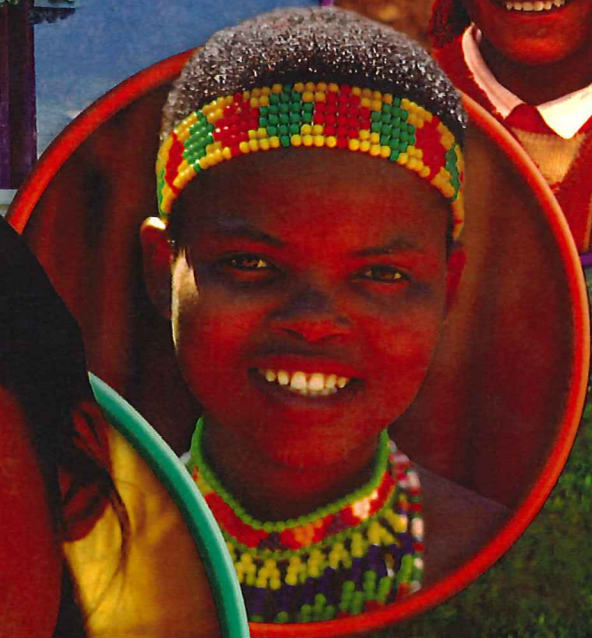
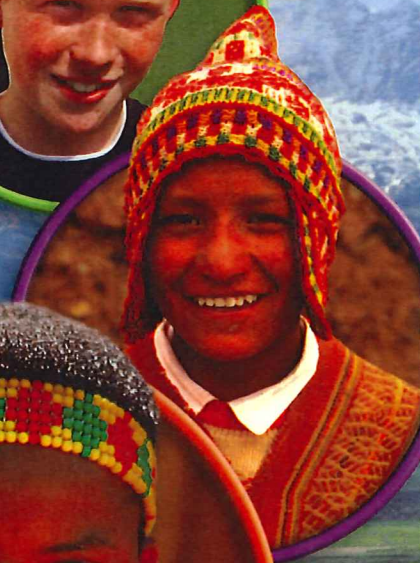


McDougal Littell

World Cultures *and* GEOGRAPHY



Atlas by
 RAND McNALLY

SECTION
2

Reading for Understanding

▶ Key Ideas

BEFORE, YOU LEARNED

Geography is the study of Earth's physical features and the interaction of people with the environment and with each other.

NOW YOU WILL LEARN

Geographers use technological tools to help them understand both Earth's physical processes and the activities of people on Earth.

▶ Vocabulary

TERMS & NAMES

globe a model of the earth in the shape of a sphere

map a representation of a part of the Earth

cartographer (kahr•TAHG•ruh•fur) a geographer who creates maps

surveyor a person who measures the land

remote sensing obtaining information about a site by using an instrument that is not physically in contact with the site

Landsat a series of information-gathering satellites that orbit above Earth

Global Positioning System (GPS)

a system that uses a network of earth-orbiting satellites to pinpoint location

Geographic Information Systems (GIS)

a computer or Internet-based mapping technology

BACKGROUND VOCABULARY

database a collection of information that can be analyzed

debris (duh•BREE) the scattered remains of something broken or destroyed

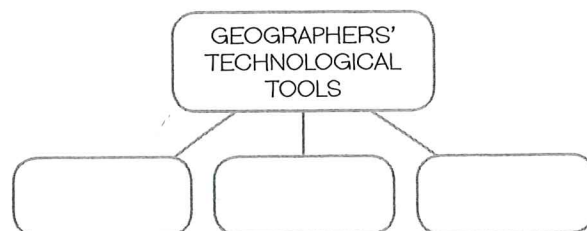
▶ Reading Strategy

Re-create the web diagram shown at right. As you read and respond to the **KEY QUESTIONS**, use the diagram to summarize ideas about geographers' technological tools.



Skillbuilder Handbook, page R5

SUMMARIZE



GRAPHIC ORGANIZERS

Go to Interactive Review @ ClassZone.com

Technology Tools for Geographers

Connecting to Your World

When you were a much younger student, you probably used paper and pencil to do your schoolwork. Now, when you have an assignment to complete, you most likely use a computer and the Internet. Today's geographers and other scientists use high-tech instruments and advanced computer software to create maps and databases. A **database** is a collection of information that can be analyzed. Geographers use these tools and their analysis to answer geographic questions.

The Science of Mapmaking

▼ **KEY QUESTION** How has technology changed mapmaking?

In their work, geographers use photographs, graphs, globes, and maps. A **globe** is a model of the Earth in the shape of a sphere. It shows the actual shape of the Earth. But you can only see half at any one time, and it is not easy to carry around. So, geographers use maps. A **map** is a representation of a part of the Earth. Maps can help geographers see patterns in the way human or physical processes occur. **Cartographers** (kahr•TAGH•ruh•furs) are geographers who create maps.



Gerardus Mercator

A Flemish cartographer, Mercator developed a type of map still used today.

Animated GEOGRAPHY

Landsat Satellite

This satellite provides visible and infrared views of the Earth.

 [Click here](#) to see how satellites gather data @ClassZone.com

Cartographers create maps from data collected in surveys. **Surveyors** are people who map and measure the land. They go out to a location and mark down the physical features they see, such as rivers, mountains, or towns. Today, cartographers use technologically advanced tools that provide a much more detailed and accurate picture of the world.

To create modern maps, geographers often use remote sensing equipment. **Remote sensing** means obtaining information about a site by using an instrument that is not physically in contact with the site. Generally, these instruments are cameras mounted on airplanes or Earth-orbiting satellites.

Satellites Two of the best-known satellites are Landsat and GOES. **Landsat** is actually a series of information-gathering satellites that orbit more than 100 miles above the Earth. Each has a variety of sensing devices to collect images and data. Each time a satellite makes an orbit, it gathers information from an area about 115 miles wide. Landsat can scan the entire Earth in 18 days.

GOES, or Geostationary Operational Environmental Satellite, is a weather satellite. This satellite flies in an orbit at the same speed as the

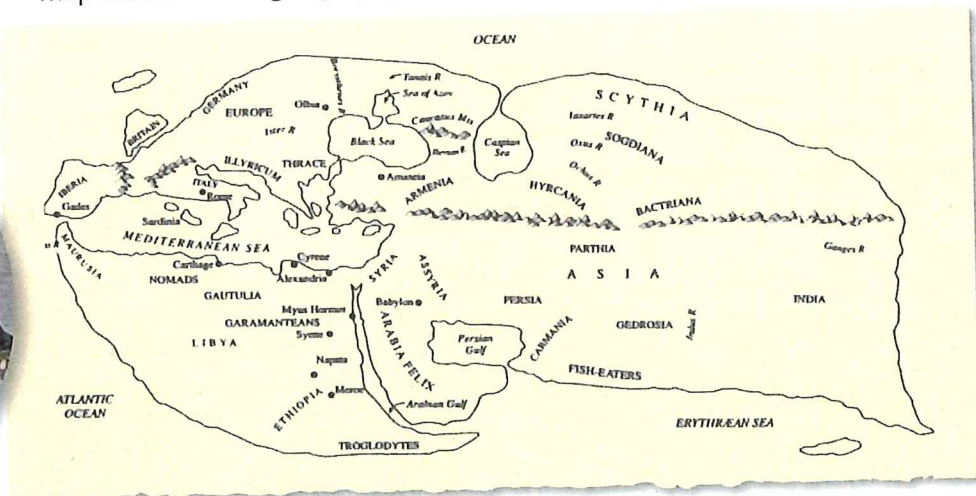
ONLINE PRIMARY SOURCE To see more works of Strabo, go to the Research & Writing Center @ClassZone.com

ANALYZING Primary Sources

Strabo (c. 64 B.C.–A.D. 23) was a Greek who wrote books about geography and history. His 17-volume *Geography* is the main source for information about the world known to the ancient Greeks and Romans. Strabo drew the map below for his geography book.



Strabo



DOCUMENT-BASED QUESTION

Which two continents labeled on the map were known to the ancient Greeks and Romans?

Earth's rotation. In this way it remains "stationary" above a fixed area. It gathers images of conditions that are used to forecast the weather. In 2006, there were two GOES satellites. One provided images from the eastern United States and the other from the west. You see GOES images when you watch a TV weather forecast.

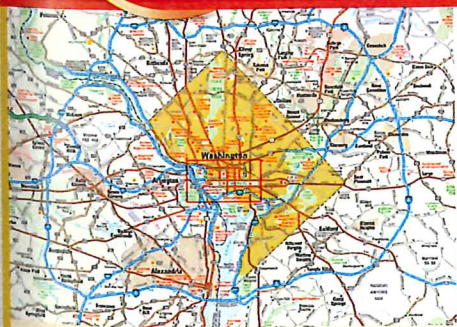
Global Positioning System The U.S. Department of Defense developed technology to help American military forces know exactly where they were. The **Global Positioning System (GPS)** employs a network of Earth-orbiting satellites to collect information about the location of a receiver. The satellites beam the receiver's exact position—latitude, longitude, elevation, and time—to Earth. This information is displayed on the receiver.

A GPS receiver can be small enough to fit in your hand. It has an electronic position locator that sends a beam from where you and the device are to an orbiting satellite. The satellite measures where the GPS device is and beams back your exact position.

GPS can be used from any point on the Earth and in any type of weather. You can use its data to help you figure out "Where am I?" and "Where am I going?" GPS data can be used to determine location, aid in navigating from place to place, create maps, and track the movement of people and things. Animal biologists, for example, use GPS devices to track animals and learn about their habits.

DRAW CONCLUSIONS Explain how technology has changed mapmaking.

COMPARING Mapping Styles: Washington, D.C.



Road Maps Road maps are created from information including aerial photographs, road surveys made with hand-held digitizers, and maps showing the positions of such features as lakes and mountains.



Satellite Images Satellite images are produced by equipment that records information in a digital format. The information is then converted to images that look like photographs.



Infrared Images Infrared images measure the radiation emitted by water bodies, vegetation, and buildings. In this type of image, the warm areas appear in light blue, areas with vegetation appear red, and water is black.

CRITICAL THINKING

Evaluate Which of these mapping styles would be the most valuable for determining where earthquake damage has occurred?

Geographic Information Systems

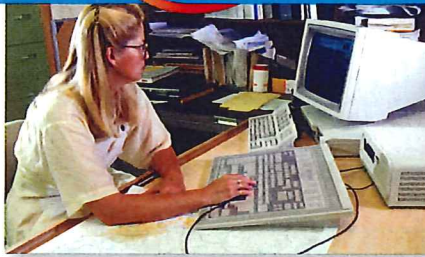
KEY QUESTION How do Geographic Information Systems work?

A very technologically advanced tool geographers use is the **Geographic Information Systems (GIS)**. GIS is a computer-based mapping technology. The complete system is able to gather, store, analyze, and display spatial information about places. It combines information from a variety of sources into digital databases.

GIS can integrate geographic information, such as maps, aerial photographs, and satellite images. It can also include information such as population figures, economic statistics, or temperature readings. Someone using GIS selects the information needed to answer a geographic question. Then GIS combines layers of information to give the user a better understanding of how the data works together. It can display the information in different ways, such as on a map, design, chart, or graph. The diagram below shows how GIS works.

CONNECT Geography & Technology

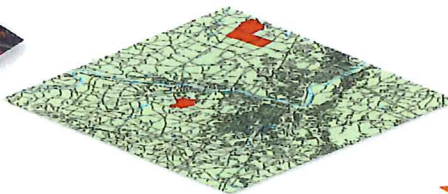
GIS GIS is a tool that allows geographers to solve problems by combining geographic information about a location from several sources.



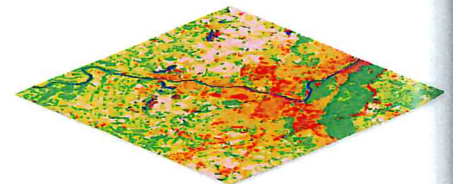
- 1 A question or problem is posed. An example is, "In what general area near this town might an airport be located?" A section of land is identified for problem solving.



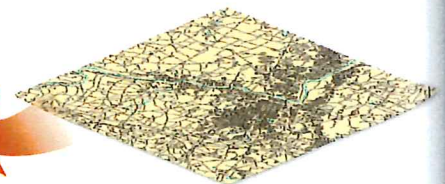
- 2 Computer databases hold geographic information about the location. The user selects layers of information that answer the question, "What geographic characteristics are important for a good airport site?"



- 3 A terrain map is selected to identify all areas flat enough for landing airplanes.



- 4 A land use map shows areas that have few homes.



CRITICAL THINKING

Summarize What geographic information is combined in the final map?

- 6 The layers of information are combined to create a composite map showing possible sites for the airport.

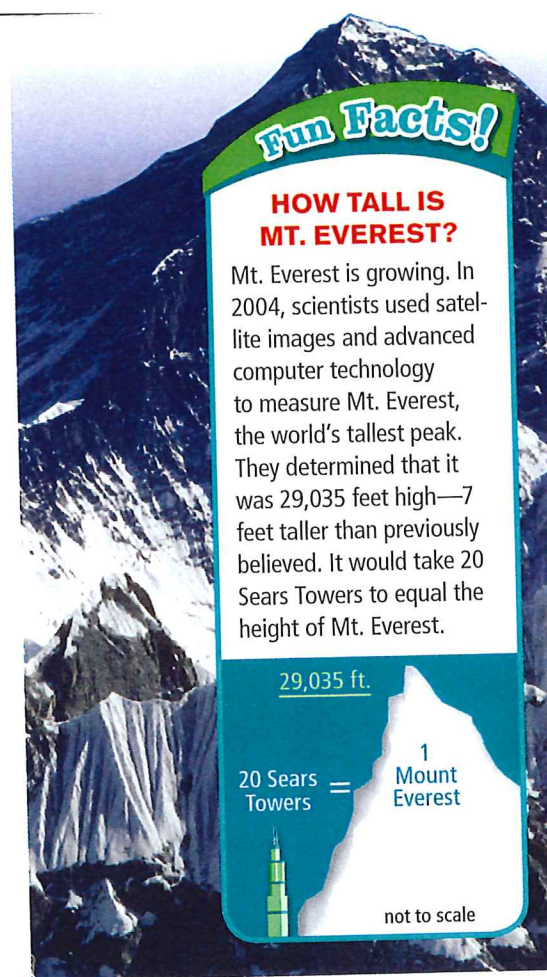
- 5 A base map shows where roads are located so that the airport can be reached and safety concerns are addressed.

GIS projects can range from simple, specific site questions to more complex global problems. For example, you could use GIS to determine the quickest and safest path to walk to your school. The federal government was able to use GIS to predict the location of **debris** (duh•BREE) from the space shuttle *Columbia*, which broke up upon reentry into the Earth's atmosphere in 2003. GIS can be used to plan for hurricane evacuations or to monitor the possible spread of avian flu. Urban planners use GIS to determine where to place a park or where to relocate a dangerous highway intersection. Private companies use GIS to decide where to drill for oil or even where to place a new fast-food restaurant.

GIS makes it possible for geographers to answer geographic questions quickly and accurately. They are better able to see relationships between data, to understand the past and present, and to predict future situations.

In the next section, you will learn about the many different kinds of jobs geographers perform.

 **SUMMARIZE** Explain how GIS works.




Fun Facts!

HOW TALL IS MT. EVEREST?

Mt. Everest is growing. In 2004, scientists used satellite images and advanced computer technology to measure Mt. Everest, the world's tallest peak. They determined that it was 29,035 feet high—7 feet taller than previously believed. It would take 20 Sears Towers to equal the height of Mt. Everest.


29,035 ft.

20 Sears
Towers




=

1
Mount
Everest



not to scale

Section 2 Assessment

 **ONLINE QUIZ**
For test practice, go to
Interactive Review
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TERMS & NAMES

1. Explain the importance of

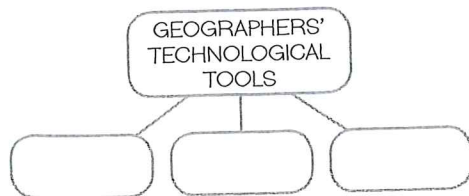
- map
- cartographer
- Geographic Information Systems (GIS)

USE YOUR READING NOTES

2. Summarize

Use your completed web diagram to answer the following question:

What are some geographers' tools besides maps and globes?



KEY IDEAS

3. What were two early means of showing the Earth's surface?
4. How did remote sensing change the way geographic data were obtained?
5. What are some ways GIS can be used?

CRITICAL THINKING

6. **Make Inferences** How were early geographers limited in gathering geographic information?
7. **Draw Conclusions** How does technology help geographers?
8. **CONNECT to Today** In what ways do you think that new geography technology might aid military forces in modern warfare?
9. **TECHNOLOGY** **Make a Multimedia Presentation** Use an Internet-based GIS to demonstrate the uses of this geographic tool. Give examples of the different tasks a GIS can do.