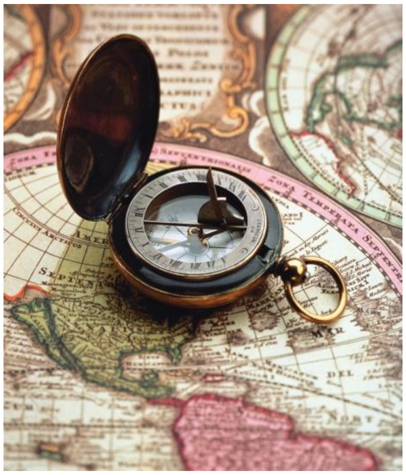
The Tools of Geography Unit 1: Lesson 1 – Introduction



Maps and compasses are two common tools used by geographers.

In the early 1800s, the United States was just beginning to expand west across North America. No American of European descent had ever crossed the territory that lay west of the Mississippi River. This vast area was a mostly mysterious blank space on the maps of the time.

To find out about this unknown territory, President Thomas Jefferson sent Meriwether Lewis and William Clark to explore the western frontier. Lewis and Clark led a team of explorers on a two-year expedition to the Pacific Ocean. The team mapped mountains and rivers as they crossed them. They collected samples of wildlife and plants that they had never seen before. The explorers also met the American Indians of the West and learned how they lived.

In many ways, today's geographers are explorers like Lewis and Clark. They study the natural features of the land, the sea, and even the sky above. They try to understand the way people interact with the world around them. For example, they look at where people choose to live and why. They study the way people use Earth's resources, such as forests, water, and minerals. They explore the advantages that come with living in cities or in the country. Often geographers use maps as a basic tool for recording information and making new discoveries.

In this lesson, you will learn how to use different kinds of maps. You will see how maps can illustrate information about people and places on Earth. You will then put these tools to use in your own study of geography.

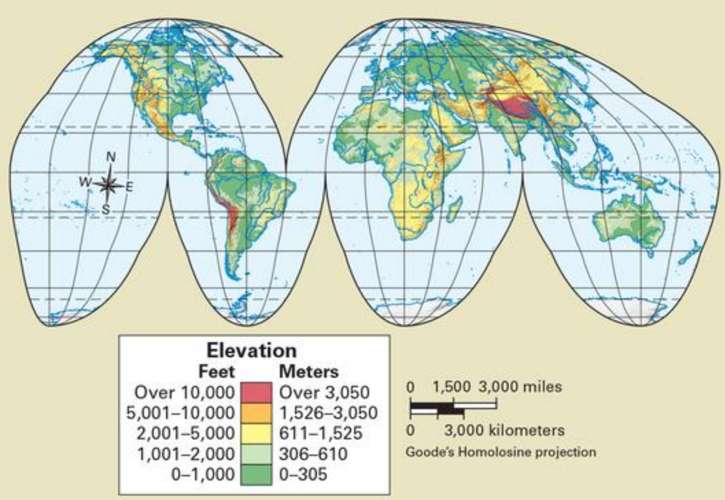
Essential Question

How do geographers show information on maps?

A geographer made this map to show information about the world. The words, lines, and symbols are clues from the geographer to help you make sense of the map. Keep this map and its clues in mind as you try to answer the Essential Question.

Graphic Organizer

Physical Features of the World



Unit 1: Lesson 1: Section 1 - The Geographic Setting

In September 1805, the Lewis and Clark expedition crossed the Rocky Mountains on the way to the Pacific Ocean. Lewis and Clark wanted to explore the Columbia River, which could take them to the ocean, but they didn't know how to find it. An American Indian chief named Twisted Hair came to the rescue. He drew a map on a white elk skin that showed the explorers how to reach the Columbia and indicated that the river was "five sleeps" away.

Today we still use maps to find the locations of places and determine how far apart they are. Like Twisted Hair's drawing, the most basic map is a diagram that shows what is where.

Locating Things on Earth: The Main Purpose of Maps For geographers, maps are tools that show where things are on Earth. With these tools, we can find the **absolute location** of any place in the world. Every feature is located at a precise, or absolute, point on Earth, and there are many ways to describe this precise point. Your street address, for example, indicates the absolute location of your home. Later in this lesson, you'll learn how a grid, or system of lines, can be used to show the absolute location of places on a map.

Maps also show the **relative location** of places on Earth. This is the location of one place compared to another. For instance, one place might be located east or west of another one. You probably use relative location when you give someone directions. Suppose you want to tell a friend how to locate the street where you live. You might tell her to proceed along a main street and then turn right one block past the park. With these directions, you would be telling her your street's location relative to a place she knows well.

Distortion: The Big Problem with Maps Maps are great tools, but they're not perfect pictures of Earth's surface. Maps are two-dimensional, or flat. In contrast, Earth is three-dimensional and shaped like a sphere, much like a basketball. The only way to show a spherical Earth on a flat map is by stretching some parts of it—a process that changes the shape, size, and position of Earth's features. These changes are called **distortion**. The photographs and maps in this section show just how severe this distortion can be.

One way geographers deal with the problem of distortion is to use globes. Because they are spheres, globes are better models of the whole Earth than flat maps. They show the size, shape, distance, and direction of places on Earth very accurately. Unfortunately, globes cannot show a lot of detail without becoming huge. Maps, in contrast, can show smaller areas of Earth and include much more detail. In addition, maps are much easier than globes to carry around.

A second way to deal with distortion is to use **map projections**. A map projection is a particular way of showing Earth on a flat surface. All map projections have some kind of distortion. For example, one projection that accurately shows the sizes of places will distort their shapes, while another that shows accurate shapes will distort sizes and distances. Geographers choose the projection that best suits the kind of information they want the map to show.

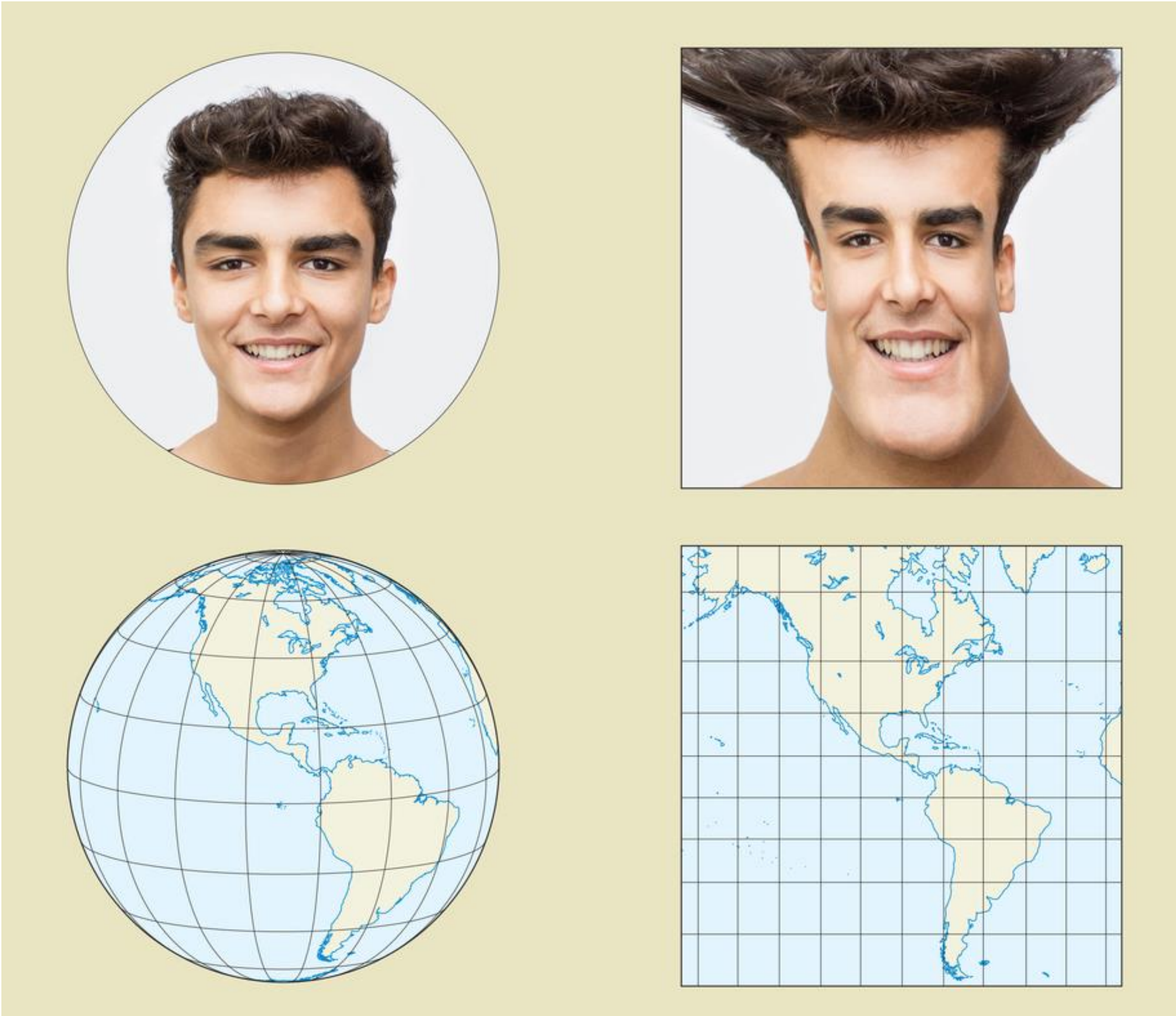
▶Geoterms

absolute location the precise point where a place is located on Earth

distortion a change in the shape, size, or position of a place when it is shown on a map

map projection a way of representing the spherical Earth on a flat surface

relative location where a place is located in relation to another place



Flattening a Sphere Distorts Features
A person’s head is shaped almost like a sphere. If you try to flatten a head, its features stretch and change shape. As a result, the person becomes almost unrecognizable. In a similar way, flat maps can distort information about Earth’s features.

Fill in the blank with the correct Geoterm.

Changes to the shape, size, and position of Earth's features are called ______________________________.

Geographers can deal with this problem in two ways. The first is to use globes, which are spheres that model the Earth better than flat maps. The second is to use ______________________________________, which attempt to show Earth on a flat surface.

To say that my house is located behind the McDonalds on Mound Road is an example of ______________>

Write definitions for the terms below. Draw a symbol that will help you remember the term. Write a sentence that includes the term. The sentence must make sense and show you understand the meaning of the term.

absolute Location

Symbol:	Definition:
	Sentence

distortion

Symbol:	Definition:
	Sentence

map projection

Symbol:	Definition:
	Sentence

relative location

Symbol:	Definition:
	Sentence

Unit 1: Lesson 1: Section 2 - Map Titles and Symbols

Like Lewis and Clark, early explorers often had no maps to guide them on their journeys. Lewis Carroll, the well-known English author of *Alice in Wonderland and Through the Looking Glass*, made fun of their situation in a poem called *The Hunting of the Snark*. The poem tells of sailors searching for an imaginary creature called a snark. To assist them, the ship's captain unrolls a large map of the sea without a trace of land or even a mark indicating where anything was. The snark-hunting sailors, Carroll wrote,

were much pleased when they found it to be
A map they could all understand . . .
"A perfect and absolute blank!"

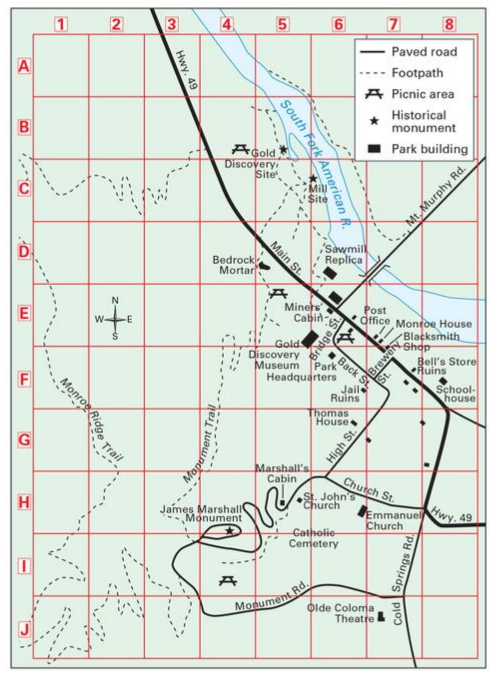
Luckily for us, instead of being blank, the maps we use today are filled with information.

The Title Tells What a Map Shows A map's title gives us our first clue about its content. The title usually describes the area shown on the map and identifies the map's main topic. The topic might be gold or silver mining, politics, agriculture, or even the night sky. Often the title also includes a date that tells us that the map shows the locations of places at a certain time.

A Compass Rose Shows Directions on a Map Have you ever used a magnetic compass to find your way when you were lost and in a strange place? If so, you know that the needle of a compass always points in a northward direction—toward the North Pole. Knowing where north is can help you determine which way to go.

Mapmakers use a small diagram called a **compass rose** to indicate directions on a map. Because these diagrams often resembled a flower on early maps, sailors called this direction-finding tool a compass rose. It gave them courage to sail out of sight of land.

Marshall Gold Discovery State Historic Park



Using a Map's Title, Compass Rose, Legend, and Grid
You can use this map to tour a historic site. The map title tells which site you will be exploring. The compass rose shows which way north is on the map. The map legend tells you what the symbols on the map mean. Once you know what you want to visit, the map grid will help you locate it on the map.

A simple compass rose has two short lines that cross at right angles. The points at the ends of the lines are labeled with the **cardinal directions**—north, south, east, and west. A more elaborate compass rose has lines between the cardinal points showing the **intermediate directions**—northeast, southeast, southwest, and northwest.

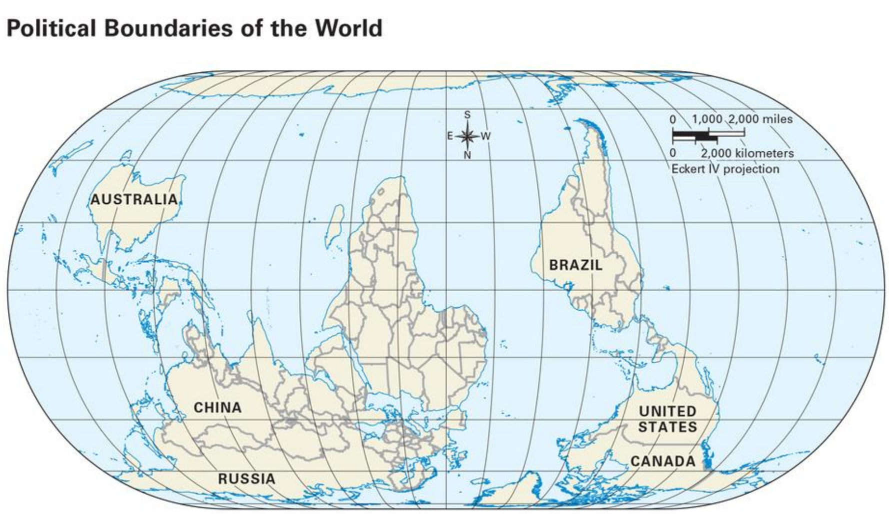
A Legend Identifies Symbols on a Map A compass rose is one of many symbols used to show information on a map. Some symbols incorporate color to show features. Blue lines, for example, are symbols that indicate the locations of rivers. Lakes and oceans are often colored blue as well. Other symbols use shapes to show information. A bold star is a common symbol for the capital of a state or country, while miniature airplanes are often used to show the locations of airports.

The symbols used on a map are usually identified in a box known as the **map legend**, or sometimes the **map key**. The map legend lists each symbol and explains what it shows on the map in this section.

A Grid Organizes Space on a Map Mapmakers often use a system of imaginary lines called a **map grid** to divide up space on their maps. You can see an example of a grid on the map above. To form this grid, the mapmaker drew a network of evenly spaced horizontal lines and vertical lines that meet at 90-degree angles. (Remember that horizontal lines go straight across, while vertical lines go up and down.)

Geographers make map grids useful by giving each line a label. For instance, on some maps the horizontal lines are labeled with letters and the vertical lines are labeled with numbers. Each number and letter identifies a particular section of the map. Once the grid has been labeled, a letter and number combination such as C3 or H7 can be used to specify the location of any place or feature on the map. The letter and number indicate the intersection of a horizontal and a vertical line on the map. Find the intersection of these two lines, and you will have found the place or feature you are looking for close by.

One very useful type of grid is the system of latitude and longitude. This **global grid** allows people to locate any point on Earth's surface with the use of a simple numeric code. You will learn more about the global grid in the next section.



The Top of a Map Doesn't Always Point North
On most maps, the top of the map points north, but not all maps work this way. This map turns our usual view of Earth upside down. The map isn't right or wrong. After all, Earth does not have a "right" side up as seen from space. When you look at any map, be sure to check the compass rose so that you know which direction is which.

Geoterms

compass rose: a diagram on a map that shows directions such as north, south, east, and west
cardinal directions: the four main directions on a compass rose: north, south, east, and west
intermediate directions: the directions on a compass rose, such as southeast, that are located between the cardinal directions
map legend: a box or other display on a map that explains the meaning of the symbols used on the map
map key map key: another name for map legend
map grid: a system of imaginary lines that divides up the space on a map
global grid: the system of imaginary lines (called parallels of latitude and meridians of longitude) used to divide the surface of Earth on maps and globes

Elements of a Map

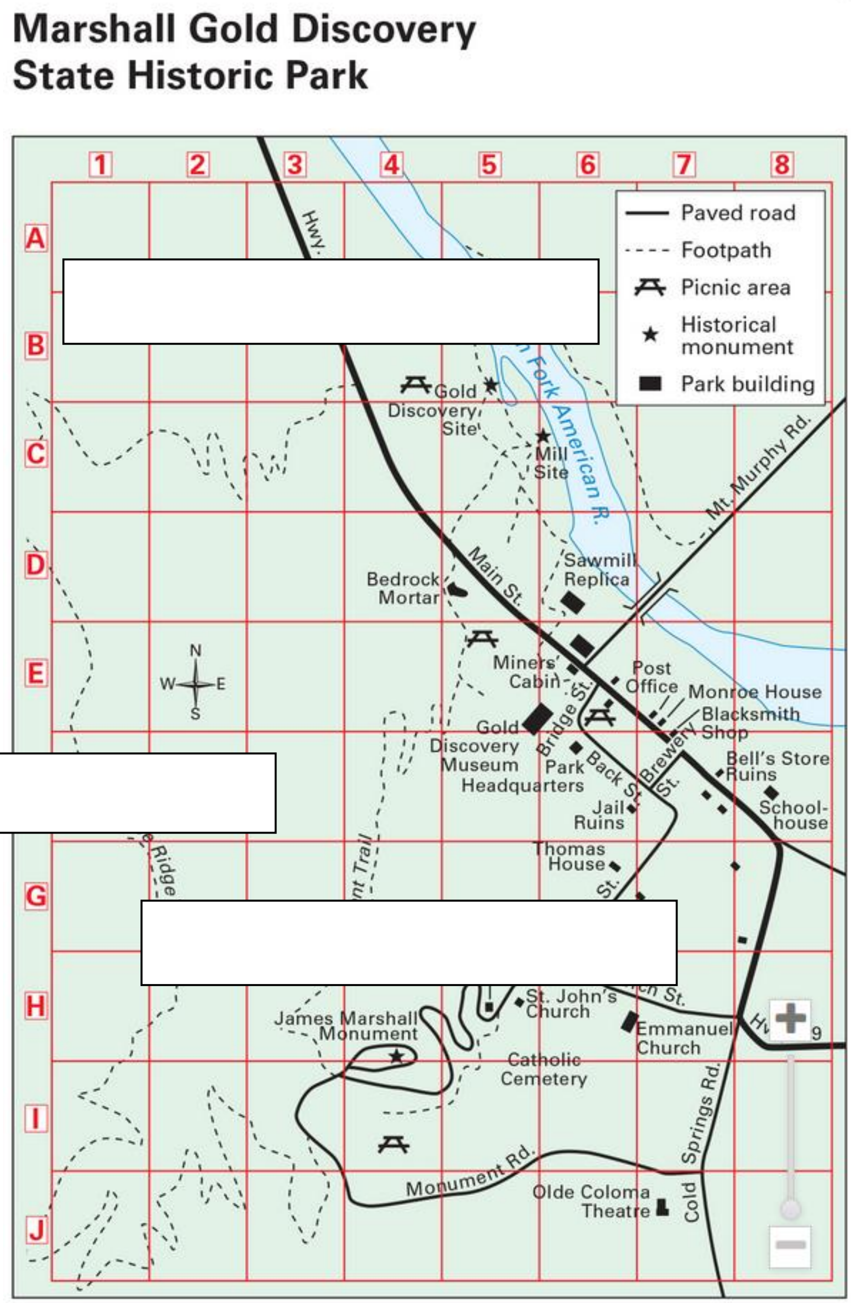
Write the function for each map element.

Element	Function
title	
Compass Rose	
Legend/Key	
Global Grid	

Scale	

Write each term by its correct position on the map.

- Compass rose
- Location J6
- Map legend
- Map title



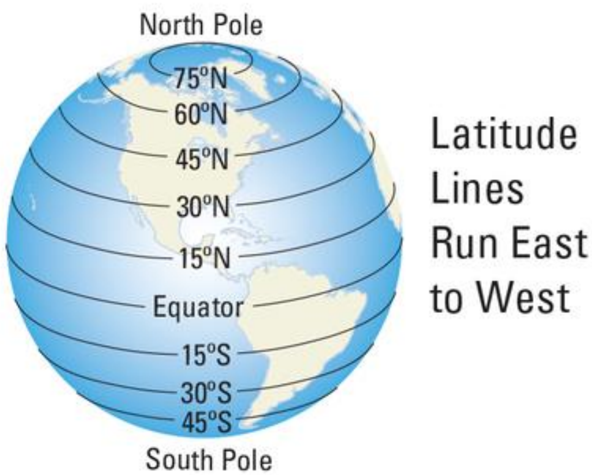
Unit 1: Lesson 1: Section 3 - The Global Grid: Longitude and Latitude

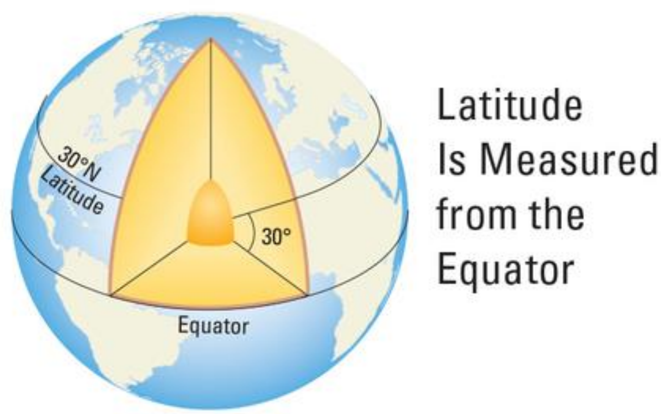
In April of 2017, two people were driving through the Gibson Desert in Australia. When their car became stuck in the sand, the couple had a serious problem. They were almost 200 miles from the nearest town. Luckily, the two had brought their Personal Locator Beacon, and they pressed a button to call for help. A helicopter crew soon rescued the two and flew them to safety.

How did the rescuers find these stranded travelers? Their locator beacon showed their exact location on the same global grid that geographers use to show the absolute location of every place on Earth.

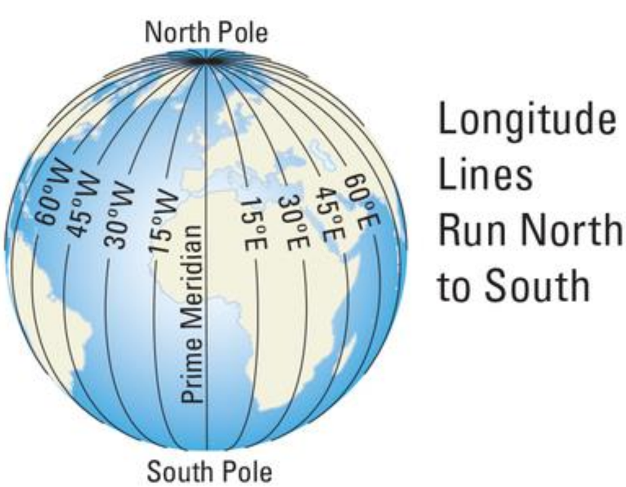
Lines of Latitude Parallel the Equator The global grid system is made up of two sets of imaginary lines. The first set of lines, **parallels of latitude**, run east and west around the globe.

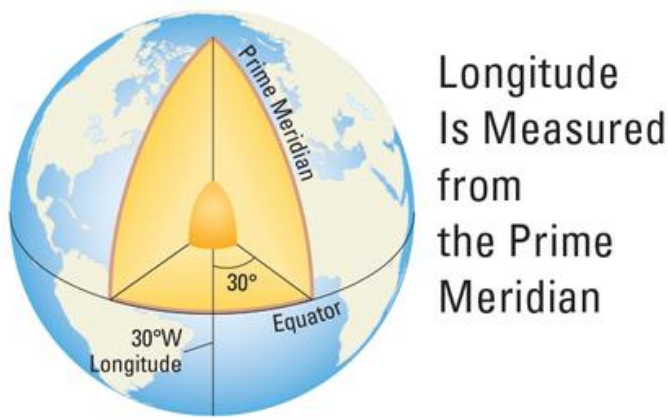
The **equator** is the most important parallel of latitude. It circles Earth exactly midway between the North and South poles. All other lines of latitude are parallel to the equator. Parallels of latitude are measured in degrees (°), with the equator marking 0° latitude. Other parallels are measured with reference to the equator.





Lines of Longitude Run from Pole to Pole The other set of lines in the global grid are half-circles, called **meridians of longitude**, that run from the North Pole to the South Pole. These lines are not parallel to each other, so the distance between them varies.





The most important of these north-south lines is the **prime meridian**, which runs through Greenwich, England. Like parallels of latitude, meridians are measured in degrees, with the prime meridian marking 0° longitude. The prime meridian is a reference for measuring other meridians.

The next most important meridian is the **International Date Line**. This line runs though the Pacific Ocean halfway around the world from the prime meridian. When travelers cross the International Date Line, they cross over to a different day. Travelers moving west across the line go forward a day, while those traveling east across the line go back a day.

Latitude and Longitude Mark Absolute Location The numbering system of the global grid helps make it easy for you to locate any place on Earth.

Moving north from the equator, the parallels of latitude increase in number from 0° up to 90°N (north) at the North Pole. A similar thing happens moving south of the equator, where the numbers of the parallels increase from 0° to 90°S (south) at the South Pole. One degree of latitude covers about 69 miles, or 111 kilometers.

Meridians of longitude start from 0° at the prime meridian. Traveling east from there, the numbers on lines of longitude increase until they reach 180° at the International Date Line. These numbers are labeled E (east). The same thing occurs going west from the prime meridian. The numbers increase until they reach 180° at the date line and are labeled W (west).

The absolute location of any place on Earth can be described as the meeting point of a parallel of latitude and a meridian of longitude. The numbers of these lines are the geographic coordinates of a place. These **coordinates** are like a street address for your house. They tell exactly where that place is located.

The absolute location of any place on Earth can be described as...

a) the meeting point of the equator and the prime meridian.
b) the location of one place compared to another.
c) the meeting point of a parallel of latitude and a meridian of longitude.
d) the geographic altitude of a place.

<u>Geoterms</u>

parallels of latitude: an imaginary line around Earth that runs parallel to the equator

equator: the line of latitude that circles Earth exactly midway between the North and South poles

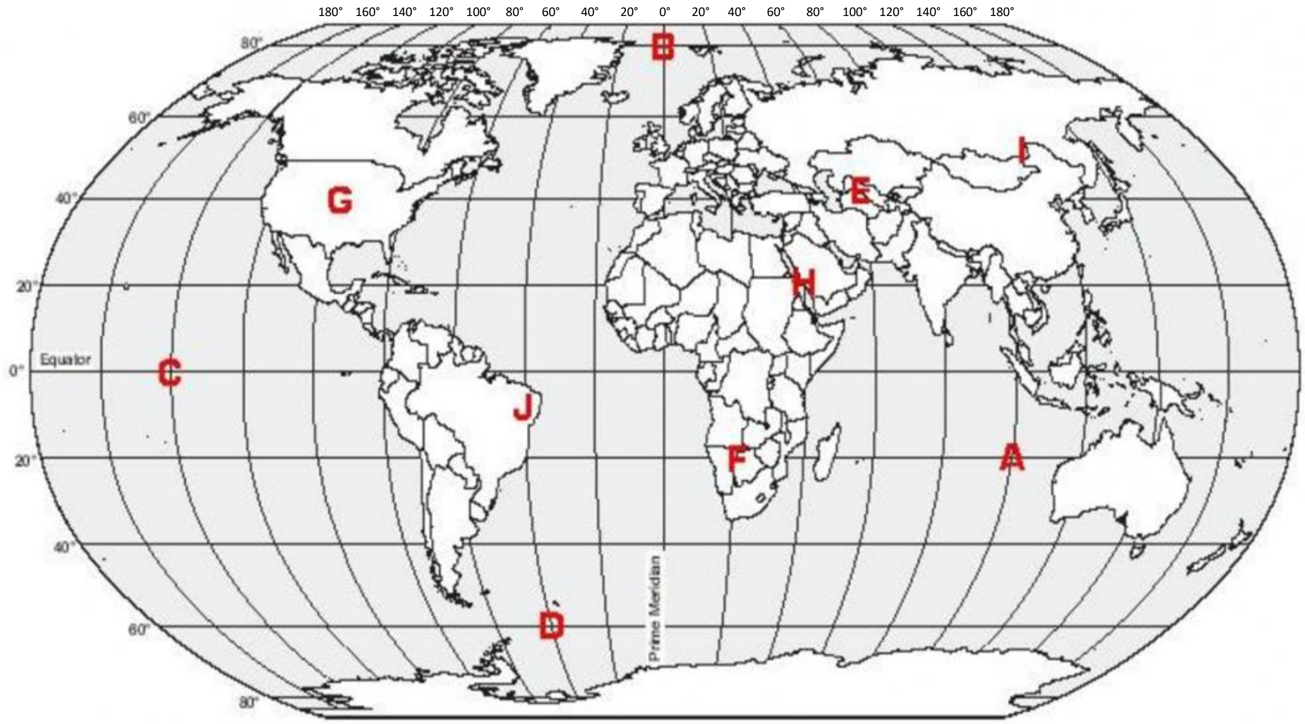
meridians of longitude: an imaginary line between the North and South poles that crosses the equator at right angles]

prime meridian: the meridian of longitude labeled 0 degrees, from which all other degrees of longitude are measured. The prime meridian passes through Greenwich, England.

International Date Line the meridian of longitude located at 180º. By international agreement, the date is one day earlier to the east of this line.

coordinates: a set of numbers that together describe the exact location of something, such as a place on a map

Color the equator yellow. Color the Prime Meridian blue. Color the International Date Line red.



An airplane crashes at 40 degrees north and 60 degrees east. What letter would you travel to hunt for survivors?

What continent would you be on at 10 degrees south and 70 degrees west?

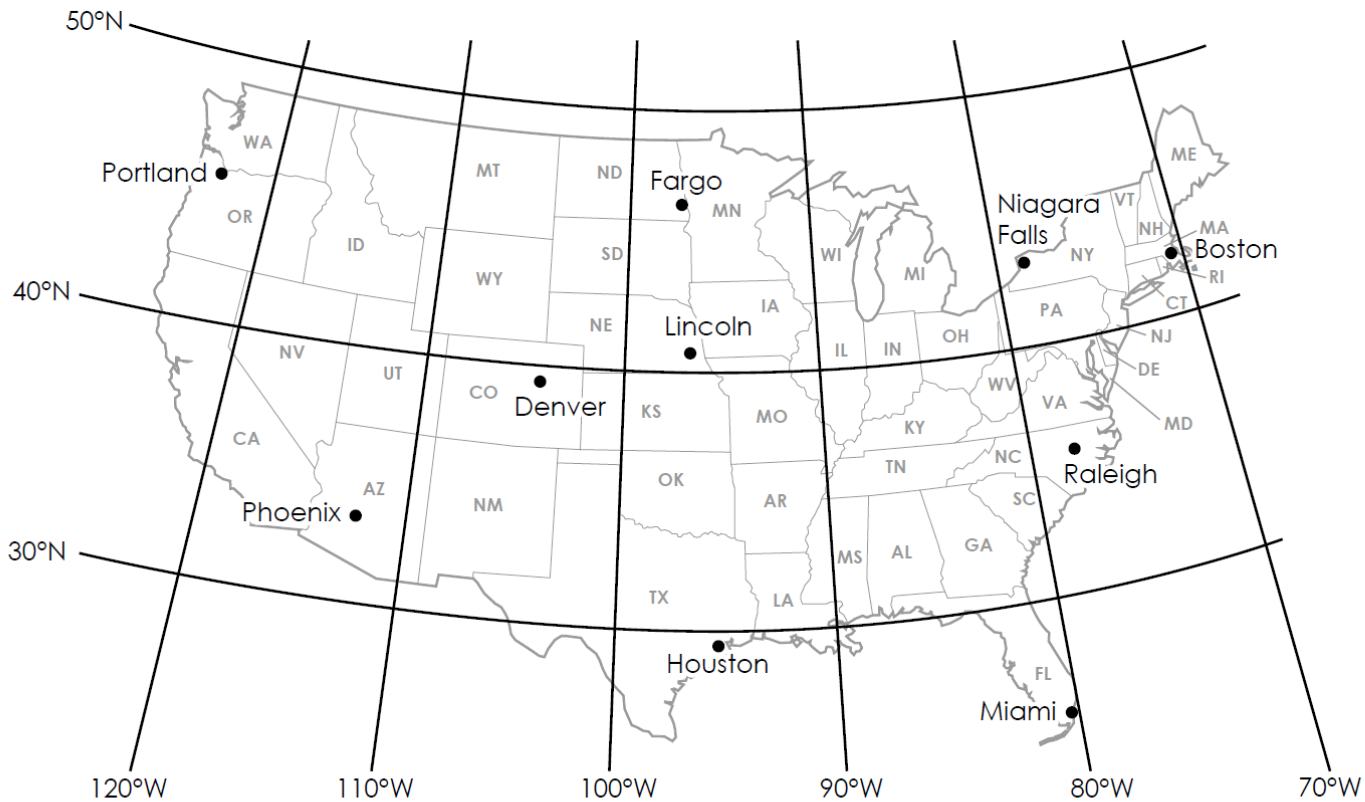
0 degrees latitude, 0 degrees longitude, the intersection of the Equator and the Prime Meridian, would be located in which ocean?

You receive a radio SOS call that a boat is sinking at 20 degrees south and 100 degrees east. What ocean would you travel to try to rescue the people?

Which letter is located at 50 degrees north and 120 degrees east?

Letter	Latitude	Longitude
A		
B		
C		
D		
E		
F		
G		
H		
I		

CHOICES
20 N 40 E
0 N 140 W
20 S 100 E
40 N 60 E
20 S 100 E
80 N 0 E
60 S 40 W
40 N 100 W
50 N 120 E



Write the name of the city and state found at the given latitude and longitude coordinates.

1. 33°N latitude, 112°W longitude ______________________________

2. 35°N latitude, 78°W longitude ______________________________

3. 46°N latitude, 96°W longitude ______________________________

4. 45°N latitude, 122°W longitude ______________________________

5. 29°N latitude, 95°W longitude ______________________________

6. 43°N latitude, 79°W longitude ______________________________

7. 25°N latitude, 80°W longitude ______________________________

Unit 1: Lesson 1: Section 4 - Dealing with Distances: Map Scale

In Ithaca, New York, a winding path called the Sagan Planet Walk takes people on a journey past models of the sun and the planets. In less than a mile, walkers pass through a model of the entire solar system. The model shrinks the vast distances of space to make them easier to understand. For instance, people can see that the planet Mars is about one and a half times Earth's distance from the sun.

A map does a similar thing for the area it shows. The scale on a map tells you how the distances on the map compare to the actual distances on Earth.

How Scale Affects Details A map can be large scale or small scale. A large-scale map gives a close-up view of a small area with a lot of detail, such as street names and interesting places to visit. You could use a large-scale map to find a store in a mall or on a neighborhood street. A small-scale map, in contrast, shows a larger area but with fewer details. Small-scale maps are best for finding your way between cities, states, and larger areas.

Estimating Distance with a Map Scale Many maps include a **map scale**, which tells you how to read distances on the map. For instance, an inch on a map might equal 10 miles or 100 miles or even 1,000 miles on Earth. The map scale appears either inside the map legend box or in a relatively open area on the map.

The map scale is usually made up of two short lines with notches along them, one line measuring distance in miles and the other in kilometers. The easiest way to use a map scale is to make a scale strip. Place a strip of paper under the map scale, mark the scale's notches on the paper, and label the marks with the numbers of miles or kilometers. Then, place your strip with the "0" mark at one point on the map, and line up the strip with a second point. Now read the closest number on your strip to this second point. You've just figured out the distance between those two points.

Washington, D.C., and Surrounding Areas

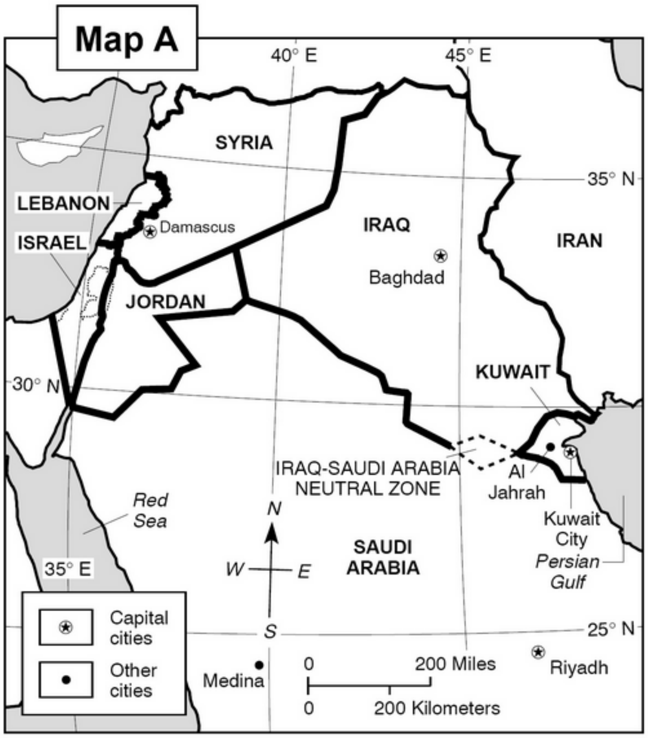
Downtown Washington, D.C.

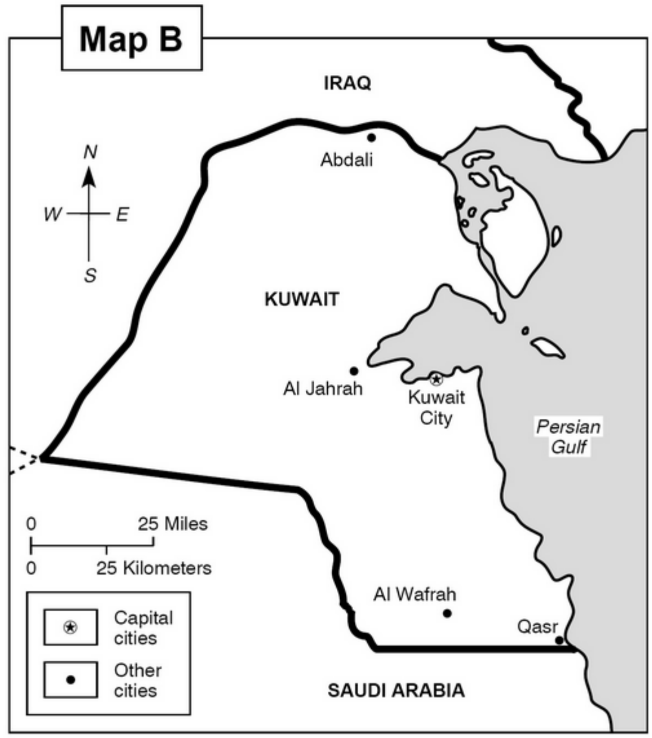
Maps with Different Scales The map on the left is a small-scale map. It shows where Washington, D.C., is located in relation to nearby cities. The map does not show details like city streets. But it does show larger features, such as major highways. The map on the right is a large-scale map. It focuses on Washington, D.C. You could use it to find your way through the city's streets to the White House or other monuments.

map scale: an element of a map that shows how a unit of distance on the map (such as an inch) relates to actual distance on the surface of Earth

1.4 Estimating Distance with a Map Scale

The two maps below use different map scales. Select the best map to answer the questions.





1. What does a map's scale compare?
   a) direction on a map with direction on Earth
   b) distance on a map with distance on Earth
   c) location on a map with location on a globe
   d) distortion on a map with distortion on a globe

How many miles is it from Kuwait City to Bagdad?
   a) About 200 miles
   b) About 400 miles
   c) Less than 100 miles
   d) More than 500 miles

2. Which map would you use to get the most accurate measurement of the distance from Kuwait City to Al Jahrah?
   a) Map A
   b) Map B

4. How many kilometers is it from the capital city of Iraq to
   the capital city of Syria?
   a) About 500 kilometers
   b) Less than 300 kilometers
   c) More than 800 kilometers
   d) About 700 kilometers

5. About how many miles across is Kuwait from North to
   South at its widest point?
   a) Just over 100 miles
   b) About 1200 miles
   c) Just less than 50 miles
   d) About 500

6. What country would you be in, if you were at the absolute location 30°N 40°E (Review 1.3)
   a) Iraq
   b) Syria
   c) Saudi Arabia
   d) Kuwait

Unit 1: Lesson 1: Section 5 - Hemispheres, Continents, and Oceans

“One of my favorite things to do when I have time off is to just watch the world go by,” said astronaut Ed Lu about his experience in space. In 2003, Lu watched Earth go by while he was living aboard the International Space Station. “It isn’t exactly seeing Earth like a big blue marble,” he explained. “It’s more like having your face up against a big blue beach ball.” On the “big blue beach ball,” he saw Earth’s wide continents and blue oceans.

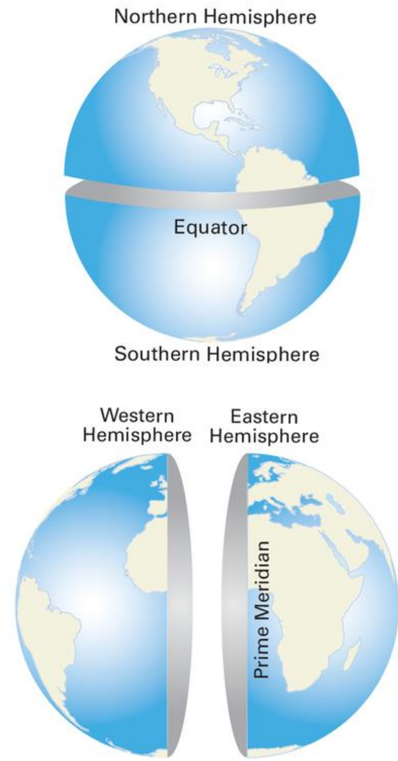
Few of us will ever see Earth from an astronaut’s point of view, but we can use maps and globes to get a bird’s-eye view of our planet’s natural wonders. Geographers make these features easier to understand by dividing Earth into different areas.

A Hemisphere Is Half a World Geographers divide Earth into halves called **hemispheres**. The equator divides Earth into two hemispheres. The northern half is called the Northern Hemisphere, and the southern half is called the Southern Hemisphere.

Geographers also divide Earth in half by longitude. The Western Hemisphere lies west of the prime meridian, and the Eastern Hemisphere lies to the east of it. The two hemispheres divide again at the International Date Line.

Continents and Oceans Cover Earth Geographers also divide Earth’s lands and seas into areas. Ocean water covers more than 70 percent of Earth’s surface. In fact, this ocean is really just one big body of water. But geographers usually divide it into five oceans—the Atlantic, Pacific, Indian, Southern, and Arctic oceans. Sometimes the Atlantic and Pacific oceans are divided at the equator into the North and South Atlantic and the North and South Pacific.

These oceans lap the shores of **continents**, the largest areas of land on our planet. The seven continents identified by geographers are, from largest to smallest, Asia, Africa, North America, South America, Antarctica, Europe, and Australia. Europe and Asia are actually parts of one huge **landmass**, but geographers usually think of them as two continents because they have different cultures and histories.



Hemispheres
The equator splits the globe into Northern and Southern hemispheres. The prime meridian and International Date Line split the globe into Eastern and Western hemispheres.

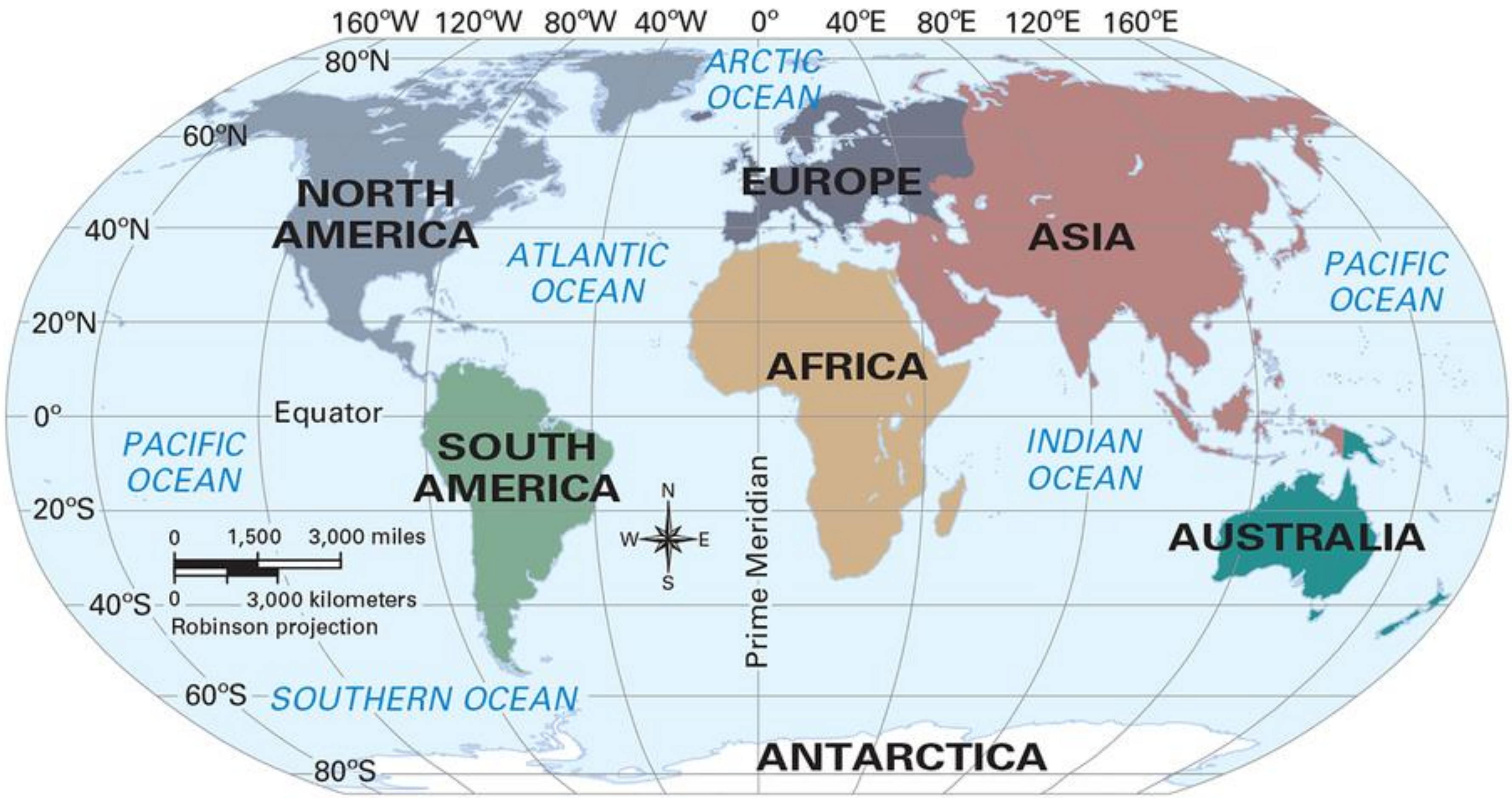
<u>Geoterms</u>

hemisphere: one half of a sphere. Earth can be divided into eastern and western hemispheres or into northern and southern hemispheres.

continent: the seven largest areas of land on Earth

landmass: a very large, unbroken area of land

The World



Earth's Continents and Oceans

You can see from this map that oceans cover most of Earth. The five major oceans are actually a single body of water that surrounds the seven continents.

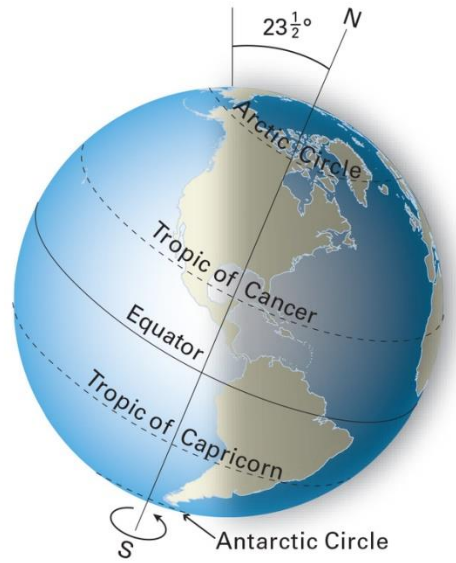
Write the name of each continent next to the hemisphere in which it is located.

South America
Asia
North America
Australia
Europe
Africa

Northern Hemisphere	
Both	
Southern Hemisphere	

Unit 1: Lesson 1: Section 6 - Earth and the Sun

For centuries, most people believed that Earth stood still in space. Today we know that our planet is in constant motion, moving at an average speed of about 67,000 miles per hour. That motion creates our years, months, and days and also helps to create our seasons.



The Tilted Earth
The tilt of Earth on its axis means that some areas receive more sunshine than others each day. This difference creates Earth's seasons.

The Moving Earth Earth moves around the sun in a nearly circular path called an orbit. One round trip, called a **revolution**, takes about 365¼ days, which makes an Earth year.

As Earth revolves around the sun, it spins like a giant top upon its **axis**. The axis is an imaginary line that runs from the North Pole to the South Pole through the center of Earth. The spinning motion of Earth is called **rotation**.

Earth makes one full rotation about every 24 hours. As Earth spins, it is daytime on the side facing the sun, and on the side facing away from the sun, it is night.

Earth's Tilt Creates the Seasons Earth's axis is tilted at an angle relative to the sun. Because of this tilt, the Northern and Southern hemispheres receive different amounts of sunlight as Earth moves around the sun. These differences create Earth's seasons.

During the north's summer, half of Earth is tilted toward the sun causing the Northern Hemisphere to receive more sunlight for more hours and allowing most places to enjoy hot days. Winter, the colder part of the year, comes when this hemisphere tilts away from the sun and the days grow short and cool.

Of course, during these same months of winter, the Southern Hemisphere tilts toward the sun, so in the south it is summer. Similarly, when it is summer in the Northern Hemisphere, it is winter in Earth's southern half.

Tropics, Circles, and Zones Because of Earth's tilt, the sun never beats straight down on places in the far north and south. Two lines of latitude mark the northernmost and southernmost points where the sun's rays ever beat straight down. The northern line is called the **Tropic of Cancer**, and the southern line is called the **Tropic of Capricorn**. The Tropic of Cancer and the Tropic of Capricorn are equidistant from the equator.

The areas between these two lines and the equator are known as **tropical zones**. Tropical zones receive a lot of sunshine and are hot all year round. Considerable rain falls, especially in the hot rainy season, but there is no winter season.

Two other lines of latitude, the **Arctic Circle** and the **Antarctic Circle**, mark the farthest north and south points where the sun doesn't shine at all on one day each year, meaning that the night lasts a full 24 hours. The areas between these circles and the North and South poles are known as **polar zones**. These zones receive little direct sunlight and are cold most of the year.

Between the tropical and polar zones lie the **temperate zones**, which lack temperature extremes. Generally, in the temperate zones summers are warm and winters are cool.

revolution

Definition:	Illustration:
Examples:	Non-examples:

axis

Definition:	Illustration:
Examples:	Non-examples:

tilted Earth

Definition:	Illustration:
Examples:	Non-examples:

rotation

Definition:	Illustration:
Examples:	Non-examples:

<u>Geoterms</u>

Tropic of Cancer: the northernmost line of latitude where the sun's rays ever beat straight down. This line marks the northern limit of the tropical zone

Tropic of Capricorn: the southernmost line of latitude where the sun's rays ever beat straight down. This line marks the southern limit of the tropical zone.

tropical zone: area between the equator and the Tropic of Cancer and between the equator and the Tropic of Capricorn, where the climate is generally hot

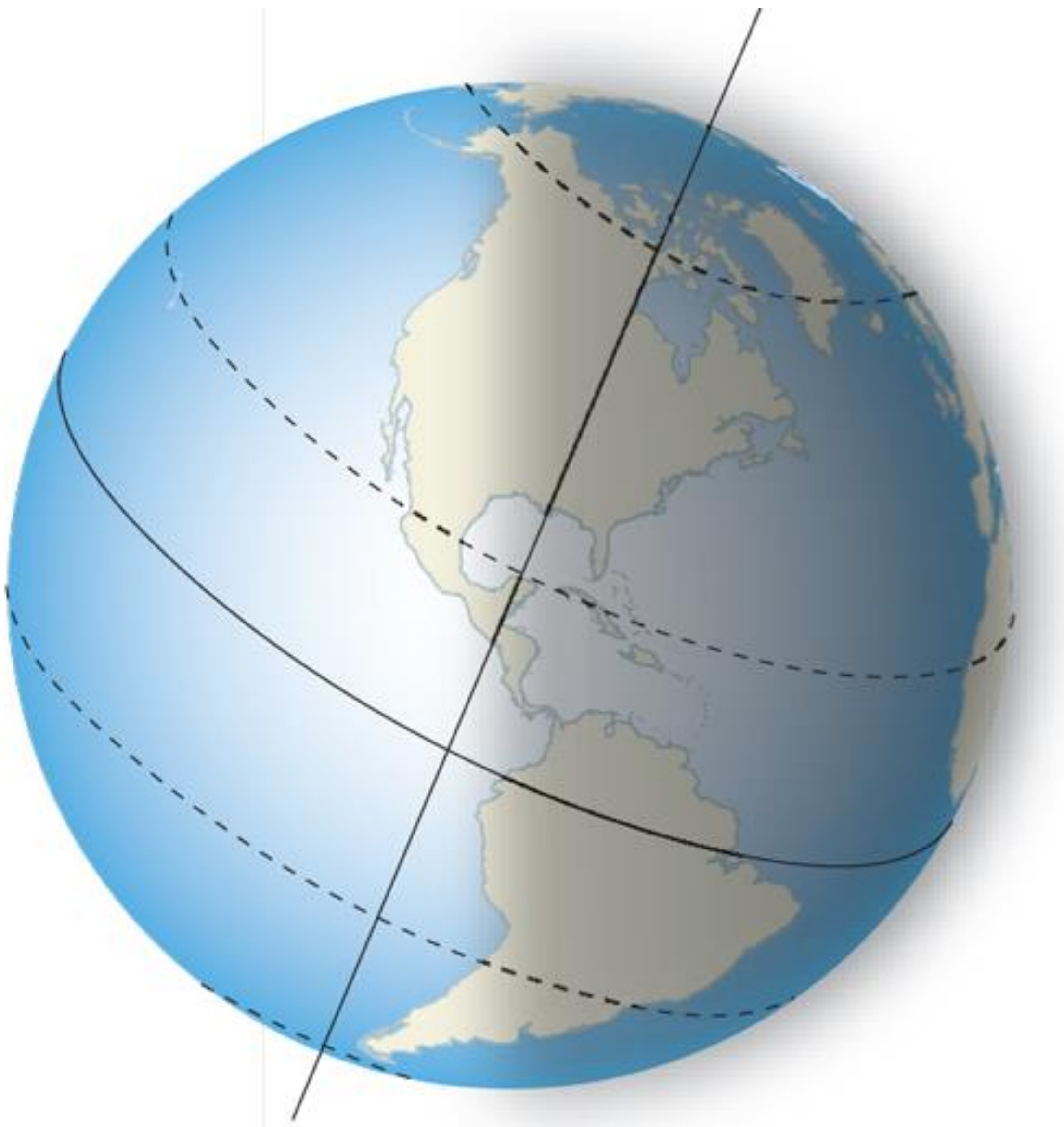
Arctic Circle: the line of latitude at 66°33'N that marks the boundary of the northern polar zone

Antarctic Circle: the line of latitude at 66°33'S that marks the boundary of the southern polar zone

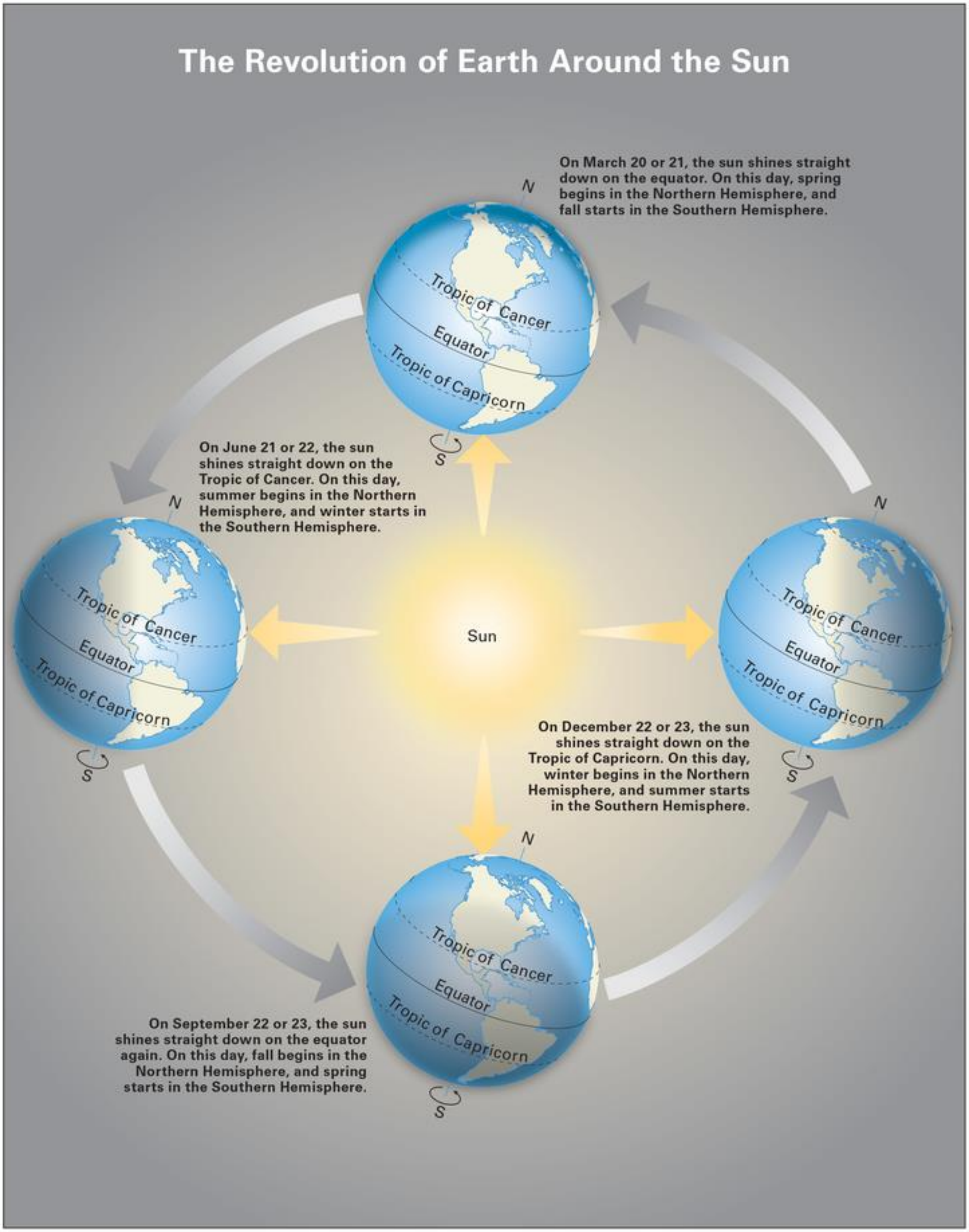
polar zone: the area between the Arctic Circle and the North Pole or between the Antarctic Circle and the South Pole, where the climate is generally cold

temperate zone: the area between Earth's tropical zones and polar zones, where the climate is relatively mild

Write the location of each Geoterm above on the globe below.



Earth's Revolution and the Seasons



Unit 1: Lesson 1: Section 7 - Showing a Round World on a Flat Map

In this lesson, you learned how geographers show information on maps. Exploring a map's title, compass rose, legend, and symbols can help you understand what a map shows.

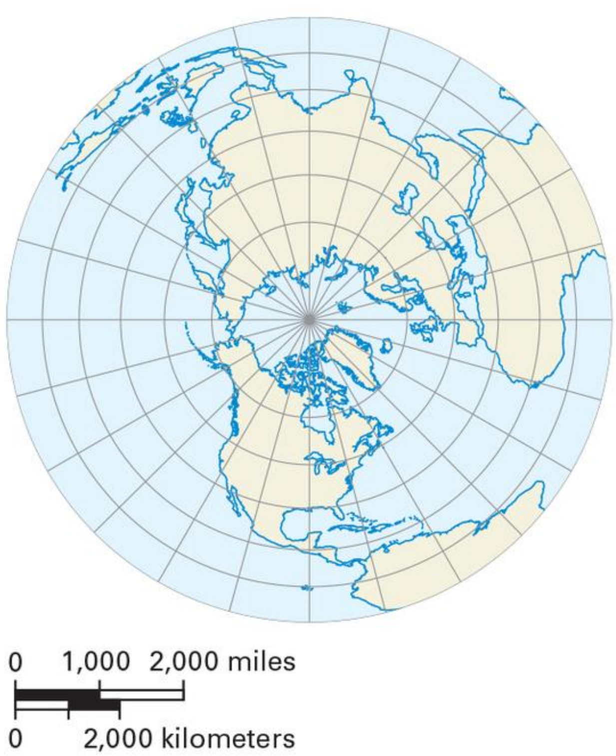
You learned how geographers describe where a place is in terms of its absolute location. The global grid allows mapmakers to indicate the exact location of any place on Earth using lines of latitude and longitude labeled with letters and numbers. Map scales are useful for describing the relative location of two places. Using a scale, you can estimate about how far two places are from each other.

All Flat Maps Have Distortion Geographers use maps to show important features of Earth, such as its oceans and continents. However, every flat map of Earth involves some distortion. As a result, the size or shape of landmasses or large bodies of water may be distorted, and the distances between places may not be accurately shown.

To deal with distortions, mapmakers use different map projections. Many projections are named after the mapmakers who designed them. For example, Arthur Robinson designed the Robinson projection. The world map in Section 5 is a Robinson projection. It is a popular projection because it balances the distortions of size and shape, resulting in a fairly accurate picture of the world.

Notice how each projection does some things better than others. As you compare the shapes and sizes of the oceans and continents displayed on the various maps, think about what type of information each projection might show best.

The World

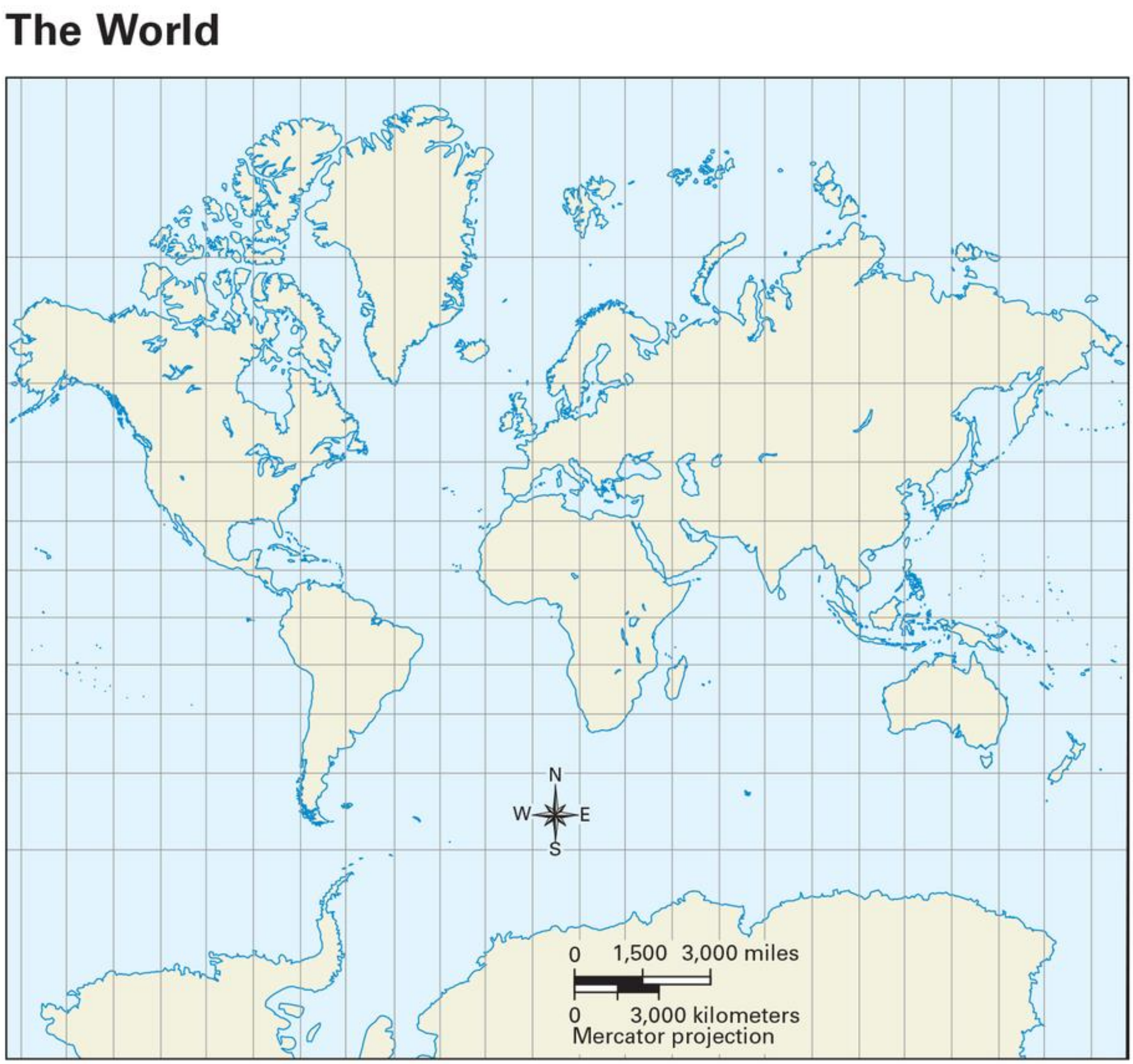


Lambert Projections Show Polar Areas that Other Maps Distort

A Lambert projection is a circular map. It shows size accurately at its center, but not distance or shape. It is good for showing the areas around the North or South pole. Most other map projections distort the shape and size of the Arctic and Antarctica.

Mercator Projections Show Direction but Distort Size

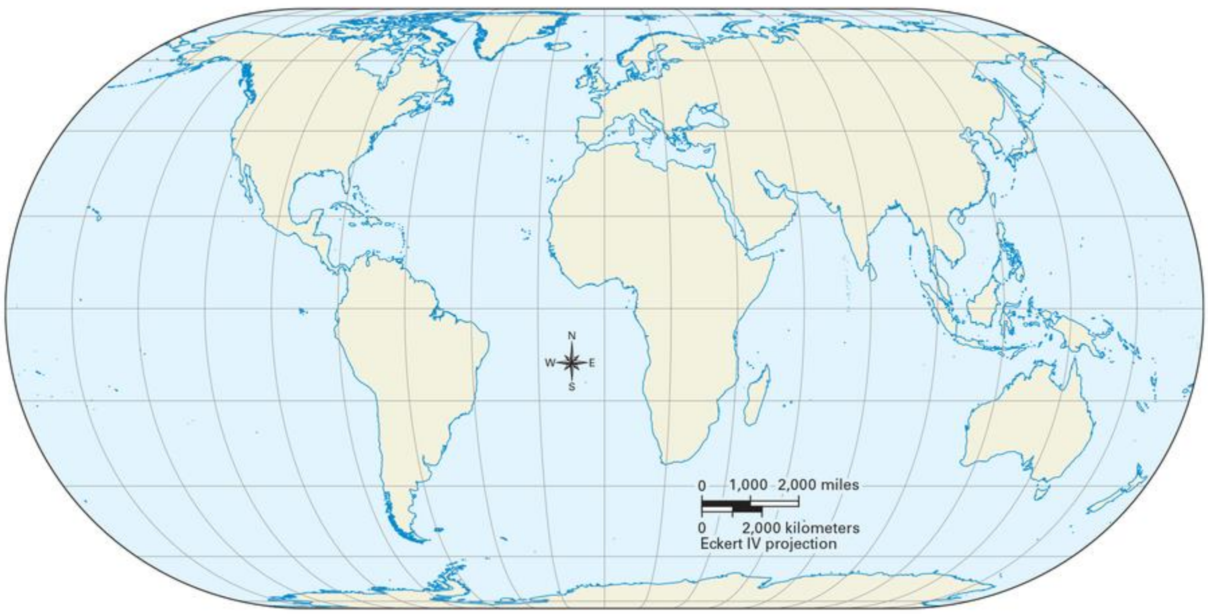
Gerardus Mercator designed his map projection in 1569. It shows directions between places accurately near the equator. But it distorts the size of continents, especially near the North and South poles. This is called area distortion.



Eckert IV Projections Show Size but Distort Shape

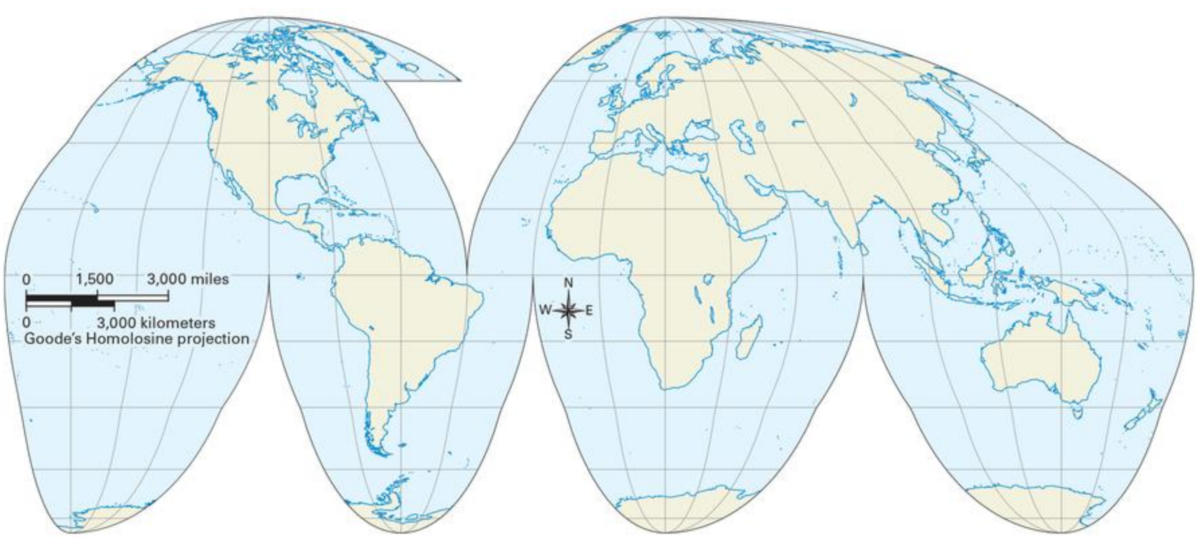
The Eckert IV projection is an equal-area map. Equal-area maps show the sizes of places accurately. However, they distort shape near the poles. This is called shape distortion. Geographers often use Eckert IV projections to show the number of people in different areas.

The World



Goode's Homolosine Projections Show

The World



Continents but Distort Oceans

Goode's Homolosine projection uses a trick to help us see how the continents compare in size. It snips bits out of the oceans. This trick allows the continents to stretch without distorting their shapes. But it distorts the shape and size of the oceans.

Summary

Maps are important tools geographers use that show information about people and places on Earth. Many maps feature important devices such as compass roses, legends, grids, and scales. The global grid system, which is made up of lines of latitude and longitude, help people find the absolute location of a place.

Some maps show the entire world, including the continents and oceans. Because the world is round, all flat maps involve distortion. Different types of map projections deal with distortion in various ways.

Review

Write each term next to the correct definition.

relative location

map projection

distortion

absolute location

Term	Definition
	a way of representing the spherical Earth on a flat surface
	a change in the shape, size, or position of a place when it is shown on a map
	the precise point where a place is located on Earth
	where a place is located in relation to another place

Create a map of your classroom. Include these things on your map:

- an appropriate title
- a legend with symbols that represent the furniture and other objects in the room.
- a compass rose
- an accurate scale