lines point outward like spokes of a wheel, and the latitude lines form a series of circles that get larger as they move away from the poles. This type of map provides a good picture of the polar areas, but the areas along the equator are distorted.

Another type of projection can be found on an **equal-area projection map**. It shows areas positioned correctly, but shapes may be distorted. This map is circular, with the lines of longitude meeting at the poles and the lines of latitude being equal distances apart and curving slightly.

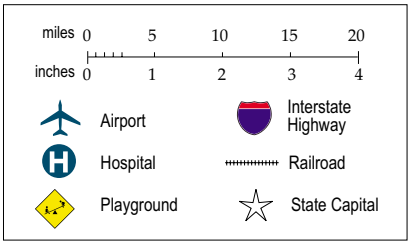


Some map projections are more accurate than others. Mercator projections produce maps that are distorted near the poles. Longitude lines are spread apart on the map to make them parallel. Polar maps, however, give an accurate view of the polar regions. Equal-area maps are useful because the land masses are located at the proper longitude and latitude.

Maps are used for different reasons. Some maps are used to show the following:

- amount of yearly rainfall
- political boundaries of cities, states, and countries
- climatic regions
- barometric pressure
- population
- vegetation of an area
- soil types
- topographic features
- elevation
- weather

Every map has a **legend** that explains the symbols used on the map. It is usually located in a box in a lower corner of the map. The legend also shows the **scale** of the map. The scale of the map compares the distance on the map to the actual distance on Earth's surface.

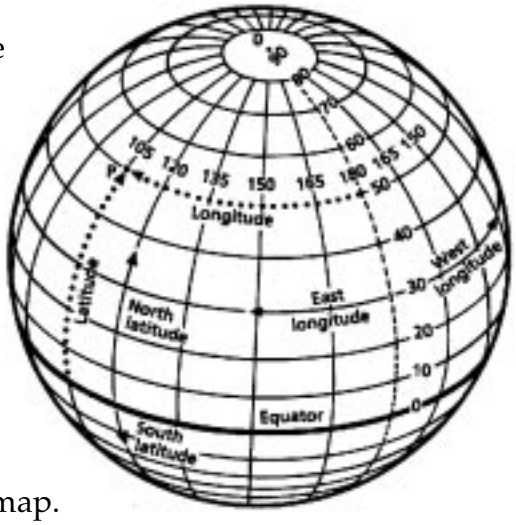


Longitude and Latitude

Maps and globes have lines drawn on them in two directions. Lines that run from the north pole to the south pole are called **meridians**. The **prime meridian** is the imaginary line that runs through Greenwich, England. The measure of distance east and west of the prime meridian is called *longitude*. Lines of longitude that are west of Greenwich are called *west longitude*, and those east of Greenwich are called *east longitude*.

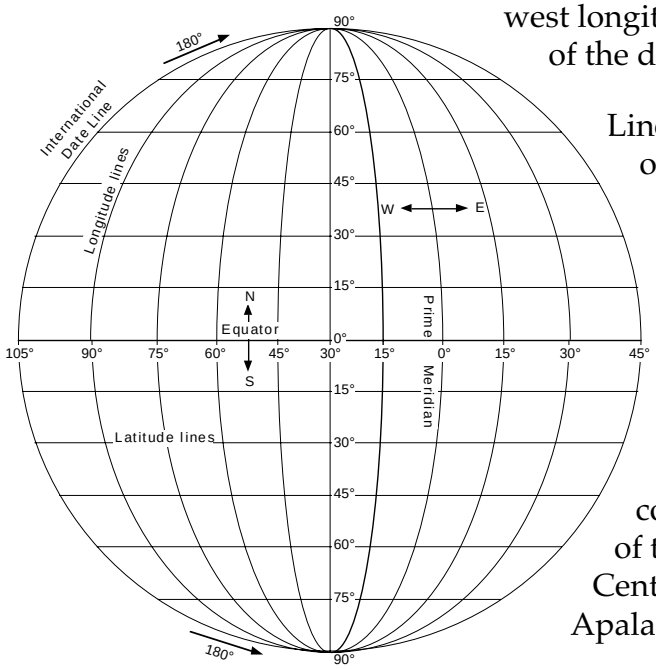
Lines that circle the globe in an east-west direction are called **parallels**. The longest of these is the equator, which is located halfway between the poles. On both sides of the equator, parallel circles (circles that are an equal distance apart) are drawn. These parallels, or circles, get smaller as they near the poles. Parallels measure the distance north and south of the equator, which is called *latitude*.

The equator is labeled 0° latitude. Since the distance from the equator to the poles is one-fourth of the distance around Earth, both poles are labeled 90° latitude. Parallels of latitude that are north of the equator are called *north latitudes*, and those south of the equator are called *south latitudes*.



Latitude and longitude are used to locate places on a map. The parallels and meridians intersect each other to form a grid or network of lines on the map. Any place on the surface of Earth can be located by giving the coordinates of the lines of latitude and longitude that cross at that point. Since distances in a circle are measured in degrees, longitude and latitude are also measured in degrees.

The prime meridian is labeled 0° longitude. Half the distance of a circle is 180°; therefore, the meridian that is halfway around the globe from the prime meridian is labeled 180° longitude. This is called the **International Date Line**. This is the place where one date changes to the next. Here longitude changes from west to east or east to west depending on the direction of travel. The International Date Line also works much like the prime meridian but in reverse. Longitudes to the east of the date line are west longitude. Longitudes to the west of the date line are east longitude.



Lines of longitude and the time of day are closely related. Just as the day is divided into 24 hours, lines of longitude that are 15° apart form 24 divisions of Earth. These divisions are called **time zones**, and there is one for each hour of the day. Four of these time zones divide the contiguous United States. Two of these in Florida—Eastern and Central—are separated by the Apalachicola River.

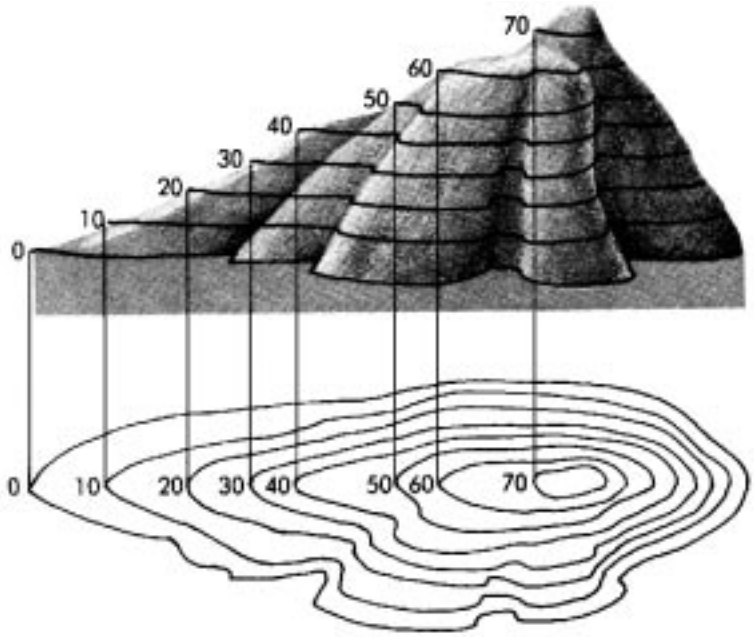
Topographic Maps

A *topographic map* is a line-and-symbol representation of natural and selected man-made features of a part of Earth's surface. These features are plotted to scale. Topographic maps show landscape features such as hills, mountains, plains, lakes, and rivers. They also show some features placed on Earth by people such as railroads, cities, dams, and roads.

Topographic maps show the shape and **elevation**, or height of surface features above sea level, of the land. In order to represent elevation on a flat map, **contour lines** are used. Contour lines are drawn to join points of equal elevation. These lines are then numbered to represent the number of feet above or below sea level of the land at that point. The difference in elevation between two contour lines is called the **contour interval**.

Topographic maps have many uses as basic tools for planning recreational sites, airports, highways, and construction of all types.

The difference in elevation between the high and low points of the land's surface is called the **relief** of the map. A map with high relief represents a lot of variation in elevation and usually indicates a very hilly or mountainous area. On the other hand, an area with low relief may be found along the coast or in the plains, where the land is generally flat.

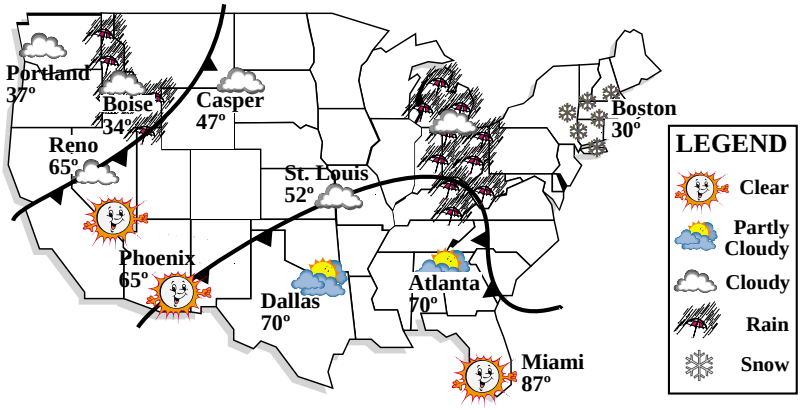


When using contour lines, the following rules apply:

- Contour lines close to form irregular ovals or circles around hills, lakes, or basins.
- Each line represents the same height above sea level all along its course.
- When contour lines cross a stream, they form a V that points upstream.
- Contour lines do not stop in the middle of the map; they either close or go to the edge of the map.
- Contour lines do not cross other contour lines that represent a different elevation.

Weather Maps

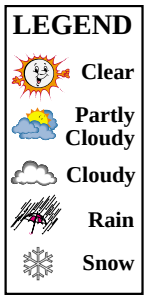
Meteorologists are scientists who study and predict the weather. They gather information about the weather from many sources, such as weather satellites, barometers, and thermometers and from observations of weather currently happening in different parts of the country. Meteorologists take this information and put it on a map, using various symbols.



Weather maps show different kinds of weather information. Places with the same barometric pressure are connected by lines called **isobars**. They show the size and position of high- and low-pressure systems. Lines that connect points of equal temperature are called **isotherms**. Weather maps may also show the direction and speed of the wind and types of precipitation, such as rain, drizzle, and snow.

Weather satellites send us pictures that show cloud covers and movement. They can also help meteorologists predict where pressure systems are moving, as well as the movement of tropical storms and hurricanes.

From the information gathered and represented on weather maps, meteorologists can then predict the weather for the next few days. Weather predictions are usually about 75 percent to 85 percent accurate. Due to rapidly changing conditions, it is impossible to be correct 100 percent of the time.



As with other types of maps, weather maps also have a legend which tells what the symbols on the map represent. The symbols used by the National Weather Service are standard—always the same. This makes it easier to track and predict weather conditions. For example, hurricanes are tracked by plotting the latitude and longitude of the storm. This is done every few hours. Despite this, it is still difficult to predict the course of hurricanes, since they often change directions suddenly. When tracking weather on television or in the newspaper, though, you should check the map legend because smaller, independent sources may use different symbols from those of the National Weather Service.

Summary

Different types of maps show different features of Earth and have different uses. Each type has advantages and disadvantages. Legends and scales help us interpret maps. Parallels and meridians are imaginary lines that measure distances in degrees of latitude and longitude. Special maps, such as topographic and weather maps, give special types of information.