

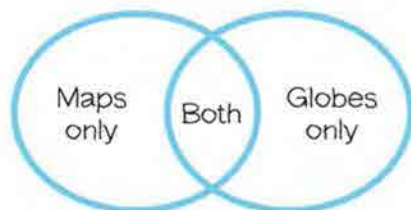
MAIN IDEAS

- 1 **Geography** Geographers use maps and globes to measure and describe Earth.
- 2 **Geography** We use maps to see natural and human-made features and to understand patterns.
- 3 **Geography** Maps have changed over time to reflect people's increasing understanding of the world.

TAKING NOTES

Reading Skill: Comparing and Contrasting

When you compare and contrast two things, you look for ways in which they are similar and different. In Lesson 2, compare maps and globes, two types of maps, and two periods of mapmaking. Record their similarities and differences in a Venn diagram like the one below.



 Skillbuilder Handbook, page R4



▲ **Compass** Early navigators used compasses, like this early Chinese one, to figure out where they were. Invented by the Chinese, the compass opened up the world to exploration and helped geographers make more accurate maps.

Words to Know

Understanding the following words will help you read this lesson:

prefer to like better (page 15)

*The geographer said she would **prefer** to see the site herself.*

symbol a thing that stands for something else (page 16)

*They were unable to identify the meaning or purpose of the **symbols**.*

indicate show or point out (page 16)

*On the map, arrows were used to **indicate** the direction in which the water currents flowed.*

longitude
latitude
hemisphere
political map
physical map
thematic map

How Maps Help Us Study History

Build on What You Know You probably use maps when you visit the mall, get on a bus, or take a trip with your family. The skills you use to read those maps can be applied to read any map.

The Geographer's Tools

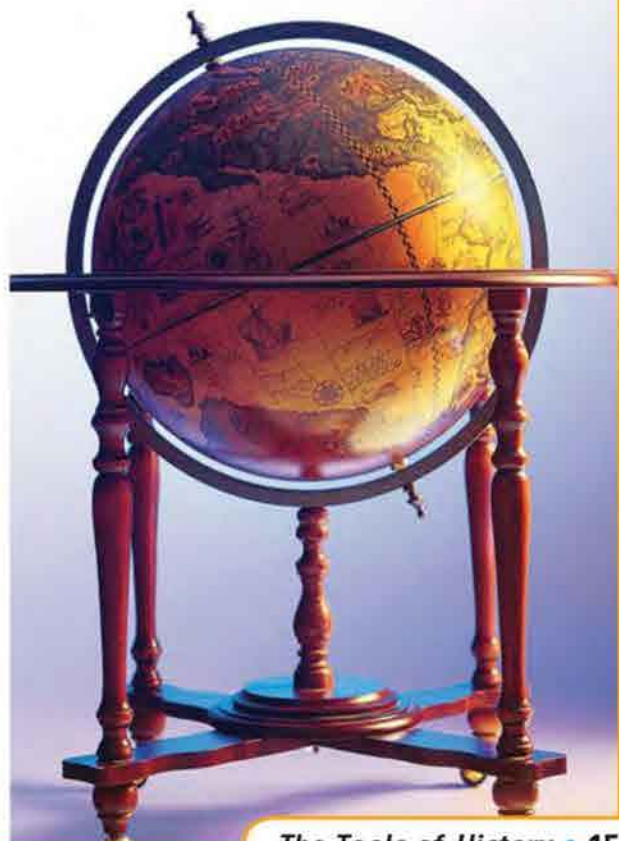
1 ESSENTIAL QUESTION What are the geographer's tools?

Geographers use both globes and maps to represent Earth. Both tools have advantages and disadvantages.

Globes One advantage of a globe is that it looks more like Earth, since both are round. A globe shows the viewer exactly how continents and oceans appear on Earth's curved surface. A globe also shows the true shapes, locations, and relative sizes of Earth's landforms and bodies of water.

Maps A map, on the other hand, is a flat representation of Earth's surface. It can be drawn to any size. No flat map can ever be as accurate as a globe. That is because Earth's surface is distorted somewhat when it is flattened to create a map. In other words, a map can alter how Earth really looks. But most people prefer to use maps because they do have several advantages. For one thing, a map lets you measure distances much more easily. For another, a map lets you see the world at a glance. Most important, it's much easier to carry a map because you can fold it up!

Globes One disadvantage of using a globe is that you can view only half of Earth at a time. This globe shows parts of North and South America. ▼



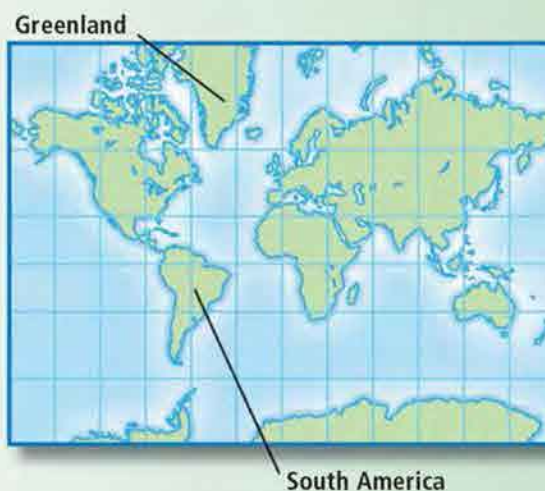


Reading a Map Most maps have nine features, as shown in the map above. These features, described below, help you read and understand maps.

- **Title** The title tells the subject of the map and gives you an idea of what information is shown.
- **Compass rose** The compass rose shows directions: north, south, east, and west.
- **Symbols** Symbols represent such items as capital cities and natural resources. The map legend explains what the symbols mean.
- **Legend** The legend, or key, lists and explains the symbols and colors used on the map.
- **Lines of longitude** These are imaginary lines that measure distances east and west of the prime meridian.
- **Lines of latitude** These are imaginary lines that measure distances north and south of the equator.
- **Scale** A scale can be used to figure out the distance between two locations on a map.
- **Labels** Labels indicate the names of cities, landforms, and bodies of water.
- **Colors** Colors represent a variety of information on a map. The map legend explains what the colors mean.

Map Projections As you have already learned, flat maps distort Earth's surface. Mapmakers try to control this distortion by using different projections. A projection is a way of showing the curved surface of Earth on a flat map. Compare the three common projections shown below.

Mercator Projection The Mercator (muhr•KAY•tuhr) projection shows most of the continents as they look on a globe. However, the projection stretches out the lands near the north and south poles. For example, the island of Greenland is actually one-eighth the size of South America.



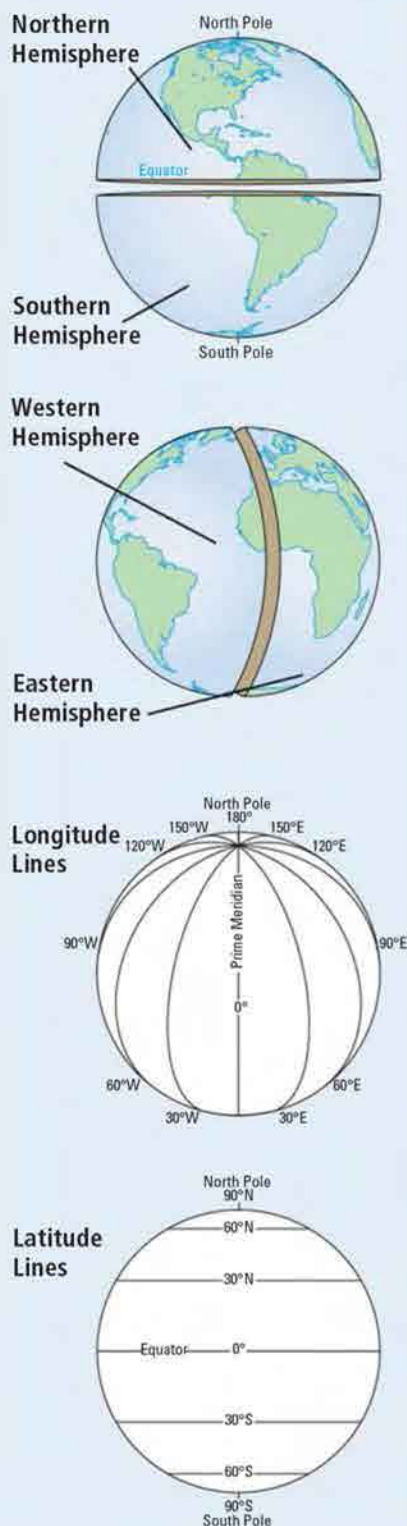
Homolosine Projection The homolosine (hoh•MAHL•uh•SYN) projection divides the oceans. This projection fairly accurately shows the sizes of landmasses. But distances on the map are not correct.



Robinson Projection The Robinson projection is often used in textbooks. It shows all of Earth with nearly the true sizes and shapes of the continents and oceans. However, the shapes of the landforms near the poles appear flat.



The Geographic Grid



Hemispheres To study Earth, geographers divide the globe into equal halves. Each half is called a **hemisphere**. An imaginary line called the equator divides the globe into north and south halves. The half of Earth north of the equator is called the Northern Hemisphere. The half south of the equator is called the Southern Hemisphere.

Geographers use another imaginary line to divide Earth east from west. This line is called the prime meridian. The half of Earth west of the prime meridian is called the Western Hemisphere. The half east of the prime meridian is called the Eastern Hemisphere. As you can see in the diagram on the left, the United States is located in the northern and western hemispheres.

The Geographic Grid The diagram also shows two globes marked with lines of latitude and longitude. As you have already learned, latitude lines lie to the north and south of the equator. Longitude lines go around Earth over the poles. These lines run east and west of the prime meridian.

Geographers use a grid system to find the point where a latitude line and a longitude line cross. This point identifies an absolute location—the exact place on Earth where a city or other geographic feature can be found. Remember that location is one of the themes geographers use to describe Earth.

Absolute location is expressed using the coordinates, or set of numbers, of the latitude and longitude lines. These coordinates are measured in degrees. Every place on Earth has only one absolute location. For example, as you can see on the map on the following page, the absolute location of Rio de Janeiro, Brazil, is 23° south latitude, 43° west longitude.

REVIEW How do the latitude and longitude lines on a map help geographers?

Different Maps for Different Purposes

- 2 ESSENTIAL QUESTION** What different maps do we use to see natural and human-made features and to understand patterns?

Different maps help us see different things. The three basic types of maps are political maps, physical maps, and thematic maps. You have probably used all of these different types of maps.

Political Maps **Political maps** show the features people have created, such as cities, states, provinces, territories, and countries. State and country boundaries can also be outlined on these types of maps. A political map of a smaller area, such as a state, often shows county boundaries.

Here are some of the questions the features of a political map, like the one below, might help you answer:

- Where on Earth's surface is this area located?
- What is the size and shape of the area? How might its size or shape affect its people?
- Who are the area's neighbors?
- How populated does the area seem to be?





Physical Maps On a physical map, you can see what Earth's surface might look like from space. **Physical maps** show the landforms and bodies of water found in particular areas. Colors are often used to show elevations. On the map above, for example, brown indicates higher, more mountainous areas. Green shows areas that are relatively flat.

Political and physical features are often shown on one map. When this information is combined, you can use it to help you better understand the region. For instance, find the cities shown on the physical map of Brazil above. Notice that many of these cities are located near the coast.

Like political maps, physical maps can help you understand specific characteristics of places. Here are some questions the features of a physical map might help you answer:

- Are there mountains or plateaus in the area?
- Near what physical features do most people live?
- What is the area's range of elevation? How might higher and lower elevations affect people's lives?
- In which direction do the rivers flow? How might this affect travel and transportation in the area?

Thematic Maps A **thematic map** includes certain information about a place or region. For example, the thematic map on this page shows the climates in Brazil.

Thematic maps can use colors, symbols, lines, or dots to help you see patterns. The map's title and legend will help you understand the theme and the information presented. In this textbook, you will find thematic maps on such topics as historical events, vegetation, and population density.

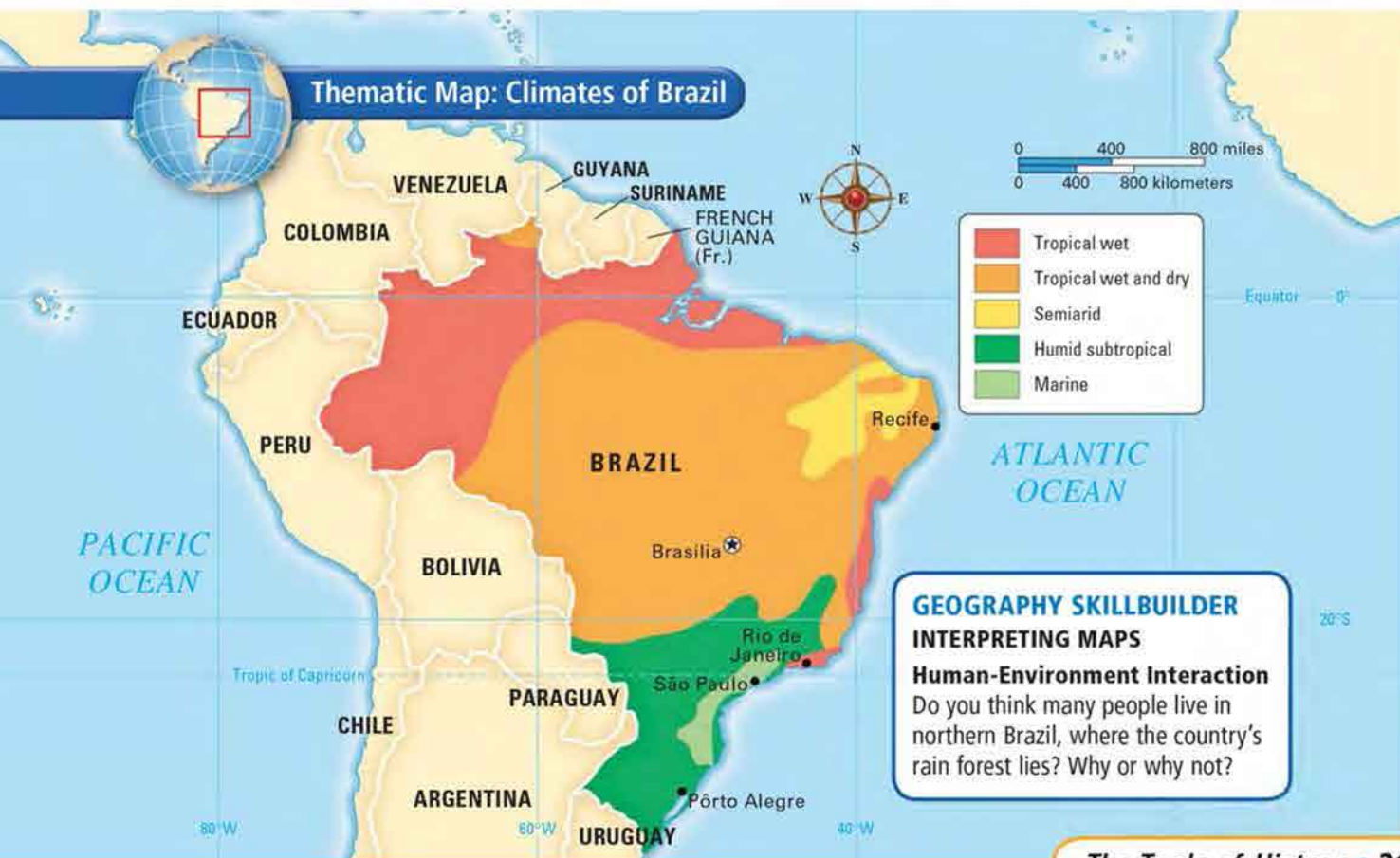
In fact, a thematic map can show just about any kind of information you can imagine. Here are just a few of the questions different thematic maps can help you answer:

- Where in the world do people speak Spanish?
- What are the natural resources of Africa?
- What is the best route for sailing across the Atlantic?
- Where and when did key battles take place during World War II?
- Where were the major trade routes in Asia in ancient times?

REVIEW Which type of map might help you find the highest mountain in Brazil?

Vocabulary Strategy

Thematic and *theme* belong to the same **word family**. Both words refer to a topic.





▲ **Map from the Past** This map of North and South America was drawn by European mapmakers in 1570. As you can see, the mapmakers had only a rough idea of what the two continents looked like.

How Maps Change

- 3 ESSENTIAL QUESTION** How have maps changed to reflect people's increasing understanding of the world?

Have you ever made a map to show someone how to get to your house? A map you would draw today would probably be much better than one you made in first grade. Maps showing different parts of the world have also greatly improved over time.

Earliest Maps The very earliest maps were probably scratched on the ground or drawn on tree bark. The oldest surviving maps were carved on clay tablets by the Babylonians around 2300 B.C.

The ancient Greeks made great advances in developing maps. In the second century A.D., a Greek astronomer and mathematician named Ptolemy (TAHL•uh•mee) produced an eight-volume work called *Geography*. This work contained valuable instruction on preparing maps.

Maps in the Middle Ages In the Middle Ages, Arab and Chinese mapmakers used their knowledge of astronomy and mathematics to draw accurate maps of parts of the world. By contrast, European mapmakers filled empty spaces on their maps with pictures or warnings. This was partly because Ptolemy's work was not available to Europeans until about 1405.

European maps greatly improved after 1569, when a Flemish mapmaker named Gerhardus Mercator showed the curved surface of Earth on a flat map. His Mercator projection, which you learned about on page 17, helped explorers plot straight routes on maps.

Today's Maps Many modern maps are made with the help of the satellites of the Global Positioning System (GPS). You will learn more about this system in the Connect to Today feature on page 24.

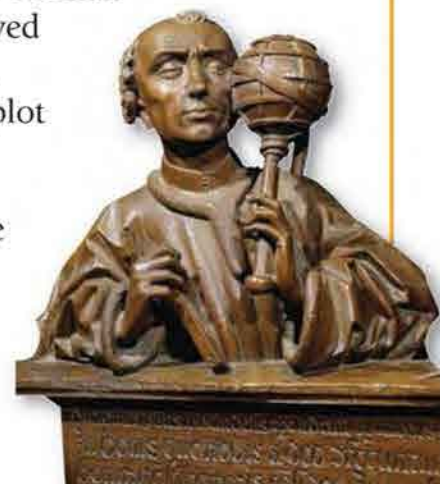
REVIEW What were some of the results as maps improved?

Lesson Summary

- Maps and globes have different advantages as tools used to measure and describe Earth.
- Political, physical, and thematic maps show us different things about the world and our place in it.
- Over time, maps have become more accurate.

Why It Matters Now . . .

We still use maps to find our way around and to learn more about familiar and unfamiliar places.



▲ **Ptolemy** Ptolemy's *Geography* remained one of the most important geographical works until 1496, when explorers began to prove some of his statements wrong.

2 Lesson Review

Terms & Names

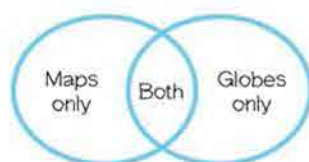
1. Explain the importance of

longitude	hemisphere	physical map
latitude	political map	thematic map

Using Your Notes

Comparing and Contrasting Use your completed Venn diagram to answer the following question:

2. How are maps and globes similar?



Main Ideas

3. Would you use a map or a globe to see a continent's exact shape? Explain why.
4. Describe the three types of maps.
5. Why were European maps in the Middle Ages so inaccurate?

Critical Thinking

6. **Drawing Conclusions** Why did European mapmakers in the Middle Ages sometimes leave empty spots on their maps?
7. **Making Inferences** What impact do you think improved mapmaking had on explorers?



Activity

Making a Map Create a thematic map of your neighborhood or school, showing, for example, populations, buildings, or numbers of people who own pets. Be sure to include a legend to explain any colors or symbols on your map.

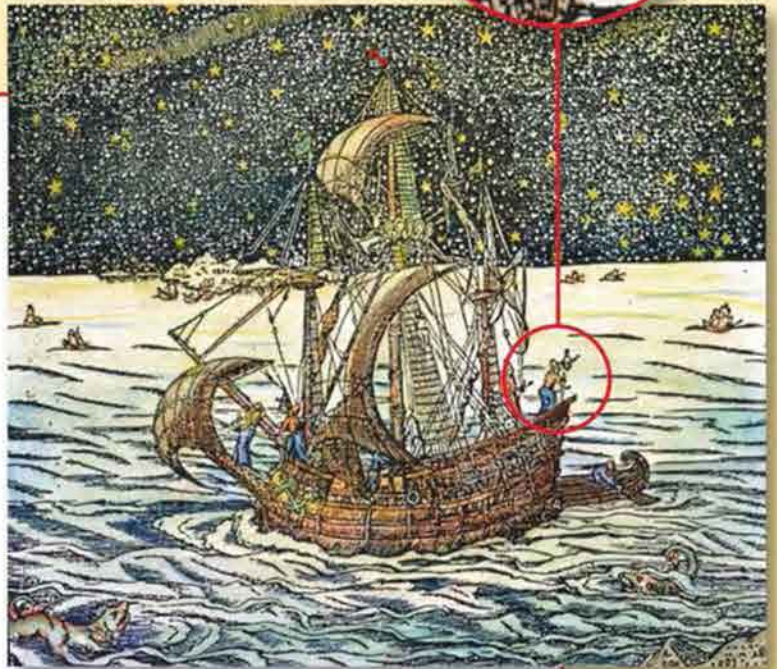
Navigation and the Global Positioning System

Purpose: To learn about Global Positioning System, which is used to determine locations on Earth

Throughout history, people have tried to figure out where they were and how they could find their way to another place. The earliest explorers and sailors navigated by the stars. However, this method wasn't much use on a cloudy night. Today, navigators still look to the sky to find their location. But now they are guided by the orbiting satellites of the Global Positioning System, or GPS. These satellites can pinpoint any spot on Earth in any weather.

Past

The Sextant For several hundred years, sailors used sextants, like the one shown below, to navigate. A sextant is a device that measures the angle between two objects. A navigator used the mirrors on a sextant to sight the horizon and the sun or a star. The angle between the two appeared on the sextant's scale. The navigator in the illustration at the right is using a sextant.



Present

GPS Satellites Twenty-four GPS satellites, such as the one shown here, orbit Earth. Receivers detect their signals and determine location within about 30 feet. GPS was originally developed for the military, but the system can also be used to create maps, track threatened wildlife, and help fire trucks and ambulances respond to an emergency.

Tracking Vehicles Monitoring the locations of cars is one of the fastest-growing GPS applications. Drivers can also use GPS map displays to plan trips.



Tracking Children Receivers mounted on watches help parents keep track of wandering children. The system finds a child and shows his or her location on a detailed map.



Activities

- 1. TALK ABOUT IT** What uses for GPS can you think of?
- 2. WRITE ABOUT IT** Write a dialogue in which a modern navigator explains the uses and benefits of GPS technology to an early explorer.