

## 2.1 Elements of a Map

**Main Idea** Globes and maps are two different tools used to study places on Earth.

Have you ever needed to figure out how to get to a friend's house? Imagine that the only resource you had was a globe. In order to see enough detail to find your friend's house, the globe would have to be enormous—much too big to carry around in your pocket!

### Globes and Maps

A three-dimensional, or spherical, representation of Earth is called a **globe**. It is useful when you need to see Earth as a whole, but it is not helpful if you need to see a small section of Earth.

Now imagine taking a part of the globe and flattening it out. This two-dimensional, or flat, representation of Earth is called a **map**. Maps and globes are different representations of Earth, but they have similar features.

### Map and Globe Elements

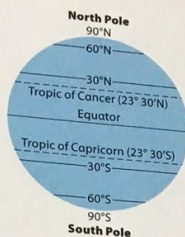
- A** A **title** tells the subject of the map or globe.
- B** **Symbols** represent information such as natural resources and economic activities.
- C** **Labels** are the names of places, such as cities, countries, rivers, and mountains.
- D** **Colors** represent different kinds of information. For example, the color blue usually represents water.
- E** **Lines of latitude** are imaginary horizontal lines that measure the distance north or south of the equator.
- F** **Lines of longitude** are imaginary vertical lines that measure the distance east or west of the prime meridian.
- G** A **scale** shows how much distance on Earth is represented by distance on the map or globe. For example, a half inch on the map above represents 100 miles on Earth.
- H** A **legend**, or key, explains what the symbols and colors on the map or globe represent.
- I** A **compass rose** shows the directions north (N), south (S), east (E), and west (W).
- J** A **locator globe** shows the specific area of the world that is shown on a map. The locator globe on the map above shows where Germany is located.





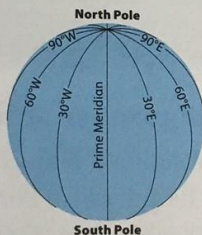
## Latitude

Lines of **latitude** are imaginary lines that run east to west, parallel to the equator. The **equator** is the center line of latitude. Distances north and south of the equator are measured in degrees ( $^{\circ}$ ). There are 90 degrees north of the equator and 90 degrees south. The equator is  $0^{\circ}$ . The latitude of Berlin, Germany, is  $52^{\circ}$  N, meaning that it is 52 degrees north of the equator.



## Longitude

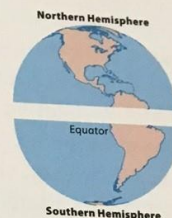
Lines of **longitude** are imaginary lines that run north to south from the **North Pole** to the **South Pole**. They measure distance east or west of the prime meridian. The **prime meridian** runs through Greenwich, England. It is  $0^{\circ}$ . There are 180 degrees east of the prime meridian and 180 degrees west. The longitude of Berlin, Germany, is  $13^{\circ}$  E, meaning that it is 13 degrees east of the prime meridian.



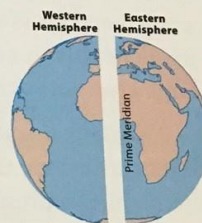
Remember that absolute location is the exact point where a place is located. This point includes a place's latitude and longitude. For example, the absolute location of Berlin, Germany, is  $52^{\circ}$  N,  $13^{\circ}$  E. You say this aloud as "fifty-two degrees North, thirteen degrees East."

## Hemispheres

A **hemisphere** is half of Earth. The equator divides Earth into the **Northern Hemisphere** and the **Southern Hemisphere**. North America is entirely in the Northern Hemisphere. Most of South America is in the Southern Hemisphere.



The **Western Hemisphere** is west of the prime meridian. The **Eastern Hemisphere** is east of the prime meridian. South America is in the Western Hemisphere. Most of Africa is in the Eastern Hemisphere.



### Before You Move On

**Monitor Comprehension** How are maps and globes different? How is each one used?

### FORMATIVE ASSESSMENT

## MAP LAB



GeoJournal

- 1. Interpret Maps** What types of industry are located in Germany? What map elements did you use to find the answers?
- 2. Make Inferences** What is the main industry in southern Germany? Why might this industry be located there?
- 3. Identify** What is the difference between lines of latitude and lines of longitude?
- 4. Location** Use a map or globe to find the absolute location of Munich, Germany.



# 2.3 Political and Physical Maps

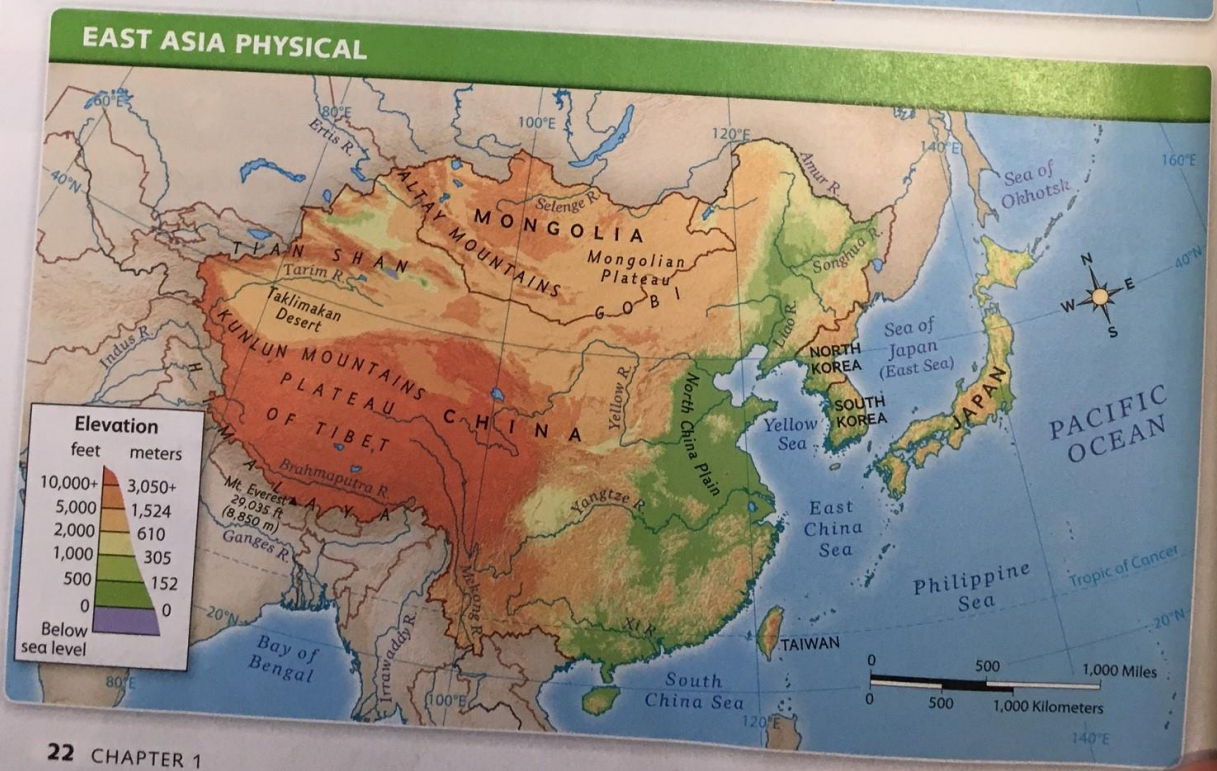
myNGconnect.com For online political and physical maps of world regions



### EAST ASIA POLITICAL



### EAST ASIA PHYSICAL





**Main Idea** Political maps show features that humans have created on Earth's surface. Physical maps show natural features.

The governor of a state needs a map that shows counties and cities. A mountain climber needs a map that shows cliffs, canyons, and ice fields. **Cartographers**, or mapmakers, create different kinds of maps for these different purposes.

## Political Maps

A political map shows features that humans have created, such as countries, states, provinces, and cities. These features are labeled, and lines show boundaries, such as those between countries.

## Physical Maps

A physical map shows natural features of physical geography. It includes landforms, such as mountains, plains, valleys, and deserts. It also includes oceans, lakes, rivers, and other bodies of water.

A physical map can also show elevation and relief. **Elevation** is the height of a physical feature above sea level. **Relief** is the change in elevation from one place to another. Maps show elevation by using color. The physical map at left uses seven colors for seven ranges of elevation.

### Before You Move On

**Monitor Comprehension** How is a political map different from a physical map?

**Critical Viewing** The Sobaek Mountains cut diagonally across South Korea. Which map best indicates the location of these mountains?

### FORMATIVE ASSESSMENT

## MAP LAB



GeoJournal

- 1. Interpret Maps** What is the most mountainous country in East Asia? How did you find the answer?
- 2. Human-Environment Interaction** Based on elevations shown on the map, what economic activity would you expect to find on the North China Plain?
- 3. Draw Conclusions** What do the locations of Hong Kong, Shanghai, and Tokyo have in common? What conclusion can you draw about the location of cities around the world?



## 2.4 Map Projections



Maps and  
Graphs

**Main Idea** Cartographers use various projections to show Earth's curved surface on a flat map.

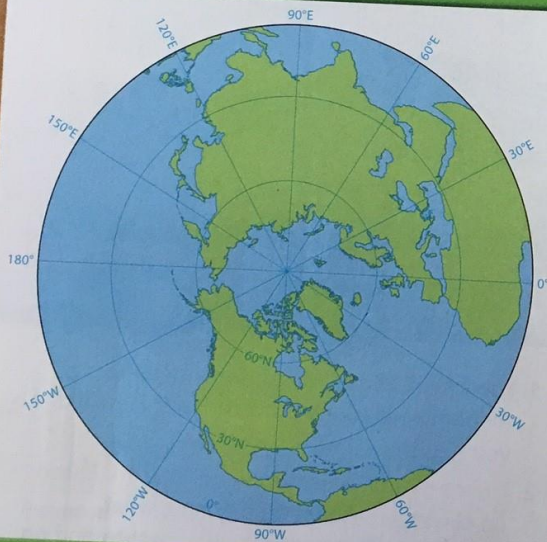
The world is a sphere, but maps are flat. As a result, maps **distort**, or change, shapes, areas, distances, and directions found in the real world. To reduce distortion, mapmakers use **projections**, or ways of showing Earth's curved surface on a flat map. Five common map projections are the azimuthal, Mercator, homolosine, Robinson, and Winkel Tripel. Each projection has strengths and weaknesses—each distorts in a different way.

When cartographers make maps, they need to choose a map projection. The type of projection depends on the map's purpose. Which elements are acceptable to distort? Which are not acceptable to distort? For example, if a cartographer is creating a navigation map, it is important that directions are not distorted. It may not matter, however, if some areas or shapes are distorted.

### Before You Move On

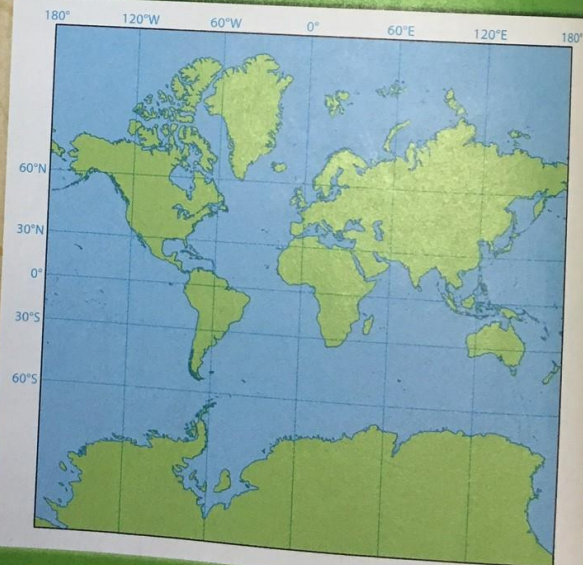
**Make Inferences** How do cartographers decide which projection to use?

### AZIMUTHAL PROJECTION



Mapmakers create the **azimuthal projection** by projecting part of the globe onto a flat surface. The projection shows directions accurately but distorts shapes. It is often used for the polar regions.

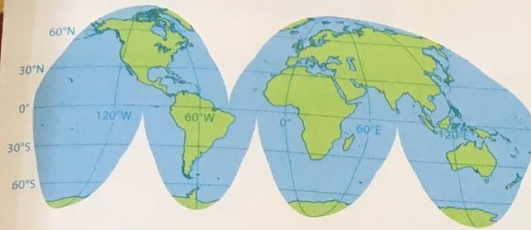
### MERCATOR PROJECTION



This **Mercator projection** shows much of Earth accurately, but it distorts the shape and area of land near the North and South Poles. This projection shows direction accurately, so it is good for navigation maps.

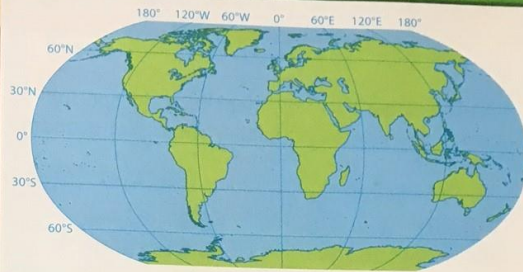


## HOMOLOGINE PROJECTION



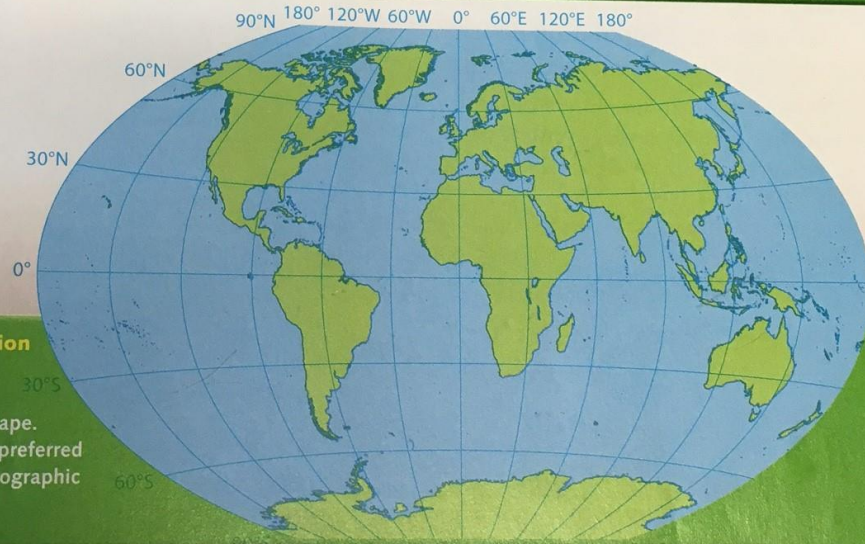
The **homolosine projection** resembles the flattened peel of an orange. It accurately shows the shape and area of landmasses by cutting up the oceans. However, it does not show distances accurately.

## ROBINSON PROJECTION



The **Robinson projection** combines the strengths of other projections. It shows the shape and area of the continents and oceans with reasonable accuracy. However, the North and South Poles are distorted.

## WINKEL TRIPEL PROJECTION



The **Winkel Tripel projection** is a modified version of the Robinson projection. It has less distortion of area and shape. This projection has been the preferred projection of the National Geographic Society since 1998.

### FORMATIVE ASSESSMENT

## MAP LAB



GeoJournal

1. **Compare and Contrast** Locate Greenland on the Mercator projection and on the Robinson projection. What is similar and different in the two maps? Why?
2. **Location** What does the azimuthal projection show about the relative location of Alaska and Russia?



## 2.5 Thematic Maps

examples of thematic maps

Maps and Graphs

**Main Idea** Thematic maps focus on specific topics, such as the population density or economic activity in a region or country.

Suppose you wanted to create a map showing the location of sports fields in your community. You would create a thematic map, which is a map about a specific **theme**, or topic.

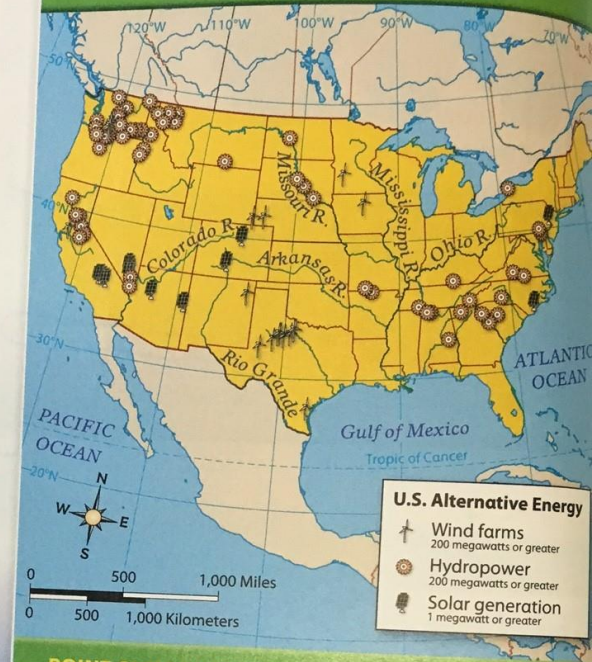
### Types of Thematic Maps

Thematic maps are useful for showing a variety of geographic information, including economic activity, natural resources, and population density. Common types of thematic maps are the point symbol map, the dot density map, and the proportional symbol map.

#### Before You Move On

**Make Inferences** Look through this textbook and identify another example of a thematic map. Why did you choose this map?

### U.S. ALTERNATIVE ENERGY



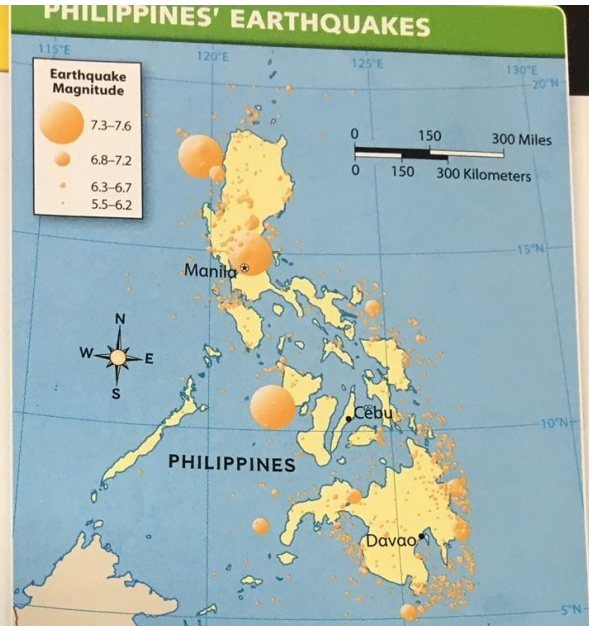
**POINT SYMBOL MAP** This type of map shows the location of activities at different points. For example, this map has symbols that show some sources of wind, water, and solar energy in the United States.

**Critical Viewing** Solar panels in the Nevada desert absorb light from the sun and turn it into energy. Why might Nevada be a good location for solar fields?

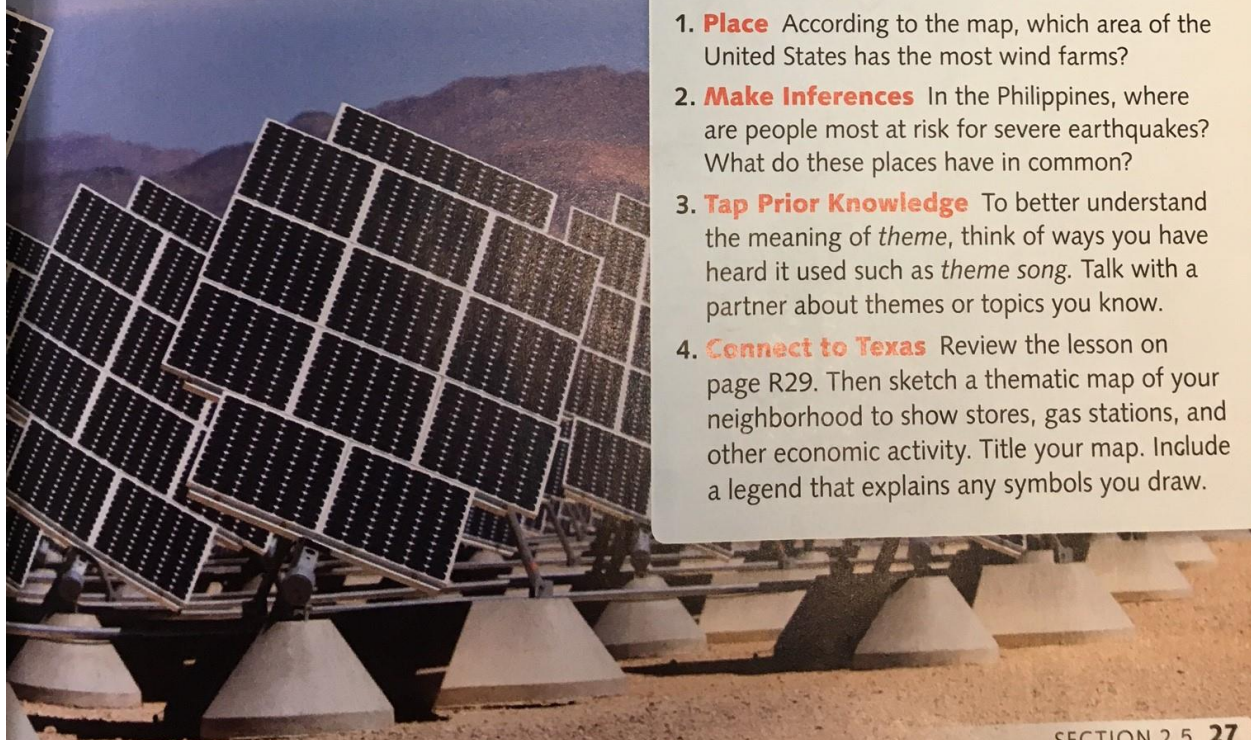




**DOT DENSITY MAP** This type of map uses dots to show how something is distributed in a country or region. Each dot represents an amount. For example, the dots on this map show population density in Thailand.



**PROPORTIONAL SYMBOL MAP** This type of map uses symbols of different sizes to show the size of an event. For example, the size of the circles on this map shows the severity of earthquakes in the Philippines.



FORMATIVE ASSESSMENT

MAP LAB



- Place** According to the map, which area of the United States has the most wind farms?
- Make Inferences** In the Philippines, where are people most at risk for severe earthquakes? What do these places have in common?
- Tap Prior Knowledge** To better understand the meaning of *theme*, think of ways you have heard it used such as *theme song*. Talk with a partner about themes or topics you know.
- Connect to Texas** Review the lesson on page R29. Then sketch a thematic map of your neighborhood to show stores, gas stations, and other economic activity. Title your map. Include a legend that explains any symbols you draw.