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.

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.

Skillsbuilder Handbook, page R4

CALIFORNIA STANDARDS

FRAMEWORK  In studying the ancient world, students should come to appreciate the special significance of geographic place in the development of the human story.

CST 1  Students explain how major events are related to one another in time.

CST 3  Students use a variety of maps and documents to identify physical and cultural features of neighborhoods, cities, states, and countries and to explain the historical migration of people, expansion and disintegration of empires, and the growth of economic systems.

HI 2  Students understand and distinguish cause, effect, sequence, and correlation in historical events, including the long- and short-term causal relations.
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

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!
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.

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**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.

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**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.
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

**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?

![Political Map: Brazil](image)
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**

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

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**Thematic Map: Climates of Brazil**

**GEOGRAPHY SKILLBUILDER**

**INTERPRETING MAPS**

**Human-Environment Interaction**

Do you think many people live in northern Brazil, where the country’s rain forest lies? Why or why not?
How Maps Change

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.

**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? (CST 3)

**Main Ideas**
3. Would you use a map or a globe to see a continent’s exact shape? Explain why. (CST 3)
4. Describe the three types of maps. (CST 3)
5. Why were European maps in the Middle Ages so inaccurate? (CST 1)

**Critical Thinking**
6. **Drawing Conclusions** Why did European mapmakers in the Middle Ages sometimes leave empty spots on their maps? (HI 2)

7. **Making Inferences** What impact do you think improved mapmaking had on explorers? (HI 2)

**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. (CST 3)