

Unit



Young boy from the
island of New Guinea



City of Hong Kong,
China



The World

You are about to journey to dense rain forests, bleak deserts, bustling cities and marketplaces, and remote villages. In your study of the earth, you will learn about different places and different peoples. Imagine that you could visit any place in the world. Where would you want to go? What would you want to see?

▲ Hot air balloon floating over cultivated fields, Egypt

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Chapter

1

Looking at the Earth



The World and Its People

NATIONAL GEOGRAPHIC



To learn more about Earth's structure and landforms, view **The World and Its People Chapter 1** video.



Social Studies **online**

Chapter Overview Visit **The World and Its People** Web site at twip.glencoe.com and click on **Chapter 1—Chapter Overviews** to preview information about Earth.

Why It Matters

Spaceship Earth

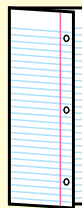
A famous inventor once compared the planet Earth to a large spaceship hurtling through the galaxy. The spaceship-planet carries all the resources needed for its journey. As passengers on this “ship,” we need to know something about how it works to avoid costly repairs and breakdowns.

◀ Skydiving over Key West, Florida

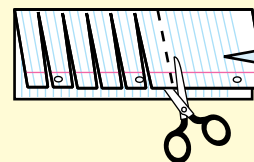
FOLDABLES™ Study Organizer

Summarizing Study Foldable To fully understand what you read, you must be able to identify and explain key vocabulary terms. Use this foldable to identify, define, and use important terms in Chapter 1.

Step 1 Fold a sheet of notebook paper in half from side to side.



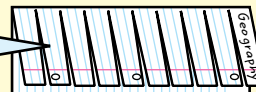
Step 2 On one side, cut along every third line.



Tabs will form as you cut.

Step 3 Label your foldable as you read the chapter. The first vocabulary term is labeled on the model below.

You should have 10 tabs.



Reading and Writing As you read the chapter, select and write key vocabulary terms on the front tabs of your foldable. Then write the definition of each term under the tabs. After each definition, write a sentence using each vocabulary term correctly.

Guide to Reading

Main Idea

Geographers use various tools to understand the world.

Terms to Know

- geography
- landform
- environment
- Global Positioning System (GPS)
- geographic information systems (GIS)
- artifact
- fossil

Reading Strategy

Create a chart like this, and write three examples for each heading.

How Geographers View the World

- 1.
- 2.
- 3.

Tools of Geography

- 1.
- 2.
- 3.

Uses of Geography

- 1.
- 2.
- 3.

Section 1

Thinking Like a Geographer



NATIONAL GEOGRAPHIC

Exploring Our World

How would *you* go about making an accurate map of the world?

Scientists decided the best way to map the earth was to see it from space. They placed a radar camera in a space shuttle and took pictures of the continent of Africa. By using radar, the camera was not hampered by clouds or darkness.



Why do geographers want to know exactly what the earth looks like? Think about the following: Mount Etna in **Italy** is one of the world's most active volcanoes. Two eruptions between 2001 and 2003 were the most explosive in the volcano's history. Scientists who study volcanoes constantly watch Mount Etna. By doing so, they hope to learn enough about the volcano to be able to predict eruptions and warn the people living nearby. Earthquakes, which usually happen before a volcanic eruption, can also give local residents advance warning. In addition, scientists study movements under the surface of the earth to predict volcanic activity.

This is just one example of how people around the world use geographic knowledge collected from various sources. **Geography** is the study of the earth in all its variety. When you study geography, you learn about the earth's land, water, plants, and animals. This is physical geography. You also learn about how the continents were

formed and what causes erosion. You also study people—where they live, how they live, how they change and are influenced by their environment, and how different groups compare to one another. This is human geography.

A Geographer's View of Place

Geographers look at major issues—like the eruptions of Mount Etna, which affect many people over a wide area. They also look at local issues—such as where the best place is for a company to build a new store in town. Whether an issue is global, national, or local, geographers try to understand both the physical and human characteristics, or features, of the issue.

Physical Characteristics Geographers study places. They look at *where* something is located on the earth. They also try to understand what the place is *like*. They ask: What features make a place similar to or different from other places?

To answer this question, geographers identify the landforms of a place. **Landforms** are individual features of the land, such as mountains and valleys. Geographers also look at water. Is the place near the ocean or on a river? Does it have plentiful or very little freshwater? They consider whether the soil will produce crops. They see how much rain the place usually receives and how hot or cold the area is. They find out whether the place has minerals, trees, or other resources.



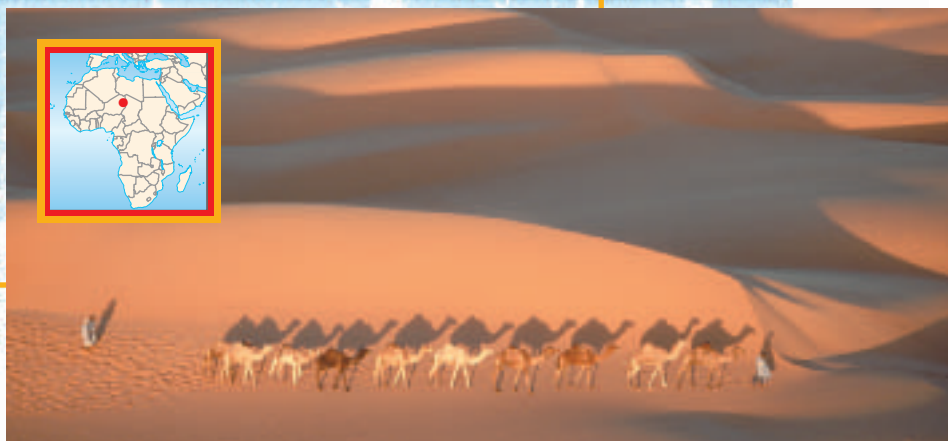
On Location



Varied Landforms

This mountain valley in France and this desert in Africa have very different physical characteristics.

Place List two physical features shown in each photograph.



Looking at the Earth

Human Characteristics Geographers also look at the social characteristics of the people living in the place. Do many or only a few people live there? Do they live close together or far apart? Why? What kind of government do they have? What religions do they follow? What kinds of work do they do? What languages do they speak? From where did the people's ancestors come?

People and Places Geographers are especially interested in how people interact with their **environment**, or natural surroundings. People can have a major impact on the environment. In many parts of the world, people have built dams along rivers. As a result, they have changed the ways that rivers behave in flood season.

Where people live often has a strong influence on *how* they live. The earliest settlements were near rivers, which provided water for crops and transportation. Today people near the sea might catch fish and build ships for trade. Those living inland might farm or take up ranching. More and more people are using computers and other technology in their work today. This means people depend less on their physical environment to make a living.

Regions Geographers carefully study individual cities, rivers, and other landforms. They also look at the big picture, or how individual places relate to other places. In other words, geographers look at a region, or an area that shares common characteristics. Regions can be relatively small—like your state, town, or school district. They can also be huge—like the western **United States**. Some regions may even include several countries if they have similar environments or their people follow similar ways of life and speak the same language. The countries of western South America are often discussed as a region. They are called the Andean countries because the **Andes**, a series of mountain ranges, run through all of them.

 **Reading Check** What do geographers study to determine the human characteristics of a place?

The Tools of Geography

Geographers need tools to study people and places. Maps and globes are the main tools they use. As you read in the **Geography Handbook** on page 9, geographers use many different types of maps. Each type gives geographers a particular kind of information about a place.

Collecting Data for Mapping Earth How do geographers gather information so they can make accurate maps? One way is to take photographs from high above the earth. Landsat images are photographs taken by satellites that circle the earth. These images show details such as the shape of the land, what plants cover an area, and how land is being used. Radar cameras can even reveal hidden information. Photos of **Antarctica** taken from radar cameras show rivers of ice 500 miles (805 km) long—all hidden by snow.



Social Studies **Online**

Web Activity Visit **The World and Its People** Web site at twip.glencoe.com and click on **Chapter 1—Student Web Activities** to learn more about geographic information systems.



Mt. Everest

GPS satellites measure as well as locate places on the earth. A GPS receiver placed on top of Mt. Everest, the tallest mountain in the world, showed that it is 7 feet (2.1 m) higher than people previously thought.

Location Why is it important for geographers to know exactly where places are located on the earth?

How do geographers accurately label the exact locations of places on a map? Believe it or not, the best way to find a location is from outer space. Another group of satellites traveling around the earth makes up the **Global Positioning System (GPS)**. A GPS receiver is a special device that receives signals from these satellites. When the receiver is placed at a location, the GPS satellite can tell the exact latitude and longitude of that location. As a result, a mapmaker can know where exactly on the earth the particular area is located. GPS devices are even installed in vehicles to help drivers find their way.

Geographic Information Systems Today geographers use another powerful tool in their work—computers. Special computer software called **geographic information systems (GIS)** helps geographers gather many different kinds of information about the same place. First geographers input all the data they collect. Then they use the software to combine and overlap the information on special maps.

In the early 2000s, scientists developed GIS technology to help conserve the plants and animals that live in the Amazon rain forest. More than 50 million acres of the rain forest are destroyed each year because of logging, mining, and other such activities. Using GIS technology, scientists can compare data gathered from the ground to data taken from satellite pictures. For example, they can see what species live where within the rain forest. Land use planners use this information to help local people make good decisions about how to use the land. These activities help prevent the rain forest from being destroyed.

✓ Reading Check What is the difference between GPS and GIS?

Artifacts

Cave paintings, pottery, arrowheads, and other artifacts provide clues about how ancient people lived.

History What clues can you gather about the society that made this arrowhead?




Uses of Geography

Have you ever gone on a long-distance trip in a car or taken a subway ride? If you used a road map or subway map to figure out where you were going, you were using geography. This is just one of the many uses of geographic information.

Geographic information is used in planning. Government leaders use geographic information to plan new services in their communities. They might plan how to handle disasters or how much new housing to allow in an area. Businesses study population trends to see where people are moving in a region. If people are moving out of an area, for example, a business may decide to close or relocate.

In addition, geographic information helps people make sound decisions. Perhaps a question arises over whether a new building should be constructed. City leaders look at street use to see if the area can handle additional traffic. They make sure the area has the power, water, and sewage systems the building will need.

Finally, geographic information helps people manage resources. Resources such as trees or water can be replaced or renewed. Other natural resources, such as oil or coal, are available only in limited supply. People can use geographic information both to locate more of these limited natural resources and to manage them wisely.

 **Reading Check** Why do people have to manage resources carefully?

Clues to Our Past

So far, you have learned about the tools geographers use to study the world and how to think like a geographer. You will use these tools as you read about the people and places of today, as well as learn about the past—from ancient civilizations to modern history. Historians, archaeologists, and anthropologists are scientists who try to unravel

the mysteries of early times. Like geographers, these scientists also have tools to help them in their work.

Written Records Historians rely mostly on written records to create their stories of the past. For example, they search through diaries, newspapers, and legal documents for information about how people used to live. However, no written records exist for the prehistory of humankind. In fact, *prehistory* means the time before writing was developed. How, then, do we know about ancient times and early humans?

Artifacts and Fossils Much of what is known about ancient people comes from studies by archaeologists and anthropologists. These scientists study past societies by analyzing what people have left behind. They dig up and examine **artifacts**—tools, pottery, paintings, weapons, and other items. They also study the remains of humans, or human **fossils**, to determine how ancient people lived. By examining artifacts such as tools and weapons, for example, scientists may learn that an early society was able to farm and had military strength. By analyzing bones, animal skins, and plant seeds, they are able to piece together what early people ate and what animals they hunted.

✓ **Reading Check** How is prehistory different from history?



Assessment

Defining Terms

1. **Define** geography, landform, environment, Global Positioning System (GPS), geographic information systems (GIS), artifact, fossil.

Recalling Facts

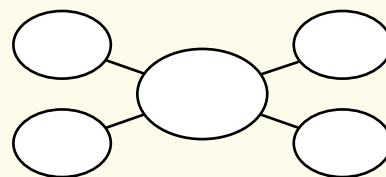
2. **Place** What two kinds of characteristics of a place do geographers study?
3. **Technology** What are the main tools of geography?
4. **Human/Environment Interaction** What are three uses for geography?

Critical Thinking

5. **Understanding Cause and Effect** How have the physical characteristics of your region affected the way people live there?
6. **Categorizing Information** Give five examples of regions. Begin with an area near you that shares common characteristics, then think of larger and larger regions.

Graphic Organizer

7. **Organizing Information** Draw a diagram like this one. In the center, write the name of a place you would like to visit. In the outer ovals, identify the types of geographic information you would like to learn about this place.



Applying Social Studies Skills

8. **Analyzing Maps** Find Egypt on the map on page RA21 of the **Reference Atlas**. Along what physical feature do you think most Egyptians live? Why? Turn to the population density map of Egypt on page 10 of the **Geography Handbook** to see if you are correct.

MakingConnections

ART

SCIENCE

CULTURE

TECHNOLOGY

Geographic Information Systems

What if a farmer could save money by applying fertilizer only to the crops that needed it? Today, thanks to computer technology called geographic information systems (GIS), farmers can do just that.

The Technology

Geographic information systems (GIS) use computer software to combine and display a wide range of information about an area. GIS programs start with a map showing a specific location on the earth. This map is then linked with other information about that same place, such as satellite photos, amounts of rainfall, or where houses are located.

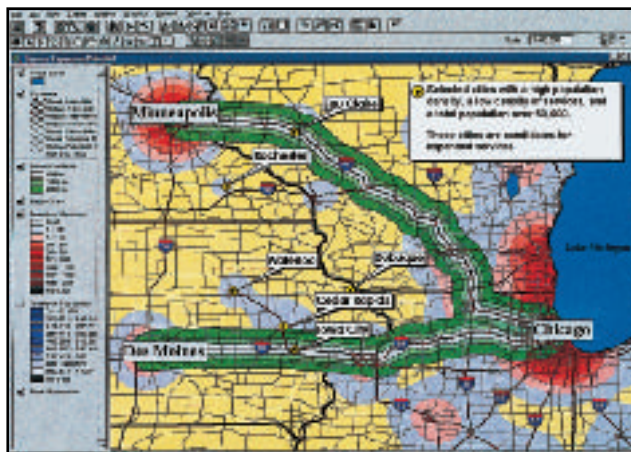
Think of geographic information systems as a stack of overhead transparencies. Each transparency shows the same general background but highlights different information. The first transparency may show a base map of an area. Only the borders may appear. The second transparency may show only rivers and highways. The third may highlight mountains and other physical features, buildings, or cities.

In a similar way, GIS technology places layers of information onto a base map. It can then switch each layer of information on or off, allowing data to be viewed in many different ways. In the case of the farmer mentioned above, GIS software combines information about soil type, plant needs, and last year's crop to pinpoint exact areas that need fertilizer.

How It Is Used

GIS technology allows users to quickly pull together data from many different sources and construct maps tailored to specific needs. This helps people analyze past events, predict future possibilities, and make sound decisions.

A person who is deciding where to build a new store can use GIS technology to help select the best location. The process might begin with a list of possible sites. The store owner gathers information about the areas surrounding each place. This could include shoppers' ages, incomes, and educations; where shoppers live; traffic patterns; and other stores in the area. The GIS software then builds a computerized map composed of these layers of information. The store owner can use the information to decide on a new store location.



Graphic image created using ArcView® GIS software, and provided courtesy of Environmental Systems Research Institute, Inc.

Making the Connection

1. What is GIS technology?
2. In what ways do GIS programs analyze data?
3. **Asking Questions** What questions would you ask to locate the best place to add a new school to your district?

Section 2

Guide to Reading

Main Idea

Earth has life because of the sun. Earth has different seasons because of the way it tilts and revolves around the sun.

Terms to Know

- solar system
- orbit
- atmosphere
- axis
- revolution
- leap year
- summer solstice
- winter solstice
- equinox

Reading Strategy

Draw a diagram like this one and list three facts about the sun in the first column. In the second column, write how these facts contribute to life on Earth.

Sun fact	Contribution

The Earth in Space



Exploring our World

The sun warms Earth, but the sun's warmth barely reaches Antarctica at the southern tip of our planet. Even in summer, temperatures are often below 0°F (−18°C). Winter temperatures may fall to −100°F (−73°C). Every part of this scientist's body must be protected against the freezing cold as he moves through an enormous ice tunnel in Antarctica.



The sun's heat provides life on our planet. Earth, eight other planets, and thousands of smaller bodies all revolve around the sun. Together with the sun, these bodies form the solar system. Look at the diagram of the **solar system** on page 30. As you can see, Earth is the third planet from the sun.

The Solar System

Each planet travels along its own path, or **orbit**, around the sun. The paths they travel are ellipses, which are like stretched-out circles. Each planet takes a different amount of time to complete one full trip around the sun. Earth makes one trip in 365¼ days. Mercury orbits the sun in just 88 days. Far-off Pluto takes almost 250 years!

Planets can be classified into two types—those that are like Earth and those that are like Jupiter. Earthlike planets are Mercury, Venus, Mars, and Pluto. These planets are solid and small. They have few or no moons. They also rotate, or spin, fairly slowly.

The other four planets—Jupiter, Saturn, Neptune, and Uranus—are huge. Uranus, the smallest of the four, is 15 times larger than Earth.

Believe It! or Not!

Solar Eclipse

One of the most spectacular sights in the sky is a solar eclipse. This event takes place when the moon passes between Earth and the sun and covers some or all of the sun. The photograph here shows a total eclipse, when the moon completely blocks the sun. When the moon blocks the sun's light, a large shadow is cast on part of Earth.



These planets are more like balls of gas than rockier Earthlike planets. They spin rapidly and have many moons. Surrounding each one is a series of rings made of bits of rock and dust.

Sun, Earth, and Moon The sun—about 93 million miles (150 million km) from Earth—is made mostly of intensely hot gases. Reactions that occur inside the sun make it as hot as 27 million degrees Fahrenheit (about 15 million degrees Celsius). As a result, the sun gives off light and warmth. Life on Earth could not exist without the sun.

The layer of air surrounding Earth—the **atmosphere**—also supports life. This cushion of gases measures about 1,000 miles (1,609 km) thick. Nitrogen and oxygen form about 99 percent of the atmosphere, with other gases making up the rest.

Humans and animals need oxygen to breathe. The atmosphere is important in other ways, too. This protective layer holds in enough of the sun's heat to make life possible, just as a greenhouse keeps in enough heat to protect plants. Without this protection, Earth would be too cold for most living things. At the same time, the atmosphere also reflects some heat back into space. As a result, Earth does not become too warm. Finally, the atmosphere shields living things. It screens out some rays from the sun that are dangerous. You will learn more about the atmosphere in Chapter 2.

Earth's nearest neighbor in the solar system is its moon. The moon orbits Earth, taking about 30 days to complete each trip. A cold, rocky sphere, the moon has no water and no atmosphere. The moon also gives off no light of its own. When you see the moon shining, it is actually reflecting light from the sun.



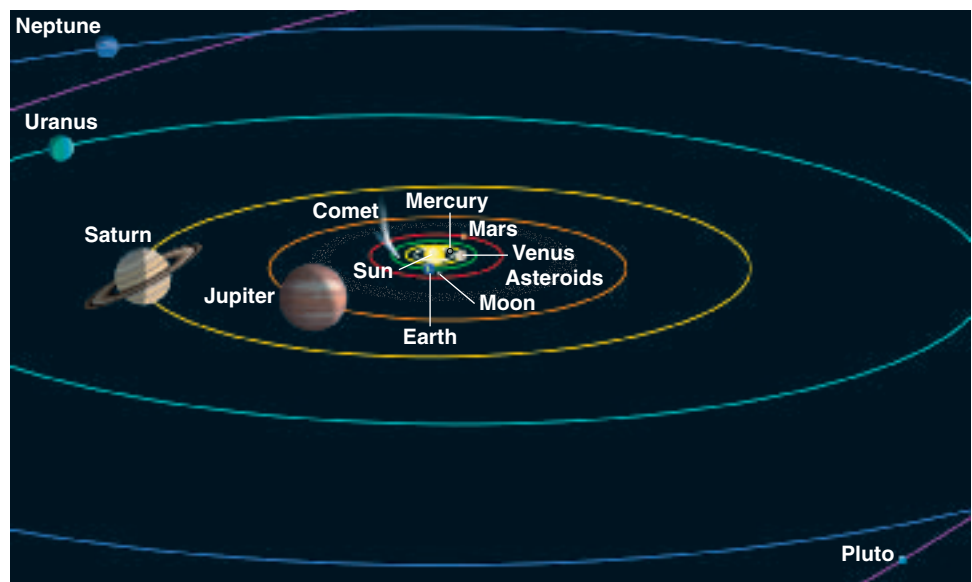
The Solar System

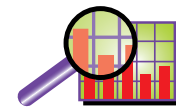
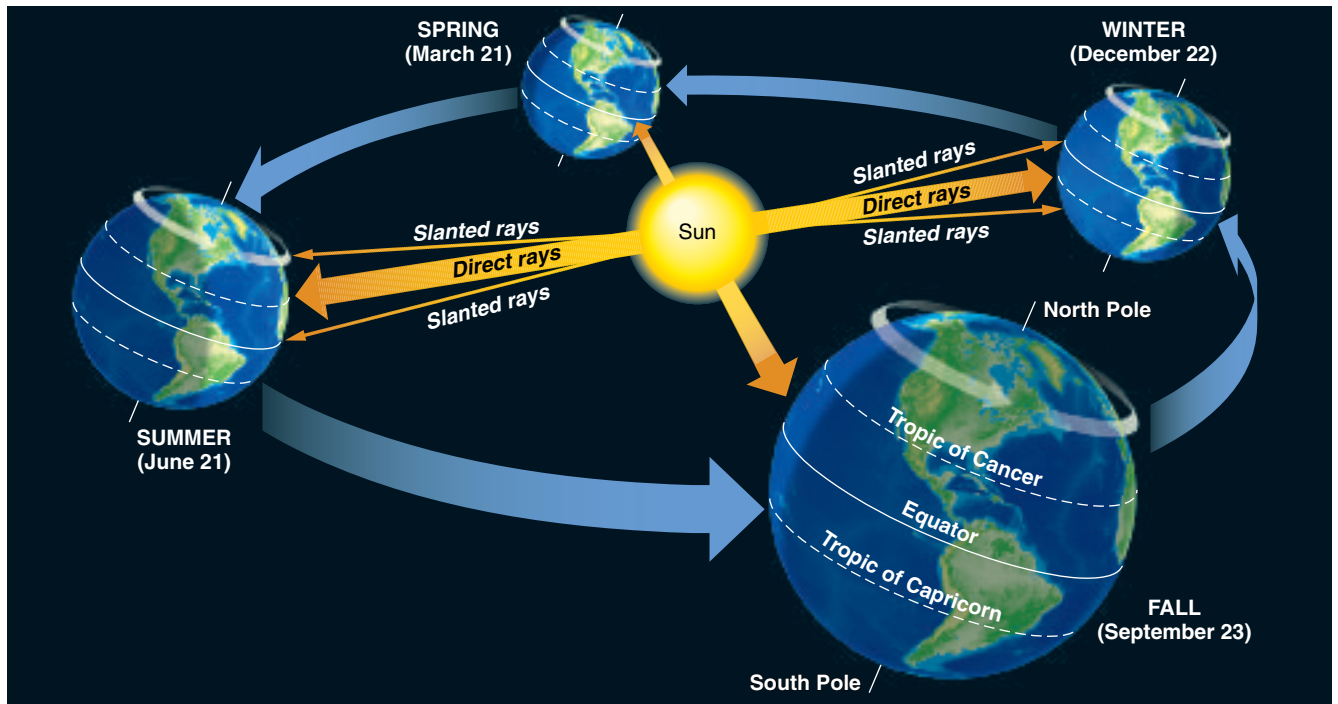


Analyzing the Diagram

Earth and eight other planets in our solar system travel around the sun.

Movement Between which two planets' orbits is Earth's orbit?





Analyzing the Diagram

Because Earth is tilted, different areas receive direct rays from the sun at different times of the year.

Movement How does this fact cause changes in seasons?

Earth's Movement Like all the planets, Earth rotates, or spins, on its axis. The **axis** is an imaginary line that runs through Earth's center between the North and South Poles. Earth takes 24 hours to finish one complete spin on its axis. As a result, one day is 24 hours. As Earth turns, different parts of the planet are in sunlight or in darkness. The part facing the sun has day, and the part facing away has night.

Earth has another motion, too. The planet makes one **revolution**, or complete orbit around the sun, in $365\frac{1}{4}$ days. This period is what we define as one year. Every four years, the extra one-fourths of a day are combined and added to the calendar as February 29. A year that contains one of these extra days is called a **leap year**.

✓ Reading Check How does Earth's orbit affect you?

The Sun and the Seasons

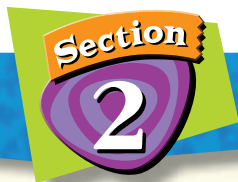
Earth is tilted $23\frac{1}{2}$ degrees on its axis. As a result, seasons change as Earth makes its year-long orbit around the sun. To see why this happens, look at the four globes in the diagram above. Notice how sunlight falls directly on the northern or southern halves of Earth at different times of the year. Direct rays from the sun bring more warmth than the slanted rays. When the people in a hemisphere receive those direct rays from the sun, they enjoy the warmth of summer. When they receive only indirect rays, they experience winter, which is colder.

Solstices and Equinoxes Four days in the year have special names because of the position of the sun in relation to Earth. These days mark the beginnings of the four seasons. On or about June 21, the North Pole is tilted toward the sun. On noon of this day, the sun appears directly overhead at the line of latitude called the Tropic of Cancer ($23\frac{1}{2}^{\circ}\text{N}$ latitude). In the Northern Hemisphere, this day is the **summer solstice**, the day with the most hours of sunlight and the fewest hours of darkness. It is the beginning of summer—but only in the Northern Hemisphere. Remember that the Northern Hemisphere includes everything north of the Equator. Everything south of the Equator is in the Southern Hemisphere. In the Southern Hemisphere, that same day is the day with the fewest hours of sunlight and marks the beginning of winter.

Six months later—on or about December 22—the North Pole is tilted away from the sun. At noon, the sun's direct rays strike the line of latitude known as the Tropic of Capricorn ($23\frac{1}{2}^{\circ}\text{S}$ latitude). In the Northern Hemisphere, this day is the **winter solstice**—the day with the fewest hours of sunlight. This same day, though, marks the beginning of summer in the Southern Hemisphere.

Spring and autumn begin midway between the two solstices. These are the **equinoxes**, when day and night are of equal length in both hemispheres. On or about March 21, the vernal equinox (spring) occurs. On or about September 23, the autumnal equinox occurs. On both of these days, the noon sun shines directly over the Equator.

 **Reading Check** Which seasons begin on the two equinoxes?



Assessment

Defining Terms

1. **Define** solar system, orbit, atmosphere, axis, revolution, leap year, summer solstice, winter solstice, equinox.

Recalling Facts

2. **Region** Which bodies make up the solar system?
3. **Science** List two gases in the atmosphere.
4. **Movement** Which two motions does Earth make in space?

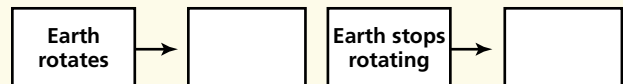
Critical Thinking

5. **Analyzing Information** How does the position of Earth determine whether a day is one of the solstice or equinox days?

6. **Summarizing Information** In a paragraph, describe why the seasons change.

Graphic Organizer

7. **Organizing Information** Draw two diagrams like those below. First, list the effects of Earth's rotation on human, plant, and animal life. Then list the effects if Earth were to stop rotating.



Applying Social Studies Skills

8. **Analyzing Diagrams** Look at the diagram on page 31. When the sun's direct rays hit the Tropic of Capricorn, what season is it in the Northern Hemisphere?

Social Studies Skill

Using a Map Key

To understand what a map is showing, you must read the **map key**, or legend. The map key explains the meaning of special colors, symbols, and lines on the map.

- Find examples of each map key color, line, or symbol on the map.
- Use the compass rose to identify the four cardinal directions.

Practicing the Skill

Look at the map of Washington, D.C., below to answer the following questions.

1. What does the red square represent?
2. What does the blue square represent?
3. Does the Washington Monument lie east or west of the Lincoln Memorial?
4. From the White House, in what direction would you go to get to the Capitol?

Learning the Skill

Colors in the map key may represent different elevations or heights of land, climate areas, or languages. Lines may stand for rivers, streets, or boundaries.

Maps also have a compass rose showing directions. The cardinal directions are north, south, east, and west. North and south are the directions of the North and South Poles. If you stand facing north, east is the direction to your right. West is the direction to your left. The compass rose might also show intermediate directions, or those that fall between the cardinal directions. For example, the intermediate direction *northeast* falls between north and east. To use a map key, follow these steps:

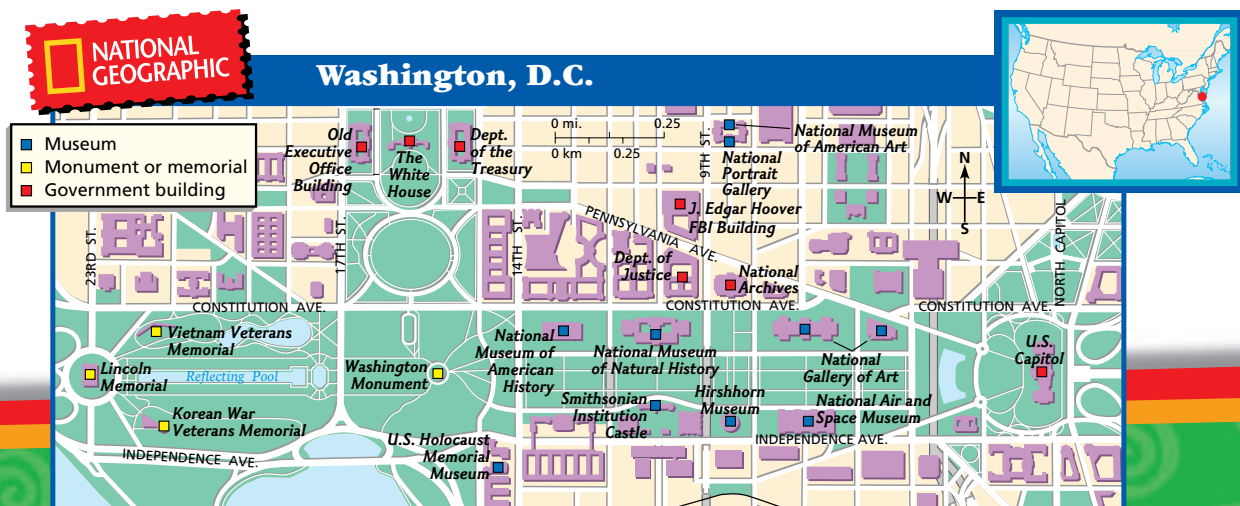
- Read the map title.
- Read the map key to find out what special information it gives.

Applying the Skill

Find a map in a newspaper or magazine. Use the map key to explain three things the map is showing.



Practice key skills with **Glencoe Skillbuilder Interactive Workbook, Level 1.**



Guide to Reading

Main Idea

Forces both inside the earth and on its surface affect the shape of the land.

Terms to Know

- core
- mantle
- magma
- crust
- continent
- plate tectonics
- earthquake
- tsunami
- fault
- weathering
- erosion
- glacier

Reading Strategy

Create a chart like this one. Write three forces that change the shape of the land. Then write three effects these forces can have on Earth.

Forces	Effects
→	
→	
→	

Section 3

Forces Shaping the Earth



Exploring our World

Forces beneath the earth's surface shape the land and the lives of the people who live on it. Here in the Azores, a volcano makes cooking easy. People wrap pots of meat and vegetables in a cloth and bury the bundle in a hole where heat from deep inside the earth rises to the surface. The temperature reaches 200°F (93°C), which is hot enough to steam the food.



Thousands of miles beneath your feet, the earth's heat has turned metal into liquid. You may not feel these forces, but what lies inside the earth affects what lies on top. Mountains, deserts, and other landscapes were formed over millions of years by forces acting below the earth's surface—and they are still changing today. Some forces work slowly and show no results for thousands of years. Others appear suddenly and have dramatic, and sometimes very destructive, effects.

Inside the Earth

Scientists have only been able to study the top layer of the earth, but have developed a picture of what lies inside. They have found that Earth has three layers—the core, the mantle, and the crust. Have you ever seen a cantaloupe cut in half? The earth's core is like the center of a cantaloupe, where you find the seeds. The mantle is like the part of the fruit that you eat, between the center and the rind, or outer

layer. The crust is like the melon's rind. Let us look closer at Earth's three layers.

In the center of the earth is a dense **core** of hot iron mixed with other metals and rock. The inner core is solid, but the outer core is so hot that the metal has melted into liquid. Surrounding the core is the **mantle**, a layer of rock about 1,800 miles (2,897 km) thick. Like the core, the mantle also has two parts. The section nearest the core remains solid, but the rock in the outer mantle sometimes melts. If you have seen photographs of an active volcano, then you have seen this melted rock, called **magma**. It flows to the surface during a volcanic eruption.

The uppermost layer of the earth, the **crust**, is relatively thin. It reaches only 31 to 62 miles (50 to 100 km) deep. The crust includes the ocean floors. It also includes seven massive land areas known as **continents**. The crust is thinnest on the ocean floor. It is thicker below the continents. Turn to the map on page 41 to see where the earth's seven continents are located.

 **Reading Check** Which layer of the earth is thinnest?

Forces Beneath the Earth's Crust

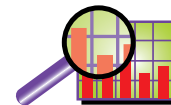
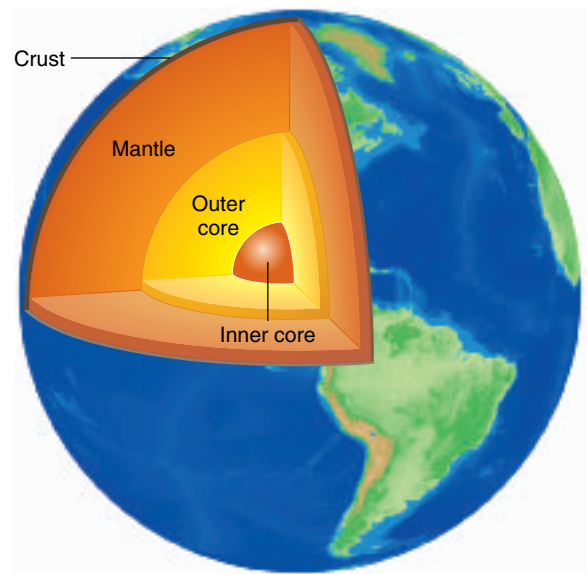
You have probably watched science shows about earthquakes and volcanoes. You have probably also seen news on television discussing the destruction caused by earthquakes. These events result from forces at work inside the earth.

Plate Movements Scientists have developed a theory called **plate tectonics** to explain the earth's structure. This theory states that the crust is not an unbroken shell but consists of plates, or huge slabs of rock, that move. The plates float on top of liquid rock just below the earth's crust. They move—but often in different directions. Oceans and continents sit on these gigantic plates, as shown on page 36.

Have you ever noticed that the eastern part of **South America** seems to fit into the western side of **Africa**? That is because these two continents were once joined together in a landmass that scientists call **Pangaea**. Millions of years ago, however, the continents moved apart. Tectonic activity caused them to move. The plates are still moving today, but they move so slowly that you do not feel it. The plate under the Pacific Ocean moves to the west at the rate of about 4 inches (10 cm) per year. That is about the same rate that a man's beard grows. The plate along the western edge of South America moves east at the rate of about 1.8 inches (5 cm) per year. That is a little faster than your fingernails grow. Turn to page 45 to see what Pangaea looked like before and after it experienced this movement, known as continental drift.



Earth's Layers

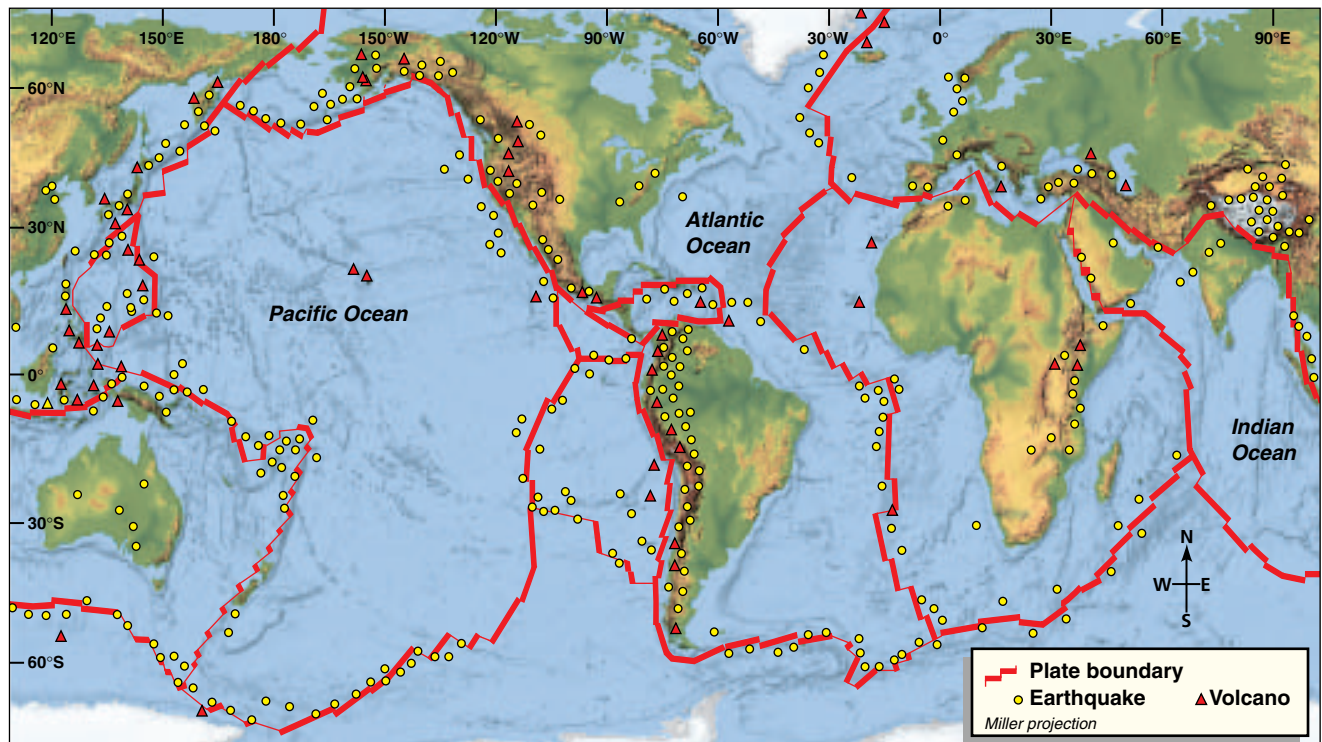


Analyzing the Diagram

Hot rock and metal—some of it liquid—fill the center of the earth.

Region What is the innermost layer inside the earth called? In which layer do you find the continents?

Tectonic Plate Boundaries



Analyzing the Diagram

Most of North America sits on one plate.

Region What pattern do you see among plate boundaries, earthquakes, and volcanoes?

When Plates Meet The movements of the earth's plates have actually shaped the surface of the earth. Sometimes the plates spread, or pull away from each other. That type of tectonic action separated South America and Africa millions of years ago. Sometimes, though, the plates push against each other. When this happens, one of three events occurs, depending on what kinds of plates are involved.

If two continental plates smash into each other, the collision produces high mountain ranges. This kind of collision produced the **Himalaya** in South Asia.

If a continental plate and an ocean plate move against each other, the thicker continental plate slides over the thinner ocean plate. The downward force of the lower plate causes molten rock to build up. Then, as magma, it erupts to form volcanic mountains. Another result may occur from the pressure that builds up between the two sliding plates. This pressure may cause one plate to move suddenly. The result is an **earthquake**, or a violent and sudden movement of the earth's crust.

Earthquakes can be very damaging to both physical structures and human lives. They can collapse buildings, destroy bridges, and break apart underground water or gas pipes. Undersea earthquakes can cause huge waves called **tsunamis** (tsu•NAH•mees). These waves may reach as high as 98 feet (30 m). Such waves can cause severe flooding of coastal towns.

Sometimes two plates do not meet head-on but move alongside each other. To picture this, put your hands together and then move them in opposite directions. When this action occurs in the earth, the two plates slide against each other. This movement creates **faults**, or cracks in the earth's crust. Violent earthquakes can happen near these faults. In 1988, for example, an earthquake struck the country of Armenia. About 25,000 people were killed, and another 500,000 lost their homes. One of the most famous faults in the United States is the **San Andreas Fault** in California. The earth's movement along this fault caused a severe earthquake in San Francisco in 1906 and another less serious earthquake in 1989.

✓ **Reading Check** What happens when two continental plates collide?

Forces Shaping Landforms

The forces under the earth's crust that move tectonic plates cause volcanoes and earthquakes to change the earth's landforms. Once formed, however, these landforms will continue to change because of forces that work on the earth's surface.

Weathering **Weathering** is the process of breaking surface rock into boulders, gravel, sand, and soil. Water and frost, chemicals, and even plants cause weathering. Water seeps into cracks of rocks and then freezes. As it freezes, the ice expands and splits the rock. Sometimes entire sides of cliffs fall off because frost has wedged the rock apart. Chemicals, too, cause weathering when acids in air pollution mix with rain and fall back to the earth. The chemicals eat away the surfaces of stone structures and natural rocks. Even tiny seeds that fall into cracks can spread out roots, causing huge boulders to eventually break apart.

EXPLORING CULTURE

Architecture

In earthquake-prone parts of the world, engineers design new buildings to stand up to tremors, or shaking of the earth. Flexible structures allow buildings to sway rather than break apart. Placing a building on pads or rollers cushions the structure from the motion of the ground. Some so-called intelligent buildings automatically respond to tremors, shifting their weight or tightening and loosening joints.

Looking Closer How can studying earthquake-damaged buildings help designers improve future construction?

San Francisco, California, 1989 ▶

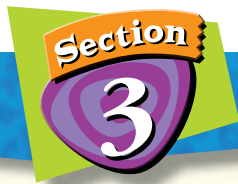


Erosion **Erosion** is the process of wearing away or moving weathered material. Water, wind, and ice are the greatest factors that erode, or wear away, surface material. Rain and moving water in oceans, rivers, and streams can erode even the hardest stone over time. Rainwater that works its way to streams and rivers picks up and moves soil and sand. These particles make the river water similar to a giant scrub brush that grinds away at riverbanks and any other surface in the water's path.

Wind is also a major cause of erosion as it lifts weathered soil and sand. The areas that lose soil often become unable to grow crops and support life. The areas that receive the windblown soil often benefit from the additional nutrients to the land. When wind carries sand, however, it acts like sandpaper. Rock and other structures are carved into smooth shapes.

The third cause of erosion is ice. Giant, slow-moving sheets of ice are called **glaciers**. Forming high in mountains, glaciers change the land as they inch over it. Similar to windstorms, glaciers act like sandpaper as they pick up and carry rocks down the mountainside, grinding smooth everything beneath them. Some glaciers are thousands of feet thick. The weight and pressure of thousands of feet of ice also cut deep valleys at the mountain's base.

 **Reading Check** List three things that can cause weathering.



Assessment

Defining Terms

1. **Define** core, mantle, magma, crust, continent, plate tectonics, earthquake, tsunami, fault, weathering, erosion, glacier.

Recalling Facts

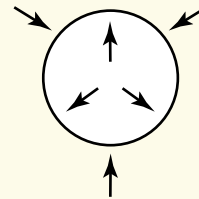
2. **Region** What are the three layers of the earth?
3. **Movement** In what three ways can tectonic plates move?
4. **Science** What are the three greatest factors that cause erosion?

Critical Thinking

5. **Making Comparisons** How does water play a role in the processes of weathering and erosion?
6. **Understanding Cause and Effect** How does erosion hurt some areas yet benefit others?

Graphic Organizer

7. **Organizing Information** Draw a diagram like this one, then label the inner arrows with inside forces that shape landforms. Label the outer arrows with surface forces that change the earth's landforms.



Applying Social Studies Skills

8. **Analyzing Diagrams** Look at the diagram of tectonic plate boundaries on page 36. Why might it be a problem that many of the world's people live along the western edge of the Pacific Ocean?

Guide to Reading

Main Idea

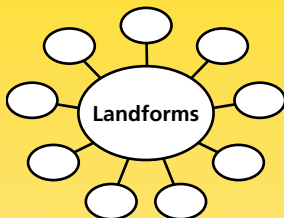
Landforms in all their variety affect how people live.

Terms to Know

- elevation
- plain
- plateau
- isthmus
- peninsula
- island
- continental shelf
- trench
- strait
- channel
- delta

Reading Strategy

Draw a diagram like this one. In each of the surrounding circles, write the name of a landform and a fact about it.



Section 4

Landforms and Waterways



NATIONAL GEOGRAPHIC

Exploring our World

Mountains and other landforms are usually formed by forces under the earth's crust. Yet some landforms are not created by the earth's forces—they are made by animals. Here, off Australia's northeast coast, coral and algae have joined together underwater, creating the Great Barrier Reef. They worked hard—the reef stretches more than 1,250 miles (2,012 km).

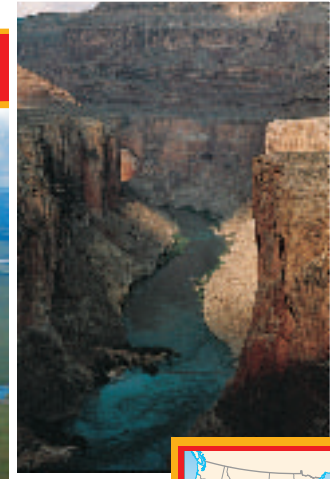


The earth's land surface consists of seven continents—North America, South America, Europe, Africa, Asia, Australia, and Antarctica. All have a variety of landforms—even icy Antarctica.

Types of Landforms

Look at the illustration on pages 14–15 of the **Geography Handbook**. Notice the many different forms that the land may take. Which ones are familiar to you? Which ones are new to you?

On Land Mountains are huge towers of rock formed by the collision of the earth's tectonic plates or by volcanoes. Some mountains may be a few thousand feet high. Others can soar higher than 20,000 feet (6,096 m). The world's tallest mountain is **Mt. Everest**, located in South Asia's Himalaya mountain ranges. It towers at 29,035 feet (8,850 m)—nearly 5.5 miles (8.9 km) high.



Valleys vs. Canyons

The Great Rift Valley in Africa is surrounded by mountains (above). Canyons, like the Grand Canyon in Arizona (right), are carved from plateaus.

Place How are valleys and canyons similar?

Mountains often have high peaks and steep, rugged slopes. Hills are lower and more rounded. Some hills form at the foot, or base, of mountains. As a result, these hills are called foothills.

In contrast, plains and plateaus are mostly flat. What makes them different from one another is their **elevation**, or height above sea level. **Plains** are low-lying stretches of flat or gently rolling land. Many plains reach from the middle of a continent to the coast, such as the **North European Plain**. **Plateaus** are also flat but have higher elevation. With some plateaus, a steep cliff forms on one side where the plateau rises above nearby lowlands. With others, such as the **Plateau of Tibet** in Asia, the plateau is surrounded by mountains.

Between mountains and hills lie valleys. A valley is a long stretch of land lower than the land on either side. Rivers are often found at the bottom of valleys. Canyons are steep-sided lowlands that rivers have cut through a plateau. One of the most famous canyons is the **Grand Canyon** in Arizona. For millions of years, the Colorado River flowed over a plateau and carved through rock, forming the Grand Canyon.

Geographers describe some landforms by their relationship to larger land areas or to bodies of water. An **isthmus** is a narrow piece of land that connects two larger pieces of land. A **peninsula** is a piece of land with water on three sides. A body of land smaller than a continent and completely surrounded by water is an **island**.

Under the Oceans If you were to explore the oceans, you would see landforms under the water that are similar to those on land. Off each coast of a continent lies a plateau called a **continental shelf** that

stretches for several miles underwater. At the edge of the shelf, steep cliffs drop down to the ocean floor.

Tall mountains and very deep valleys line the ocean floor. Valleys here are called **trenches**, and they are the lowest spots in the earth's crust. The deepest one, in the western Pacific Ocean, is called the **Mariana Trench**. This trench plunges 35,840 feet (10,924 m) below sea level. How deep is this? If Mt. Everest were placed into this trench, the mountain would have to grow 1.3 miles (2 km) higher just to reach the ocean's surface.

Landforms and People Humans have settled on all types of landforms. Some people live at high elevations in the Andes mountain ranges of South America. The people of Bangladesh live on a low coastal plain. Farmers in Ethiopia work the land on a plateau called the Ethiopian Highlands.

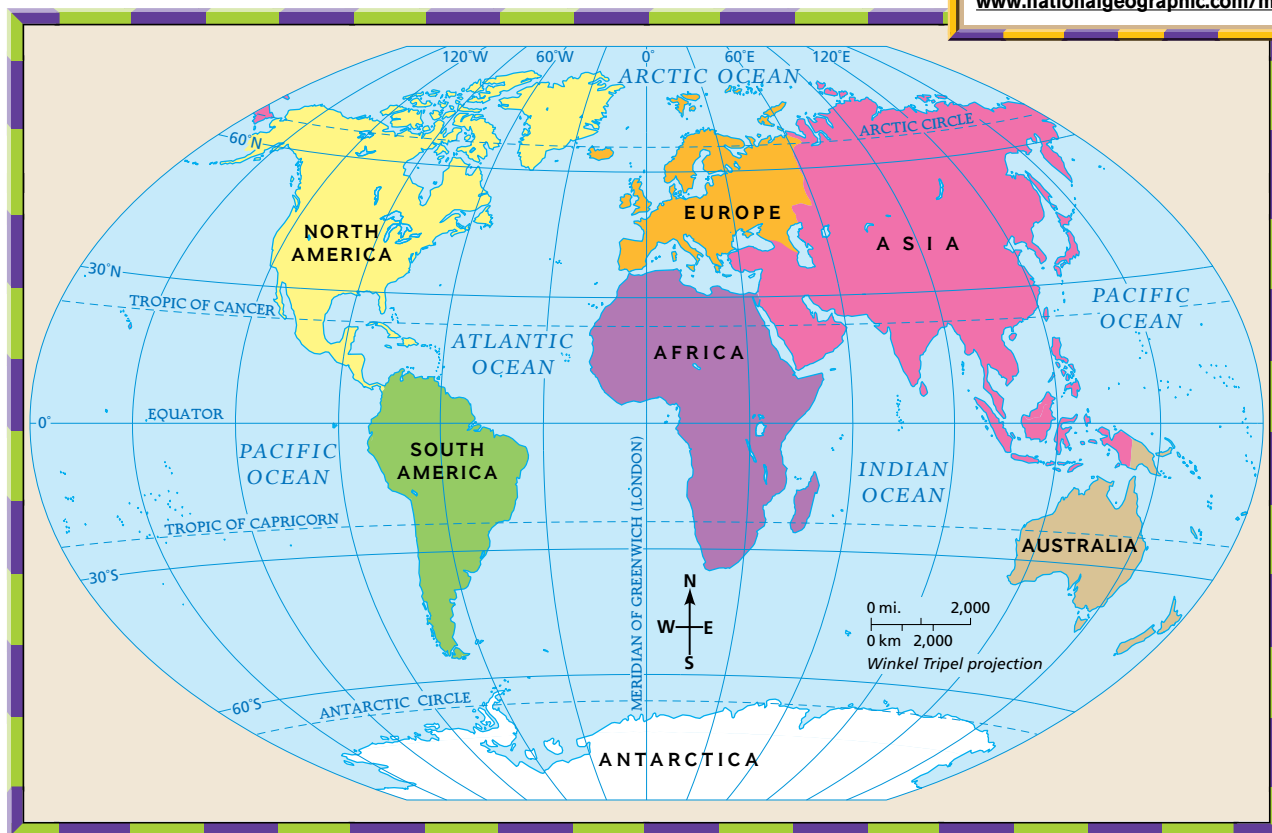
Why do people decide to live in a particular area? Climate—the average temperature and rainfall of a region—is one reason. You will read more about climate in the next chapter. The availability of resources is another reason. People settle where they can get freshwater and where they can grow food, catch fish, or raise animals. They might settle in an area because it has good supplies of useful items such as trees for building, iron for manufacturing, or petroleum for making energy. You will read more about resources in Chapter 3.



Reading Check How are plains and plateaus similar? How are they different?



World Continents and Oceans



Applying Map Skills

1. What are the names of the seven large land-masses on the earth?
2. What are the earth's four major oceans?

Find NGS online map resources @ www.nationalgeographic.com/maps

Bodies of Water

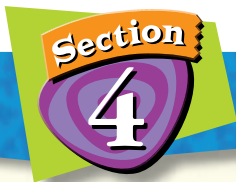
About 70 percent of the earth's surface is water. Most of that water is salt water, which people and most animals cannot drink. Only a small percentage is freshwater, which is drinkable. Oceans, consisting of salt water, are the earth's largest bodies of water. Smaller bodies of salt water are connected to oceans but are at least partly enclosed by land. These bodies include seas, gulfs, and bays.

Two other kinds of water form passages that connect two larger bodies of water. A **strait** is a narrow body of water between two pieces of land. The **Strait of Magellan** flows between the southern tip of South America and an island called Tierra del Fuego (tee•EHR•uh DEHL fu•AY•GOH). This strait connects the Atlantic and the Pacific Oceans. A wider passage is called a **channel**. The Mozambique Channel separates southeastern Africa from the island of Madagascar.

Bodies of freshwater appear on the world's continents and islands. They include larger bodies like lakes and rivers as well as smaller ones such as ponds and streams. The point at which a river originates—usually high in the mountains—is called its source. The mouth of a river is where it empties into another body of water. As you learned in Section 3, rivers carry soil and sand. They eventually deposit this soil at the mouth, which builds up over time to form a **delta**.



Reading Check What is the difference between the source and the mouth of a river?



Assessment

Defining Terms

1. **Define** elevation, plain, plateau, isthmus, peninsula, island, continental shelf, trench, strait, channel, delta.

Recalling Facts

2. **Place** What is the difference between mountains and hills?
3. **Place** How are straits and channels similar? How are they different?
4. **Culture** What are two reasons people decide to settle in a particular area?

Critical Thinking

5. **Analyzing Information** What two landforms are created by rivers?
6. **Making Inferences** Why do people often settle on the edges of rivers?

Graphic Organizer

7. **Organizing Information** Make a chart like this and give three examples for each item.

Landforms			
Landforms Under the Ocean			
Types of Bodies of Water			



Applying Social Studies Skills

8. **Analyzing Maps** Look at the map of Asia on pages RA24–RA25 of the **Reference Atlas**. Find an example of the following: plain, plateau, peninsula, island, strait. List the specific names of each landform.

Reading Review

Section 1

Thinking Like a Geographer

Terms to Know

geography
landform
environment
Global Positioning System (GPS)
geographic information systems (GIS)
artifact
fossil

Main Idea

Geographers use various tools to understand the world.

- ✓ **Place** Geographers study the physical and social characteristics of places.
- ✓ **Human/Environment Interaction** Geographers are especially interested in how people interact with their environment.
- ✓ **Technology** To study the earth, geographers use maps, globes, photographs, the Global Positioning System, and geographic information systems.
- ✓ **Economics** People can use information from geography to plan, make decisions, and manage resources.

Section 2

The Earth in Space

Terms to Know

solar system leap year
orbit summer solstice
atmosphere winter solstice
axis equinox
revolution

Main Idea

Earth has life because of the sun. Earth has different seasons because of the way it tilts and revolves around the sun.

- ✓ **Science** The sun's light and warmth allow life to exist on Earth.
- ✓ **Science** The atmosphere is a cushion of gases that protects Earth and provides air to breathe.
- ✓ **Movement** Earth spins on its axis causing day and night.
- ✓ **Movement** The tilt of Earth and its revolution around the sun cause the changes in seasons.

Section 3

Forces Shaping the Earth

Terms to Know

core plate tectonics
mantle tsunami
magma fault
crust weathering
continent erosion
earthquake glacier

Main Idea

Forces both inside the earth and on its surface affect the shape of the land.

- ✓ **Region** Earth has an inner and outer core, a mantle, and a crust.
- ✓ **Movement** The continents are on large plates of rock that move.
- ✓ **Movement** Earthquakes and volcanoes can reshape the land.
- ✓ **Science** Wind, water, and ice can change the look of the land.

Section 4

Landforms and Waterways

Terms to Know

elevation continental shelf
plain trench
plateau strait
isthmus channel
peninsula delta
island

Main Idea

Landforms in all their variety affect how people live.

- ✓ **Location** Mountains, plateaus, valleys, and other landforms are found on land and under the oceans.
- ✓ **Science** About 70 percent of the earth's surface is water.
- ✓ **Culture** People have adapted in order to live on various landforms.

Assessment and Activities



Using Key Terms

Match the terms in Part A with their definitions in Part B.

A.

1. elevation
2. landform
3. summer solstice
4. plate tectonics
5. geographic information systems
6. Global Positioning System
7. erosion
8. equinox
9. fault
10. weathering

B.

- a. height above sea level
- b. wearing away of the earth's surface
- c. theory that the earth's crust consists of huge slabs of rock that move
- d. a group of satellites around the earth
- e. special software that helps geographers gather and use information
- f. when day and night are of equal length
- g. a process that breaks surface rocks into gravel, sand, or soil
- h. a crack in the earth's crust
- i. the day with the most hours of sunlight
- j. particular features of the land



Reviewing the Main Ideas

Section 1 Thinking Like a Geographer

11. **Place** Give three examples of the physical characteristics of a place.
12. **Region** How is a region different from a place?
13. **Human/Environment Interaction** Give an example of how people use geographic knowledge.

Section 2 The Earth in Space

14. **Region** How many planets are in the solar system?
15. **Movement** What movement of Earth causes day and night?
16. **Movement** How does Earth's revolution around the sun relate to the seasons?

Section 3 Forces Shaping the Earth

17. **Movement** How do the plates in the earth's crust move?
18. **Movement** Give an example of erosion.

Section 4 Landforms and Waterways

19. **Place** Which has a higher elevation—plains or plateaus?
20. **Movement** What are two reasons people settle in a particular region?

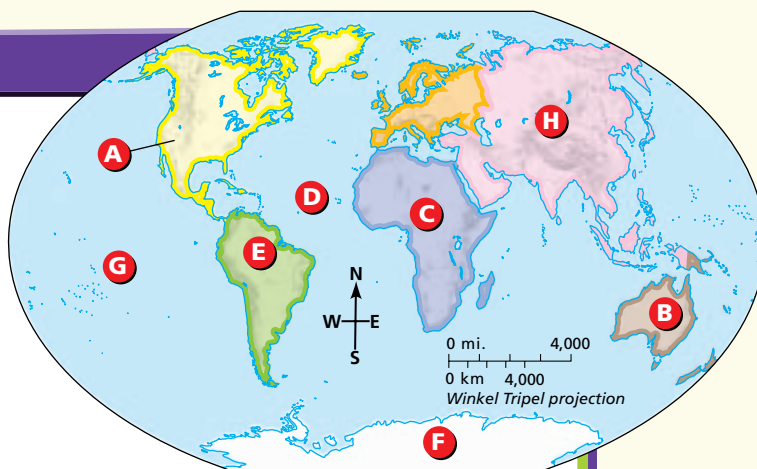


The World

Place Location Activity

On a separate sheet of paper, match the letters on the map with the numbered places listed below.

1. North America
2. Pacific Ocean
3. Africa
4. South America
5. Antarctica
6. Australia
7. Atlantic Ocean
8. Asia





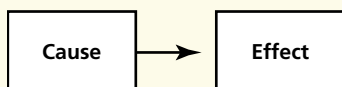
Social Studies Online

Self-Check Quiz Visit **The World and Its People** Web site at twip.glencoe.com and click on **Chapter 1—Self-Check Quizzes** to prepare for the Chapter Test.



Critical Thinking

- 21. Drawing Conclusions** Why do people in Australia snow-ski during the Northern Hemisphere's summer months?
- 22. Understanding Cause and Effect** Create a diagram like this one. In the "Cause" box, write "plate movements." In the "Effect" box, describe the effect that this force has on the earth. Draw four more pairs of boxes and do the same for the other forces that shape the earth: earthquakes, volcanoes, weathering, and erosion.



Comparing Regions Activity

- 23. Geography** Think about your neighborhood. List the characteristics that make it a region. Organize into pairs and compare the characteristics of your region to your partner's region.



Mental Mapping Activity

- 24. Focusing on the Region** Draw a simple outline map of the earth, then label the following:
 - core • crust
 - mantle • atmosphere



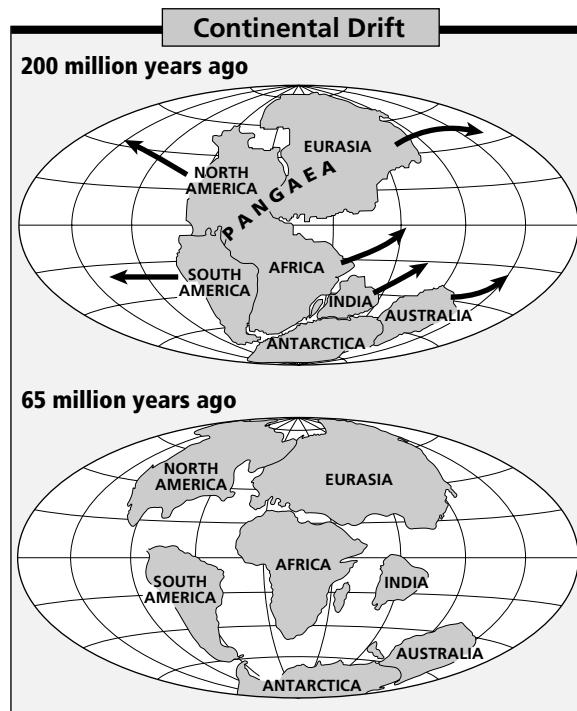
Technology Skills Activity

- 25. Building a Database** Use a word processing program to make a database like the following. In the first column, list forces inside Earth that have shaped the land. Then write the result of the force in the second column. In the third column, research to find an example of each result. The first row has been filled in for you.

Force	Result	Example
collision of plates	mountains	Himalaya

Standardized Test Practice

Directions: Study the maps below, and then answer the question that follows.



1. What "supercontinent" do many scientists believe existed 200 million years ago?
 - A Eurasia
 - B Pangaea
 - C Gondwana
 - D Antarctica

Test-Taking Tip: Use information on the maps to answer this question. Read the title above the maps and then the two subtitles. If you reread the question, you see it is asking about a certain time period. Make sure you use the correct map above to answer the question.