

CHAPTER

7

1400–1800

Exploration and Expansion



Coin minted during the reign of Charles V



Woodcut from the 1500s showing Hispaniola

1492

Global Events

Columbus makes his first voyage to the Americas.

1532 Global Events

Francisco Pizarro invades the Inca Empire.

1556

Politics

Charles V divides his lands between members of his family.

1569

Science and Technology

The first Mercator projection map makes navigation much easier.

c. 1503–1506

The Arts

Leonardo da Vinci paints the *Mona Lisa*.

1400

1431

Daily Life

Joan of Arc is burned at the stake.

1500



Galileo's telescope

1519

Global Events

The Magellan-Elcano expedition begins its voyage around the world.

1543

Science and Technology

Copernicus publishes his heliocentric theory.

1588

Politics

The Spanish Armada sets sail against England.

1513

Global Events

Ponce de León explores and names Florida.

Build on What You Know

The Italian Renaissance of the 1300s marked a time of great change in Europe. Renaissance thinking and styles spread throughout western and northern Europe. The Protestant Reformation of the 1500s led to new social, political, and economic patterns across Europe. The Reformation challenged traditional approaches to religious thought and the individual's role in society. During this same era, new ways of studying and understanding the natural world brought about a scientific revolution. In this chapter, you will learn about the causes and effects of this revolution in thought.



A maritime trading company's crest



Dutch ship landing slaves in colonial Jamestown

1610
Business and Finance
The Dutch East India Company introduces the term "shares" of stock.

1619
Politics
Colonists of Jamestown, Virginia, form the first representative colonial assembly in America.

1619
Global Events
A Dutch ship brings the first cargo of African slaves to Jamestown.

c. 1674
Science and Technology
Antoni van Leeuwenhoek first observes bacteria through a microscope.

1750
Daily Life
The world's population reaches approximately 750 million.

1756
The Arts
Composer Wolfgang Amadeus Mozart is born.

1776
Business and Finance
Scottish economist Adam Smith writes about mercantilism in *Wealth of Nations*.

1700

1628
Science and Technology
William Harvey accurately describes the human circulatory system.

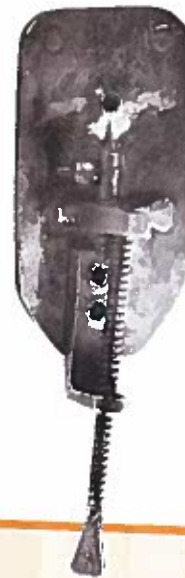
1626
Business and Finance
The Dutch purchase Manhattan Island from American Indians.

1609
The Arts
William Shakespeare publishes a book of sonnets.

1708
Business and Finance
British traders dominate trade on the coasts of India.



The Dutch purchased Manhattan Island for trade goods.



The Leeuwenhoek microscope, shown here, was about 3 to 4 inches high. On the back of the instrument, a screw with a needle provided a place to hold the object being viewed. The microscope was then held up to the viewer's eye.

1800

What's Your Opinion?



Do you **agree** or **disagree** with the following statements? Support your point of view in your journal.

Economics A nation's need for natural resources encourages national commitment to exploration and discovery.

Global Relations Exploration can lead to confrontations and mistreatment of conquered peoples.

Science, Technology & Society A society's approach to scientific study has little impact upon daily lifestyles and standards of living.

SECTION

1

The Scientific Revolution

READ TO DISCOVER

- 1 What factors contributed to the Scientific Revolution?
- 2 How did Copernicus, Kepler, and Galileo challenge traditional thought?
- 3 What were some of the important scientific discoveries of this period?

DEFINE

scientific method
geocentric theory
heliocentric theory

IDENTIFY

Roger Bacon
Scientific Revolution
Nicolaus Copernicus
Johannes Kepler
Galileo Galilei
Isaac Newton
Andreas Vesalius
René Descartes
Francis Bacon
Robert Boyle

WHY IT MATTERS TODAY

Scientific discoveries can have both positive and negative effects on society. Use [C215-05](#) or other **current event** sources to find several social issues that involve science or technology. Record your findings in your journal.

[cwn.com](#)
News.com

The Main Idea

The Scientific Revolution challenged and changed the way people thought about the world.

The Story Continues *In the early 1600s Spanish writer Miguel de Cervantes published a novel called Don Quixote de la Mancha. It told the story of an aging man stuck in the myths of the past. Cervantes's humorous tale reflected a new world that was rejecting the legends of old for a reality based on science.*

From Magic to Science

Until well into the 1500s, most Europeans saw little difference between science and magic. Alchemists used spells and magic formulas to try to change one substance to another—for example, lead into gold. Astrologers believed that the position of the stars in the sky influenced human life. People still believed many explanations of natural events proposed by Aristotle almost 2,000 years earlier. These people were called natural philosophers. They relied on religious teachings and the works of classical Greek and Roman thinkers to explain the mysteries of nature. Many scientists before the Renaissance were like **Roger Bacon**, an English philosopher and scientist of the 1200s. Bacon, a Franciscan monk who had studied at Oxford and Paris, was viewed as a leading scholar of his time. He was one of the earliest to favor a system of scientific experimentation, rather than faithful acceptance of religious ideas and ancient beliefs, as a means of finding truth. Nevertheless, he was shaped by the thinking of the time and mainly practiced alchemy. Famed for his teaching, Bacon became known as Doctor Mirabilis—wonderful teacher.

The spirit of the Renaissance encouraged curiosity, investigation, discovery, and the practical application of the knowledge of nature to everyday life. Some people felt freer to question old ideas and beliefs. They were more willing to use new approaches to answering questions about the natural world. During the era of the **Scientific Revolution**, people began using experiments and mathematics to understand these mysteries. The study of nature became more organized. They were no longer content to explain the world in terms of religious thought, magic, or the ideas of ancient writers.



INTERPRETING THE VISUAL RECORD

Alchemy Alchemists sought to understand and control the natural world through the use of magic. Some of their procedures and tools, however, were similar to those of early and later scientists. **Based on the picture, how might alchemists have contributed to the development of early scientific procedures?**

This new approach produced answers to many questions in physics, astronomy, and anatomy. It formed the basis for what we know today as science. Before the 1600s the word science meant “to know.” After the 1600s the sense of the word changed into the narrower meaning it has today.

✓ **READING CHECK: Drawing Inferences** What role did the Renaissance play in the development of science?

The New Study of Nature

As scientists spent more time examining the world around them, they observed things that did not agree with traditional explanations. For this reason, early scientists of the 1500s began to question ancient beliefs. They learned to form conclusions based on what they could observe with their own senses. They also used three new tools—scientific instruments, mathematics, and experiments. This new approach to study and knowledge marked the beginnings of the Scientific Revolution. It was a turning point in thinking that led to a rapid increase in people’s understanding of the world.

The ability to conduct experiments was key to this new approach to learning. Scientists used newly invented instruments such as the barometer, the microscope, the telescope, the air pump, and the thermometer. These tools greatly improved their ability to observe and measure. Scientists used mathematics to check and apply those measurements. Also, they repeated their experiments to make sure they got the same results. Then they drew conclusions about what they observed. This manner of study is called the **scientific method**.

✓ **READING CHECK: Drawing Conclusions** Why did the study of nature change during the 1500s and the 1600s?

Astronomy, Physics, and Anatomy

Three areas of study were especially interesting to some of the strongest thinkers of the times. Astronomy was the study of stars, planets, and other bodies in the sky. Another area, physics, focused on changes and properties of matter and energy. Scientists in the field of anatomy studied the structure of the human body, mainly by examining dead bodies. Several European scientists helped to shape the modern study of these important sciences.

Copernicus. In the A.D. 100s, the astronomer Ptolemy stated that Earth was the center of the universe. The sun and the planets, according to Ptolemy, moved around Earth. Ptolemy’s theory is called the **geocentric**, or “Earth-centered,” theory. The Greek word for Earth is *geo*. People believed this theory for many centuries.

During the early 1500s, Polish scientist **Nicolaus Copernicus** began to abandon Ptolemy’s geocentric theory. Instead, he argued that the sun was the center of the universe. Copernicus developed the **heliocentric**, or “sun-centered,” theory. *Helio* is the Greek word meaning “sun.” Copernicus realized that his theory explained many of the then-known facts about astronomy.

When Copernicus’s theory was published in 1543, people paid little attention. The theory seemed to deny what people’s senses told them. Anyone could “see” that the sun and planets moved around Earth. Anyone could “feel” that solid Earth did not move.

HISTORY MAKER



Nicolaus Copernicus
(1473–1543)

Nicolaus Copernicus, the great Polish scientist, is viewed today as the founder of modern astronomy. His heliocentric theory demonstrated that the earth is a moving planet and that it revolves around the sun. Copernicus became a symbol of the new ideas and approaches that brought about the Scientific Revolution. **How did Copernicus change our understanding of the universe?**

Model of Copernicus’s theory of planetary revolutions



CONNECTING TO Math

Kepler's Laws of Planetary Motion

Johannes Kepler tried to use mathematics to prove that the planets orbit around the sun. Kepler discovered three "laws" about how planets move in space. These laws are referred to as Kepler's laws of planetary motion.

Using the observations made by his employer, Tycho Brahe, Kepler found that planets travel around the sun in oval-shaped orbits called ellipses. Kepler's second discovery was that planets move faster when they are closer to the sun. Kepler's third law relates to the time it takes for a planet to complete an orbit around the sun.

Understanding Math

How would math help Kepler prove that his discoveries were true?

Kepler and Galileo. Copernicus had neither the instruments nor the mathematics to prove his theory. Proof came later with the work of two other scientists. Johannes Kepler, a German astronomer, and Galileo Galilei, an Italian scientist, each helped to confirm Copernicus's new understanding of the universe.

Johannes Kepler was a brilliant mathematician who used models, observation, and mathematics to test Copernicus's heliocentric theory. Some of the ideas on which Copernicus had based his theory were wrong. That slowed Kepler down, but he eventually proved the heliocentric theory correct. He published his laws of planetary motion in 1609. It took the work of an Italian scientist, however, to produce clear evidence that the earth moves around the sun.

Galileo Galilei had read of a Dutch device that made distant objects appear larger. Galileo built his own device—a telescope—and began studying the heavens. His telescope was very simple compared to those made today. However, Galileo was able to see things that no one had ever seen. He saw the mountains and valleys of the moon. He observed the rings around Saturn and spots on the sun. Galileo also observed the moons circling Jupiter. He used these observations to argue that not every heavenly body revolves around Earth. Galileo drew sketches of the things he observed through his telescope.

When Galileo published his findings in 1632, the work caused an uproar. Many scholars who still believed in Ptolemy's old geocentric theory refused to accept Galileo's findings. Church scholars disapproved because Galileo's theory seemed to contradict the Bible. Some said that the telescope was an invention of the devil.



In the central panel of this ceiling fresco, Galileo Galilei is shown demonstrating the use of his telescope. Later, Galileo was called before the Inquisition and forced to renounce his discoveries. He spent the rest of his life under house arrest.

Traditional scholars in physics were also displeased with Galileo. They believed, as Aristotle had said, that heavier objects fell faster than lighter ones. Using experiments and mathematics, Galileo proved this false. If there is no friction from air, all objects fall at the same rate. Galileo's discoveries formed the basis for the modern science of mechanics—the study of objects in motion.

Newton. In 1687 English scientist Isaac Newton published a book building on the work of Copernicus, Kepler, and Galileo. They had shown that the planets, including Earth, revolve around the sun. They had not, however, been able to explain why these bodies moved as they did.

After many experiments and measurements, Newton realized that the force that holds the planets in their orbits and the force that causes objects to fall to Earth are one and the same. He proposed the law of universal gravitation, which states that all bodies attract each other. Moreover, the force of this attraction can be measured. Both Kepler's Proof and Galileo's discoveries about falling objects were really examples of the law of universal gravitation. Newton also explained the laws of motion and developed the mathematical means of measuring motion. In one sweeping system, Newton tied together the movement of all things in the heavens and on Earth.

Newton's work had a huge impact on the science of his time. Even today, his laws of motion and gravitation are applied in the development of everything from automobile seatbelts to space travel. Furthermore, Newton's work changed the way people viewed the world. No longer would most well-educated Europeans see the universe as a place in which everything moved according to the constant attention of God and His angels. Most Europeans still accepted God as creator of the universe. However, they now began to think of that creation as a kind of giant mechanical clock. Once wound up by the divine clockmaker, it moved according to natural and universal laws of motion. So great was Newton's influence that the English poet Alexander Pope wrote:



“Nature and nature's laws lay hid in night;
God said, 'Let Newton be!' and all was light.”

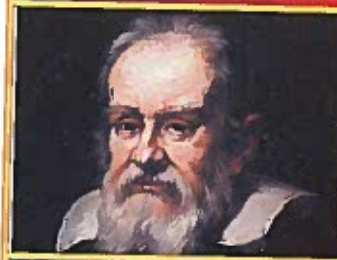
Alexander Pope, epitaph intended for Sir Isaac Newton

Vesalius and Harvey. The great Renaissance artist Leonardo da Vinci was a student of the human body. To those who tried to describe the body, he once said, “I advise you not to trouble with words unless you are speaking to blind men.” Andreas Vesalius, a Flemish scientist, heeded da Vinci's words and pioneered the study of anatomy. Vesalius refused to accept descriptions of human muscles and tissues written by Galen 1,400 years earlier. He did his own studies to see how the human body was constructed. In 1543, Vesalius published a seven-volume book called *On the Fabric of the Human Body*. The illustrations of the human body that Vesalius included in his work were amazingly detailed for the time. They helped readers to gain a visual understanding of the many complicated components of the body and of how they work together.

English physician William Harvey made equally important contributions. Using laboratory experiments, Harvey studied the circulation of blood. He described how blood moved through the veins and arteries. He also observed the working of the body's most important muscle—the heart.

✓ **READING CHECK: Making Generalizations** How did the work of early scientists during the Scientific Revolution lay the foundation for modern science?

HISTORY MAKER



Galileo Galilei
(1564–1642)

Galileo believed that scientific study would change the way people understood themselves and their world. Science, he felt, would lead to higher standards of living at every level of society. He believed, too, that science would weaken the social and economic barriers that separated people.

Because Galileo's findings challenged the traditional beliefs of the Catholic Church, church leaders kept him from teaching or writing about his ideas. **According to Galileo, in what ways would scientific progress affect society as a whole?**

Holt
Researcher



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KEYWORD: Holt Researcher

FreeFind:

Nicolaus Copernicus

Galileo Galilei

After reading more about Copernicus and Galileo on the Holt Researcher, write an imaginary dialogue between the two discussing their ideas about the universe.



HISTORY MAKER



René Descartes
(1596–1650)

René Descartes explained that the universe operates in a machine-like way according to the basic laws of physics. His philosophy became the basis of our modern Western view of the universe and its physical properties. **How did Descartes's view of the universe influence today's science?**

Analyzing Primary Sources

Identifying a Point of View How would Descartes view information that was assumed to be true or that was accepted as true on the basis of faith or tradition?

The Triumph of the New Science

The effects of discoveries made during the Scientific Revolution were felt throughout Europe. So much had been learned that scientists believed that the scientific method offered a map that could easily be followed in the search for knowledge.

During the Counter-Reformation, religious orders had helped to revive faith in church teachings. New scientific “orders” spread knowledge of the developments of the Scientific Revolution. Schools and societies devoted to science appeared in Rome, England, and France. The printing press helped scientists as it had helped religious reformers. Most of the new scientific societies published journals. Scientists everywhere could now read about scientific studies being done in Europe.

Descartes. French philosopher and mathematician **René Descartes** (day-KAHIRT) was a leader of the Scientific Revolution. His ideas led to great advances in mathematics, the sciences, and philosophy.

Descartes felt that no assumptions should be accepted without question. He developed a philosophy based on his own reason. In *Discourse on Method* (1637), Descartes stated that all assumptions had to be proven on the basis of known facts. Only ideas that were true beyond all doubt could be accepted without risk. He believed, for example, that his own existence was proven by the fact that he could think. Descartes wrote, “I think, therefore I am.” From this basic truth, he built a method of questioning that followed a clear, orderly progression of logical reasoning.



“[I] was never to accept anything as true that I did not know to be evidently so: that is to say carefully to avoid precipitancy [hasty conclusions based upon assumptions, rather than observed facts] and prejudice, and to include in my judgements nothing more than what presented itself so clearly and so distinctly to my mind that I might have no occasion to place it in doubt.”

René Descartes, *Discourse on Method*

In Descartes's view, all fields of scientific knowledge were connected, thus they should be studied together. Descartes's interests ranged across many fields. His work included studies in geometry and algebra, the scientific method, astronomy, and the physical sciences. He created a mathematical description of the way that light reflects from a smooth surface. This explanation led to the law of refraction, a basic principle in the study of optics. Much of Descartes's work challenged traditional church teachings. He was forced to live in the Protestant kingdom of Sweden, where he died in 1650.

Francis Bacon. English philosopher and scientist **Francis Bacon** lived around the same time as Descartes. Bacon believed that scientific theories could be developed only through observation. He said that no assumption could be trusted unless it could be proven by repeatable experiments. Bacon relied on truths that could be demonstrated physically, rather than through deductive thinking or reasoning. In 1620 he published *Novum Organum*, a book that outlined this new system of knowledge.

Other scientific discoveries. During the 1500s and the 1600s, scientific discoveries were made throughout Europe. German Gottfried Leibnitz (LIP-nits) and the English thinker Isaac Newton developed calculus, a new branch of mathematics. The two did not work together. They developed their mathematical ideas independent of one another.

Dutch scientist Antoni van Leeuwenhoek (LAY-ven-hook) used the microscope, invented in the late 1500s, to discover bacteria. He called them animalcules. He studied

and wrote about a whole range of tiny life forms never before seen by the human eye.

An English-Irish scientist, **Robert Boyle**, helped to pioneer the modern science of chemistry. Chemistry studies the composition of matter and how it changes. In 1662, Boyle showed that temperature and pressure affect the space that a gas occupies. An English chemist, Joseph Priestley, discovered the element oxygen in 1774. Antoine Lavoisier (luhv-WAHZ-ee-ay), a French scientist, later named it.

Before Lavoisier, people believed that fire was an element. He showed that fire resulted when a substance rapidly combined with oxygen. Lavoisier also showed that steam mixes with the air and becomes invisible. In this way, Lavoisier proved that matter can change form, but that it can neither be destroyed nor created. This idea is known as the law of conservation of matter. It is one of the most important principles in the study of chemistry.

Priestley and Lavoisier made their discoveries in the late 1700s. By this time, the scientific approach had spread across Europe. The store of human knowledge and understanding had increased beyond measure and in a very brief span of time. In fact, speed of discovery and rapid spread and exchange of knowledge were important characteristics of the Scientific Revolution. These resulted, in part, from the printing press, the rise of scientific societies, and other communications improvements.

✓ **READING CHECK: Drawing Inferences** Why did so many important scientific advances take place in so brief a period of time?



The French Academy of Sciences was founded in 1666.

Holt Researcher

go.hrw.com

KEYWORD: Holt Researcher

FreeFind: Robert Boyle

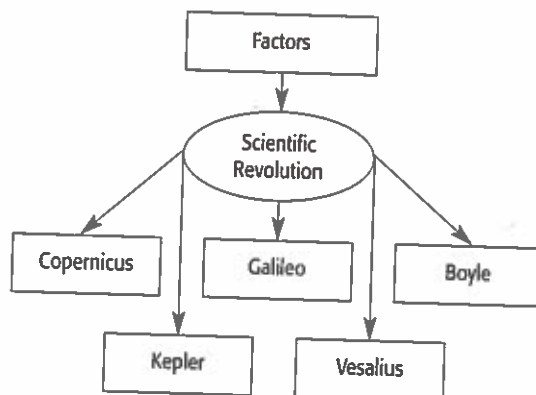
After reading more about Robert Boyle on the Holt Researcher, write a short essay describing his contributions to science.

SECTION 1 REVIEW

1. Define and explain the significance:
scientific method
geocentric theory
heliocentric theory

2. Identify and explain the significance:
Roger Bacon
Scientific Revolution
Nicolaus Copernicus
Johannes Kepler
Galileo Galilei
Isaac Newton
Andreas Vesalius
René Descartes
Francis Bacon
Robert Boyle

3. Identifying Cause and Effect Copy the web diagram below. Use it to show what factors led to the Scientific Revolution and what contribution each of the major scientists made.



4. Finding the Main Idea

- Why were the scientific developments of the 1500s and the 1600s later called the Scientific Revolution?
- What did the work of Galileo, Newton, Vesalius, van Leeuwenhoek, and Lavoisier have in common?
- How did communications advances contribute to learning, discovery, and new scientific methods in Europe?

5. Writing and Critical Thinking

Evaluating Write a short article for a science magazine describing the importance of the 1500s and the 1600s in the history of science.

Consider:

- how the study of science changed during this period
- what discoveries were made that led to today's scientific and technical knowledge

SECTION

2

READ TO DISCOVER

- 1 What technological advances made European exploration possible?
- 2 What effect did the Commercial Revolution have?
- 3 What role did mercantilism play in the colonies?

DEFINE

compass
 joint-stock company
 mercantilism
 favorable balance of trade
 tariffs
 subsidies

IDENTIFY

Commercial Revolution

WHY IT MATTERS TODAY

Social changes in one region of the world often cause people to move to other countries. Use **Q&A** or other **current event** sources to find out what recent social changes have caused people to leave their native countries. Record your findings in your journal.

CNN NEWS.com

The Foundations of European Exploration

The Main Idea
 Technological improvements led to exploration and fostered the growth of a new economy.

The Story Continues *Scientific advances would soon affect trade and the balance of political power in Europe. Rewards were offered to anyone who could invent a device for measuring longitude, since that would help ships sail more accurately and help nations compete for supremacy. It took over 100 years for someone to succeed. During that time, however, many other devices were invented that changed the global economy forever.*

Improvements in Technology

Since the time of the Crusades, Europeans had known about the riches of the East. Spices, silks, and jewels were prized as objects of trade because of their value. They came from the distant lands of India, China, and the islands of Southeast Asia. Traveling to and from these distant lands safely was essential if Europeans wished to compete with other traders. They began to focus on finding new sea routes to the East. To do this, Europeans needed better maps, navigation instruments, and ships. In short, they needed more advanced technology.

Mapmaking. Mapmaking improved during the Renaissance because of Europeans' growing interest in ancient geographers. Most scholars knew—as Ptolemy's maps had shown—that the world was round. During the Renaissance, information about Africa and Asia, unknown by Ptolemy, was added to his maps. The Americas, of course, were not yet known. Explorers believed that they could reach Asia more easily by sailing west across the Atlantic Ocean. Daring sea captains soon set out to find new trade routes to the East. Their discoveries opened whole new worlds to trade and settlement.

Navigation. Improved navigation instruments were just as important during this Age of Exploration as were more accurate maps. New navigation technology enabled ships to sail beyond sight of land without getting lost. One of the most important instruments to be developed during this time was the **compass**. In the 1100s, European navigators had learned that they could magnetize an iron needle. They rubbed the needle on a piece of lodestone—a kind of magnetic rock. When they floated the needle on water, it would point



INTERPRETING THE VISUAL RECORD

The Astronomer The Dutch artist Jan Vermeer, who worked during the 1600s, often showed his subjects in the midst of work activities. Vermeer's *The Astronomer* shows research and work connected to mapmaking. **What tools are being used by the astronomer to study the earth's surface?**

to the north. At some point during the 1200s or the 1300s, navigators created a true compass by fixing a magnetized needle to a card marked with directions.

New ships. If Europeans were to safely sail to the East, they needed better ships. Until well into the 1400s, long ships sometimes known as galleys were used by European sailors. These clumsy ships could sail using wind power only in the direction in which the wind blew. They sailed mostly along the coastlines. Sailors had to use long, heavy wooden oars to drive a galley against the prevailing winds.

In the late 1400s Spanish and Portuguese designers made important advances in ship-building technology. They built ships that were longer and larger than galleys. They also changed the size and shape of the sails. They moved the rudder—a steering device—from the side of the ship to its rear. These changes allowed ships to sail against the wind. Ships traveled more quickly and could be steered more easily. They could make way more reliably in different types of weather conditions, as well.

✓ **READING CHECK: Analyzing Information** Why did technological advances make sailors more able to explore distant lands?

Economic Changes

Improved ways of doing business also played an important part in new exploration. In some cases, banks added services to meet the needs of exploration. In other cases, Europeans changed basic economic practices. The changes were so great that many historians refer to the period between the late 1400s and the 1700s as the **Commercial Revolution**.

In many places in Europe before the 1300s and the 1400s, the value of coins could change depending on the amount of precious metal they contained. This changing value restricted European trade. Merchants and tradespeople needed a standard system of money.

As early as the mid to late 1200s, Italian cities were producing coins with fixed values. The gold florin of Florence and the ducat (DUHK-uht) of Venice were very dependable. This encouraged international trade and banking. In turn, banks could store large sums of money that they could lend governments or businesses wanting to explore overseas.

During the Commercial Revolution, individual merchants joined together into a new kind of business organization called a **joint-stock company**. Owners raised money by selling shares, or stock, in the company. Investors who bought the stock became co-owners and shared in the profits. The more shares they owned, the more of the profits they would receive. Joint-stock companies raised large sums of money from investors to finance exploration.

During the 1400s and 1500s, European monarchs supported exploration and colonization. Gaining riches through conquest and discovery would make them more powerful than rival countries. Although Italy had led the way in the Commercial Revolution, the Italians did not colonize. Instead, Portugal, Spain, and France built overseas empires. Trade shifted to these Atlantic nations.

✓ **READING CHECK: Identifying Cause and Effect** What effect did the standardization of money have on the ability of countries to trade?



CONNECTING TO Science and Technology

The Astrolabe— An Early Guidance System

Sailors of the 1500s had only a few simple tools—such as the astrolabe—to guide them. Using the position of the sun and stars, these explorers sailed the oceans of the world. They could plot and hold a course and measure their progress. Of equal importance, they could estimate where they were with respect to land.

Astrolabes were usually made of brass or iron. A sailor would sight a star along the bar shown in the picture. By lining up the bar with markings on the disk, he could figure out the latitude of his ship's position. Astrolabes were used until the invention of more accurate instruments in the 1500s and 1600s.

Understanding Science and Technology

In addition to knowing distance north or south of the equator, what other information would a sailor need to know his exact position?



INTERPRETING THE VISUAL RECORD

Lisbon Lisbon, capital of Portugal, was one of Europe's busiest seaports during the Age of Exploration. *How does this picture reflect Lisbon's role as a leading European trade center and sea power?*

Mercantilism

Economic and political changes linked to overseas expansion contributed to a new economic theory. **Mercantilism** stated that a country's government should do all it could to increase the country's wealth, which was measured by the amount of gold and silver the country possessed. According to this belief, the world contained a fixed amount of wealth. To increase its own wealth, one country had to take wealth from another country.

Balance of trade. According to mercantilists, a country could build wealth in two ways. It could mine gold and silver either at home or in its colonies. Or it could sell more goods than it bought from foreign countries, thus creating a favorable balance of trade. With a **favorable balance of trade**, a country received more gold and silver from other nations than it paid to them. This situation both strengthened the country and weakened its foreign rivals.

A favorable balance of trade was, therefore, the aim of many mercantilist countries. To achieve a favorable balance of trade, a country could do several things. First, it could reduce the amount of goods coming into it from other countries by placing **tariffs**, or import taxes, on these goods. The importer of a particular good paid the tariff and added that cost to the price of the good. The higher price discouraged people from buying it.

Second, a country could encourage exports. Manufactured goods, such as woolen cloth, were more valuable than raw materials, such as wool. Countries therefore encouraged manufacturing and the export of manufactured goods. They provided government **subsidies**, or grants of money, to help businesspeople start new industries and build ships.

Third, a country could work to gain and control overseas sources of raw materials and precious metals. A nation that controlled overseas sources of these goods would not need to import them from competing nations. Foreign countries were always considered rivals and might at any time become active enemies. The goal of winning overseas sources of materials helped fuel the race to gain colonies.

The role of colonies. Colonies played a major role in mercantilism. During the 1500s and after, European powers aimed to colonize overseas lands that were rich in gold, silver, and raw materials that could not be produced at home. A powerful nation sought to buy raw materials from its own colonies. That way, the country's wealth would remain with its own people. Most European colonial powers, moreover, forbid their colonies to sell raw materials to other countries. According to mercantilism, control of colonial markets and raw materials was key to a nation's success.

People in the home country's colonies provided strong markets for its manufactured goods. Governments passed strict laws that forbade colonies from buying foreign goods. In many cases, moreover, colonies were not allowed to manufacture goods. This forced colonies to buy manufactured goods only from their home country. Mercantilists argued that such laws were justified because colonies existed to benefit the home country.

✓ **READING CHECK: Finding the Main Idea** What was the overall aim of mercantilism?

Social Change

Advances in navigation and government economic policies by themselves did not lead to European exploration and overseas colonization. Certain social changes also helped create in people the desire to explore and resettle.

For one thing, the Renaissance and the Scientific Revolution had created a desire among many Europeans to learn more about the world and had added to the general store of geographic knowledge. Thus, simple curiosity and a spirit of discovery moved many people to explore the world outside Europe.

After the year 1500, moreover, the population of Europe increased. Some urban areas became very crowded. Adventurous people knew that overseas colonies might offer harsh living conditions. Some people were willing to accept these hardships, however, in return for the opportunity to gain land and possible wealth by settling in overseas colonies.

Other people went overseas hoping to reap quick profits. Tales of gold and silver and precious jewels—as well as fertile soil—persuaded thousands that easy wealth lay overseas. A few even went in search of fabulous cities with enormous riches, such as the legendary El Dorado (which means “the gilded one” in Spanish) in South America.

Finally, the Reformation and Counter-Reformation had led to the religious and political persecution of many. French Huguenots and others went overseas to seek religious freedom for themselves and to escape persecution at home. Some Christians went to spread their religion to non-Europeans.

In many cases, there was no single reason that motivated a person or group of people to explore or colonize. Rather, a combination of these hopes and aims led Europeans to leave their old lives for new and, to them, unknown lands.

✓ **READING CHECK: Summarizing** Why were some Europeans willing to explore and colonize distant lands?



Gold and cinnamon were highly sought-after trade goods.



DAILY LIFE

The New Commercial Economy

World exploration led to a new kind of economy in Europe. Goods brought from Africa, Asia, and the New World made many countries in Europe rich. Spices, silks, gold, silver, and precious stones were some of the most sought-after items.

The Portuguese, Spanish, and Dutch were the first European powers to build trading empires. Trade and commerce eventually replaced farming as the leading economic activity in Europe. Over time, the new commercial economy generally helped to spread wealth and improve living standards. **How did European countries benefit from the changes of the Commercial Revolution?**

SECTION 2 REVIEW

1. **Define** and explain the significance:
compass
joint-stock company
mercantilism
favorable balance of trade
tariffs
subsidies

2. **Identify** and explain the significance:
Commercial Revolution

3. **Summarizing** Copy the table below. Fill in the ways in which each factor influenced exploration and colonization.

Factors	Influence on Exploration and Colonization
Technological Advances	
Economic Changes	
Mercantilism	
Social Changes	

4. **Finding the Main Idea**

- Why were technological developments necessary before nations could begin exploration and colonization?
- How did trade laws that limited colonies' economic freedom support the idea of mercantilism?

5. **Writing and Critical Thinking**

Supporting a Point of View Imagine you are living in the 1500s. Write a letter to a relative explaining why you will or will not leave Europe to settle in a colony.

Consider:

- what conditions are like in your home country
- what you might gain or lose by traveling to a distant land



Homework Practice Online

keyword: SH3 HP7

SECTION

3

Voyages of Portugal and Spain

READ TO DISCOVER

- 1 What did early Portuguese explorers accomplish?
- 2 How did the voyages of Christopher Columbus influence the world?
- 3 Why did the Atlantic slave trade prosper?


DEFINE

triangular trade

IDENTIFY

Prince Henry
 Bartolomeu Dias
 Vasco da Gama
 Christopher Columbus
 Columbian Exchange
 Treaty of Tordesillas
 Amerigo Vespucci
 Ferdinand Magellan
 Middle Passage

WHY IT MATTERS TODAY

People have always been interested in exploring what is beyond their present environment. Use  or other **current event** sources to discover what kind of exploration is going on today. Record your findings in your journal.

 gradnet
 News.com

The Main Idea

Voyages sponsored by the Portuguese and Spanish led to new colonies and to the Atlantic slave trade.

The Story Continues *Life aboard a trading ship could be very difficult. “[Four galleys] were away three years, but only one galley returned and even on that galley most of the crew had died,” one eyewitness recalled. “And those which survived could hardly be recognized as human.” Despite such experiences, numerous sailors made voyages in search of riches for themselves and their countries.*

Portugal’s First Explorers

Portuguese and Spanish explorers made the first European voyages into unknown waters. Curiosity, religion, and economic goals drove these courageous men forward. Their voyages resulted in great advances for the sponsoring governments and served as the foundation for future empires.

One man largely responsible for Portugal’s interest in exploration was **Prince Henry** of the Portuguese royal family. Also known as “The Navigator,” Prince Henry’s first goal was to find gold for Portugal. The Portuguese also hoped to find a way to the rich spice trade of the Indies and to spread the Christian faith.

Henry gathered many of Europe’s best geographers and navigators to plan expeditions. By about 1420 or earlier his navigators were exploring westward into the Atlantic, and by the 1430s they were moving southward along the west coast of Africa. These explorations taught navigators about currents, wind patterns, and climates, knowledge they needed as they ventured farther from home. Henry’s explorers claimed the Azores for Portugal. In Africa, they began to trade for slaves, gold, and ivory.

The success of these early voyages of discovery and exploration created great excitement throughout Europe. Success encouraged more voyages. In 1488 **Bartolomeu Dias** sailed around the Cape of Good Hope at the southern tip of Africa. Although Dias had to turn back, he had found the route to the Indian Ocean.

Using this knowledge, **Vasco da Gama** sailed eastward across the Indian Ocean. He landed in India in 1498. Several years later, da Gama made a second voyage to India. He returned to Portugal, his ships full of valuable goods.

Thanks to Dias and da Gama, an overseas trade route from Europe to India and the East Indies was now available. Rich cargoes of spices and jewels arrived in Portugal. This direct ocean route saved the Portuguese from having to deal with middlemen traders. Now, the Portuguese could journey directly to the sources of the trade goods they sought. In many cases, too, ships could carry goods more cheaply than could overland caravans. Nor could Portuguese merchants be blocked or charged high tolls by competing powers that controlled overland routes. Overseas trade promised wealth for merchants and sailors and goods for Europe’s markets.

READING CHECK: Summarizing What did the Portuguese gain from the voyages of their early explorers?

An idealized portrait of Vasco da Gama meeting Indian royalty.



Christopher Columbus

Spain, too, became interested in the search for new trade routes. A Genoan navigator named **Christopher Columbus** had studied the writings of Marco Polo and Ptolemy's description of a round Earth. Columbus believed that a shorter route to Asia could be found by sailing westward instead of sailing around the tip of Africa. King Ferdinand and Queen Isabella of Spain agreed to finance Columbus's voyage of exploration.

In August 1492, Columbus set sail from Palos, Spain. His three small ships—the *Niña*, the *Pinta*, and the *Santa Maria*—sailed westward across the Atlantic. On October 12, 1492, the small fleet landed at a tiny island that Columbus named San Salvador. It was a historic moment when Columbus and his captains planted the Spanish flag. Columbus claimed the land that he had reached for Spain. Later, in reporting his discovery, Columbus wrote:



“It appears to me that the people [the Native Americans who met Columbus] are ingenious [clever], and would be good servants and I am of the opinion that they would very readily become Christians, as they appear to have no religion. They very quickly learn such words as are spoken to them.”

Christopher Columbus, extracts from journal, quoted in *Internet Medieval Source Book*, by Paul Halsall

After exploring other islands in the area Columbus returned triumphantly to Spain in 1493. Columbus believed the islands he had found lay off the east coast of India. Thus, he called them the Indies and their inhabitants Indians. However, Columbus had actually discovered islands in the Americas. They later became known as the West Indies. Between 1493 and 1504, Columbus made three more voyages to the “Indies.” For the rest of his life, he believed that he had landed off the coast of Asia.

There was a major difference between the Portuguese explorers and Columbus. The Portuguese already knew that the lands they sailed to existed. Earlier people had written of their journeys between Europe and Asia and Europe and Africa. Columbus believed he was traveling to one of these lands by a different route. Earlier Viking voyages to the Americas were unknown. When Columbus stepped ashore in what is now the Bahamas, he stepped on land that was altogether new and unknown to Europeans.

✓ **READING CHECK: Finding the Main Idea** What significant event happened in 1492?

HISTORY MAKER



Queen Isabella
(1451–1504)

Queen Isabella was one of Spain's greatest rulers. Her court was a center of learning and culture. With her husband, Ferdinand, she also helped to unify Spain.

Isabella approved the voyage of Christopher Columbus to India. Columbus found the New World and the great Spanish empire in the Americas was born. **What important events took place during Isabella's rule?**

Holt Researcher



go.hrw.com

KEYWORD: Holt Researcher

FreeFind:

Isabella

Christopher Columbus

After reading more about Isabella and Columbus on the Holt Researcher, create a Venn diagram that shows the similarities and differences in their beliefs about the lands and people Columbus encountered.

CONNECTING TO GEOGRAPHY

The Columbian Exchange

The effects of the Columbian Exchange are still felt today. For example, diet on both sides of the Atlantic changed. Potatoes from the Andes now feed millions of people in Europe. Corn, first grown by Native Americans, is a staple around the world today. Wheat was not grown in the Americas until it was brought there by Europeans. The tomato first grew not in Italy, but in the Americas.

Horses, cattle, goats, sheep, and other animals crossed the Atlantic with Europeans. North America, in exchange, gave Europe and Asia the turkey, the gray squirrel, and the muskrat.

Understanding Geography

What elements of the Columbian Exchange can you identify in your area?



The Impact of Columbus's Voyages

In the years following Columbus's voyages, a massive exchange took place between the so-called New World and the Old World of Europe. This interaction is often called the **Columbian Exchange**. Products, plants, animals, and even diseases traveled between the Western and Eastern Hemispheres. For example, gold and silver mined in South America were shipped eastward to Spain. This helped Spain become a major world power.

The exchange affected the way people in both worlds lived. American foods such as potatoes, tomatoes, beans, and corn were introduced in Europe. The Spanish brought horses to the Americas, thus changing the lifestyles of many Native American groups forever. This was especially true in areas such as the Great Plains.

Not everything the Columbian Exchange brought to the New World was helpful. European sailors carried smallpox and other diseases westward. The native population of Spanish America had no immunity to these diseases and millions died.

✓ **READING CHECK: Drawing Conclusions** Who benefited most—Europeans or Native Americans—from the Columbian Exchange? Why?

Dividing the New Lands

During the late 1400s Spain and Portugal—Europe's most active seagoing explorers—often claimed the same newly discovered lands. To settle these conflicts, Pope Alexander VI issued an edict in 1493. The Pope's edict drew an imaginary line from north to south through the middle of the Atlantic Ocean. Alexander gave Spain the rights to all newly discovered lands west of the line. Portugal could claim discoveries east of the line. Neither country, however, could take lands already held or claimed by another Christian ruler.

A year later, the **Treaty of Tordesillas** between Spain and Portugal moved the line farther west. This soon had an important impact. In 1500 the Portuguese navigator Pedro Cabral set sail westward for India. Cabral's tiny fleet of 13 ships was blown off course, and the Portuguese made landfall on the coast of what is now Brazil. Under the Treaty of Tordesillas, Cabral was able to claim this incredibly rich land for Portugal.

Over time, Spain took control of most of Central and South America. The Spanish also claimed the Philippines. In addition to the Brazilian coast, Portugal claimed lands on the eastern and western coasts of Africa. The Portuguese also claimed lands in Asia and the East Indies.

✓ **READING CHECK: Identifying a Point of View** How might the right of Spain and Portugal to claim lands not already occupied by Christians have been viewed by the people of those lands?

Vespucci, Balboa, and Magellan

Other European explorers followed Columbus westward. **Amerigo Vespucci** was an Italian navigator. Between 1497 and 1504, he crossed the Atlantic several times as part of Spanish and Portuguese expeditions. Unlike others, Vespucci did not think the land he saw was part of Asia. He called it a New World. A German mapmaker, impressed with Amerigo's argument, called the land America after Vespucci.

In 1513 Vasco Núñez de Balboa of Spain made an overland crossing of the Isthmus of Panama. Reaching a vast ocean, he named it the South Sea and claimed it for Spain. Balboa's discovery made it clear that the New World was not part of Asia.

Ferdinand Magellan, a Portuguese navigator sailing for Spain, proved Balboa was correct. In 1519 he set out from Spain with five ships to cross the Atlantic to South America. The ships sailed along its eastern shore until they reached the southernmost tip. After passing through the strait now named for him, Magellan found himself in a great ocean. He named it the Pacific Ocean because it was so calm. In Latin the word *pacificus* means “peaceful.” This was Balboa’s “South Sea.”

Magellan sailed westward across the Pacific. He reached the Philippine Islands and died there in 1521 in a fight with the islanders. His crew, led by one of his officers, sailed on. In 1522 one ship and 18 crew members returned to Spain. They had made the first round-the-world voyage.

✓ **READING CHECK: Making Generalizations** What did Vespucci, Balboa, and Magellan contribute to Europeans’ knowledge of the world?

Portuguese Expansion

After the voyages of Dias and da Gama, the Portuguese dreamed of controlling trade with Asia. In about 1510 they conquered part of the southwest coast of India. The port of Goa (GOH-uh) became their administrative center. From India they moved on to the East Indies. They conquered Malacca (muh-LAK-uh) on the southwest coast of the Malay Peninsula and the Moluccas (muh-LUKH-uhz), a group of islands. Europeans called them the Spice Islands because of their large crops of valuable spices.

Next, the Portuguese added the island of Ceylon—now Sri Lanka—to their chain of trading bases. Ceylon was in a key location between Goa and Malacca. With its tea and spices, Ceylon helped the Portuguese control trade with the East Indies. The Portuguese also gained footholds in China and Japan. Finally, they established several armed trading posts on the East African coast. The Portuguese also established a colony in Brazil where they built huge agriculture estates.

✓ **READING CHECK: Drawing Inferences** Why did the trading posts set up by the Portuguese allow them to control trade with the East?

The Slave Trade

As they did in Asia, the Portuguese went to Africa to trade. At first, they maintained friendly relations with the Africans. Christian missionaries wanted to convert the continent’s residents. Friendly relations soon collapsed, however, as the economic interests of the Portuguese—in gold and, over time, in slaves—became obvious.

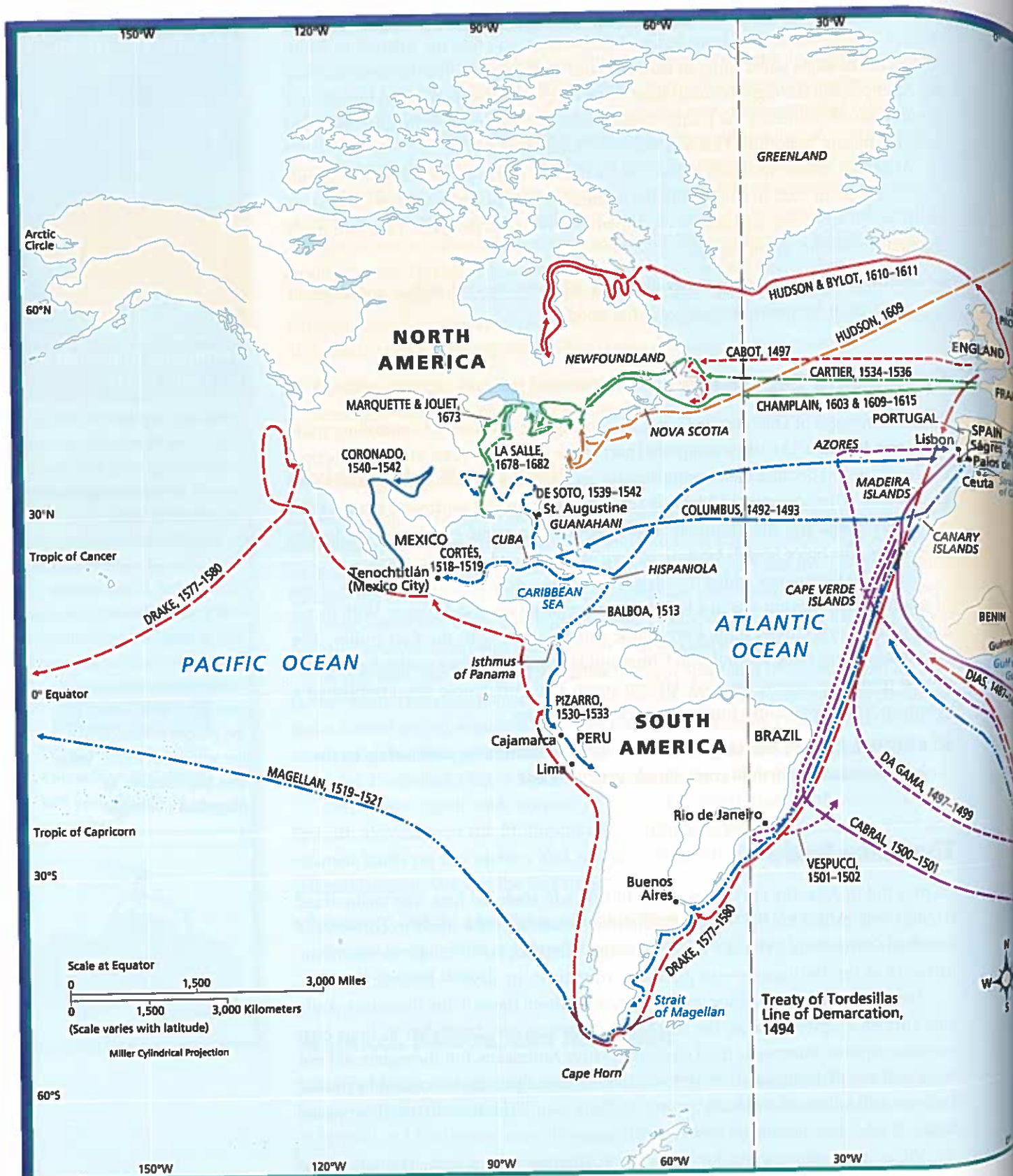
Despite the fact that Europeans themselves had been slaves in the Byzantine, Arab, and Turkish empires, during the 1500s they began to use slave labor in their own overseas empires. Europeans tried enslaving Native Americans, but the system did not work well due to the devastation of the Native American population caused by disease and the difficulties of enslaving people in their own land. Instead, the Europeans began to rely more heavily on enslaved Africans.

The slave trade grew quickly when the Portuguese set up sugar plantations on islands off the coast of Africa. To make a profit, large numbers of slaves were required. Plantation owners got these slaves from the African mainland. Later, the Dutch, English, and French also became active in the slave trade. By the early 1600s the slave trade was the chief focus of European relations with Africa.



Ferdinand Magellan became a page in the Portuguese court at a youthful age. Over time, he grew to become an experienced navigator and sailor.

Magellan became convinced that he could reach the Spice Islands in East Asia by sailing west. The circumnavigation of the globe by his fleet was not only a great achievement of navigation and courage; it also proved to the people of Europe that the world was round. **What was the outcome of Magellan’s voyage?**

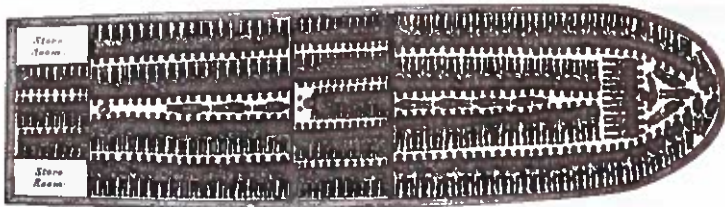


European Explorations, 1487-1682

Interpreting Maps The map shows the routes taken by Portuguese, Spanish, French, English, and Dutch explorers. They sailed both east and west to discover new lands.



Skills Assessment: Human Systems According to the map, what explorer duplicated Magellan's circumnavigation of the globe, and what nation did he represent?



INTERPRETING THE VISUAL RECORD

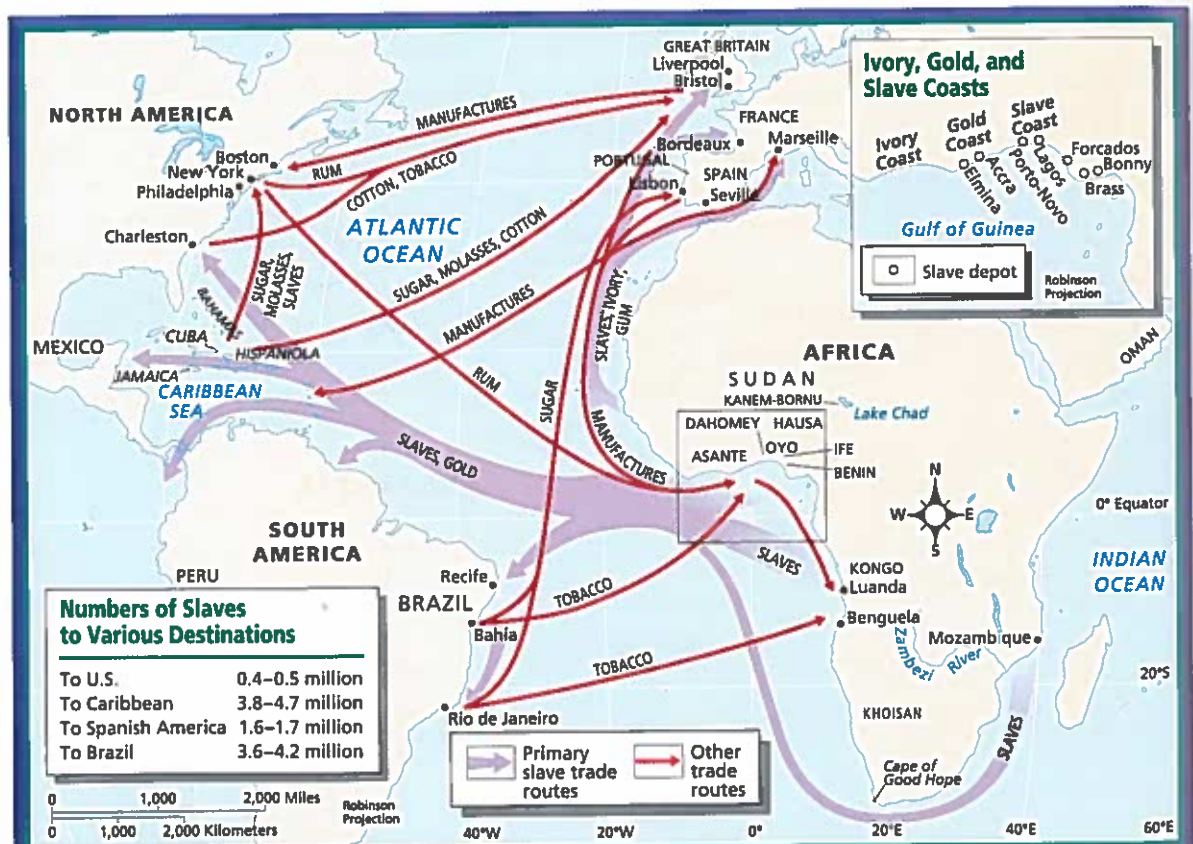
Slave ships This sketch shows a diagram of slaves in the hold of a ship. Slaves were positioned below decks in such a way as to fit as many as possible on the ship. This helped to ensure a profitable voyage. *What does this diagram indicate about conditions on board a typical slave ship?*

Triangular trade. Slave trade in the Atlantic was part of a system known as the **triangular trade**. First, merchants shipped cotton goods, weapons, and liquor to Africa in exchange for slaves or gold. The second stage—called the **Middle Passage**—was the shipment of slaves across the Atlantic to the Americas. There, slaves were sold for goods produced

on the plantations. To complete the triangle, merchants sent the plantations' products to Europe. They were used to buy manufactured products to be sold in the Americas.

The Middle Passage was brutal and degrading. Traders chained the slaves in the crowded hold of the ship. This stopped slaves from jumping overboard or causing trouble aboard ship. Slaves had little food or water and no sanitary facilities. Many died before reaching their destination.

At the height of the trade in the years between the mid-1700s and the early 1800s, European slave ships carried thousands of slaves each year. It has been estimated that some 10 million Africans survived the horrible journey to slavery in the Americas. Many perished during the horrible journey of the Middle Passage. Others died even earlier, on the hard trip from the African interior to slave ships on the coast.



Trade Across the Atlantic, 1451–1870

Interpreting Maps Trade routes linked European ports with coastal Africa as early as the mid-1400s. By the 1700s, these routes extended to the Americas in a distinctly triangular pattern. Over the years, millions of slaves were carried along these routes.

■ **Skills Assessment: The World in Spatial Terms** Approximately how far would a trip for slaves have been if they were transported from Luanda to Charleston?

African kingdoms and slavery. During the 1400s and the 1500s, strong states began to rise in West Africa. Some of these kingdoms profited from the slave trade. Not all African states participated in the slave trade with Europeans. Many African societies, however, had practiced slavery well before the Europeans' arrival. Slaves were sometimes taken in war or during raids on neighboring groups. In some traditional African societies, slaves might be allowed to gain their freedom. Generally, they played a distinct role in society. Europeans, on the other hand, considered slaves as property to be bought and sold for profit.

Some Africans who lived in the interior helped the Europeans capture and move slaves. In return they received European-made arms and other goods. Neighboring groups either had to participate or be taken as slaves. During the years of the slave trade, native populations in some parts of Africa were greatly reduced. As demands for slaves increased, population losses had disastrous effects on Africa's development and progress.

✓ **READING CHECK: Supporting a Point of View** In what ways can you support the view that the slave trade slowed the development of the African continent?

The Portuguese Empire Weakens

The great Portuguese empire declined almost as rapidly as it had grown. The Portuguese government did not have the financial wealth to support so large an empire. Thousands of soldiers and sailors were needed to maintain and expand the empire, but many never returned from overseas. Shipwrecks and battles with enemies cost both money and lives. With its small population, Portugal could not replace the losses it suffered as a result of exploration and colonization.

Finally in 1580 Spain annexed Portugal. Portugal did not regain its independence until 1640. Under Spanish control, Portugal's trade was greatly restricted and its overseas colonies were neglected. Only Brazil and Angola survived as major Portuguese colonies.

✓ **READING CHECK: Drawing Conclusions** How did the relative size of Portugal and Spain influence their success in expansion and colonization?

Primary Source

EYEWITNESS

Olaudah Equiano was a native African who was captured and enslaved by other Africans. Eventually he was bound over to European slave traders. Years later he published an account of his experiences, which included his first impressions of the white slave traders and their ship.

"When I looked round the ship too and saw a large furnace of copper boiling and a multitude of black people of every description chained together . . . I no longer doubted my fate. . . . When I recovered a little I found some black people about me. . . . I asked them if we were not to be eaten by those white men with horrible looks, red faces, and loose hair. . .

I now saw myself deprived of all chance of returning to my native country." **What did Equiano think that the slave traders were going to do to him?**

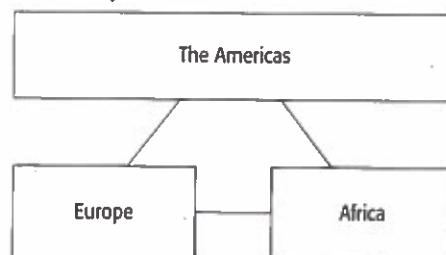
SECTION 3 REVIEW

1. **Define** and explain the significance: triangular trade

2. **Identify** and explain the significance:

Prince Henry
Bartolomeu Dias
Vasco da Gama
Christopher Columbus
Columbian Exchange
Treaty of Tordesillas
Amerigo Vespucci
Ferdinand Magellan
Middle Passage

3. **Analyzing Information** Copy the diagram below. Between each of the boxes, show the direction of trade in the triangular exchange and what type of cargo the ships carried.



4. **Finding the Main Idea**

- Sequence the important discoveries of the explorers listed in question 2.
- What do you think might have happened on the African continent if the European slave trade had not taken place?

5. **Writing and Critical Thinking**

Comparing and Contrasting Write a paragraph pointing out the positive and negative effects of the explorations of the Spanish and Portuguese.

Consider:

- the economic benefits to both countries
- the effects on human life and populations



Homework Practice Online

keyword: SH3 HP7

SECTION

4

READ TO DISCOVER

- 1 How did Spain extend its power abroad and at home?
- 2 Why were the Dutch successful in the 1600s?
- 3 Why did the Spanish Empire decline?

DEFINE

viceroy
guerrilla warfare

IDENTIFY

Ponce de León
Hernán Cortés
Moctezuma II
Francisco Pizarro
Charles V
Philip II
William of Orange

WHY IT MATTERS TODAY

Two ways that nations increase their land are conquest and colonization. Use **CNN** or other **current event** sources to find examples of both processes going on today. Record your findings in your journal.

CNN
NEWS.com

The Spanish and Dutch Empires

The Main Idea

Spain created an empire in the Americas, while the Dutch set up trading colonies in Asia and the Americas.

The Story Continues As Spanish explorers spread into the Americas, they came ready to conquer. "Some of them were dressed in glistening iron from head to foot," wrote one observer. "They terrified everyone who saw them." Their tactics established a powerful empire for Spain.

Spain's Colonial Empire

Throughout the 1500s Spain was the most powerful nation in Europe, with the largest overseas empire. While Portugal focused mainly on Africa and Asia, Spain turned to the Americas. Beginning with Columbus, Spaniards explored the West Indies, Central America, and parts of North and South America. At first, they believed these lands were in the East Indies. However, the natural resources of the Americas provided riches other than spices and jewels.

Spanish explorers sailed outward from the Caribbean to the North American mainland. In 1513 **Ponce de León** sailed northward to what is now Florida. A later voyage to Florida in 1528, led by Pánfilo de Narváez, ended in disaster and shipwreck. A handful of survivors from this tragic voyage traveled overland across what is now the southwestern United States and Mexico. Their travels opened even more land to Spanish claims and settlement.

Conquests. Other Spanish explorers went to the Yucatán in Mexico. There they learned of the great Maya and Aztec civilizations. In 1519, with 11 ships and about 600 men, **Hernán Cortés** invaded Mexico. He seized the Aztec ruler **Moctezuma II**, also known as Montezuma. Cortés captured and destroyed the great Aztec city of

Tenochtitlán. The Spanish later built Mexico City on its ruins. Spanish horses and guns, unknown in the Americas, helped the Spanish defeat the great Aztec armies, as did a smallpox epidemic that swept through the Aztecs.



INTERPRETING THE VISUAL RECORD

Cortés Hernán Cortés, at the head of about 600 Spanish soldiers, carved out a huge empire in Mexico and plundered the mighty Aztec civilization. Cortés is pictured here capturing the Aztec ruler Moctezuma II. *According to this picture, what advantages did the Spanish have over the Aztec?*

The Spanish also found rich civilizations in South America. In 1530 **Francisco Pizarro** led 180 men and 37 horses on an expedition. They traveled from the Isthmus of Panama to the capital of the Inca Empire in what is now Peru. In 1533 Pizarro claimed the land from present-day Ecuador to Chile for Spain.

Cortés and Pizarro destroyed many Aztec and Inca statues and temples. The gold and silver from these religious objects and buildings made the explorers and the Spanish treasury wealthy.

In time Spain controlled the West Indies, southern and western North America, Central America, and much of South America. Unlike Europeans in Africa and Asia, the Spanish established settlements throughout their vast empire.

Colonial government and society. Spain directed the colonial government. Officials called **viceroy**s represented the monarchy in the colonies and reported to the Council of the Indies in Spain. The council planned and directed the empire's growth on behalf of the Spanish crown.

For a time, the colonies produced enormous wealth for Spain. There were rich silver mines in the regions that are now Peru and northern Mexico. Agriculture and trade remained important, but mineral resources were the main assets of Spain's colonies.

European diseases such as smallpox, typhus, and measles weakened the Native American societies conquered by Cortés and Pizarro. From what is now the southwestern United States through Mexico and much of Central America, millions of Native Americans died. Whole cultures that had lived and thrived for centuries were wiped out or broken up in a matter of a relatively few years. Exact losses cannot be accurately determined, but many historians believe that the numbers were enormous. This tragic outcome of expansion and colonization also promoted the growth of slavery. The Spaniards needed workers for mines and farms in the New World. To make up for the loss of native labor, they imported slaves from Africa.

✓ **READING CHECK: Analyzing Information** What were some of the factors that allowed so few Europeans to conquer large numbers of peoples in the Americas?

Spain's Colonial Rivals

The Spanish government wanted to keep the wealth of the Americas to themselves. They made laws keeping foreigners out of the Spanish colonies. Only Spanish ships could carry gold and silver out of the Americas.

Making laws, however, was easier than enforcing them. The French, Dutch, and English envied Spain's American wealth. They tried various methods to capture a share of it. They traded in Spanish American ports, their monarchs encouraged pirates to attack Spanish ships, and pirates raided Spanish towns.

Spain's rivals also tried to establish colonies in the Americas, ignoring Pope Alexander's line down the middle of the ocean. Despite their efforts, these rival countries had only limited success before 1600.

✓ **READING CHECK: Making Predictions** What did Spain's rivals hope to gain by having pirates attack Spanish ships and colonial towns?



INTERPRETING THE VISUAL RECORD

Pizarro Francisco Pizarro and a handful of Spanish conquistadores overthrew the mighty Inca Empire of Peru. Here, Pizarro is shown refusing mercy to Atahualpa, the last emperor of the Inca. *What visual technique has the artist used to depict Pizarro's dominance in this scene?*

Charles V

While their explorers were expanding the empire abroad, Spanish kings expanded their authority in Spain itself. One of the greatest of these kings was **Charles V**. Charles was a member of the Habsburgs, an old German family. Charles took the Spanish throne in 1516. Three years later he was elected Holy Roman Emperor.

With Charles's titles and power, he was torn between conflicting demands. As king of Spain, he had to adopt a Spanish viewpoint. As Holy Roman Emperor, he was expected to support German aims. Finally, as the political leader of Christian Europe, Charles had to defend Europe against the Ottoman Turks.

The nearly continuous religious wars during Charles's reign drained Spain's human resources and treasury. Spain lacked industries and the government did little to promote them. So much of Spain's land was devoted to raising sheep for wool that the country could not produce enough food to feed its people. Food prices increased many times over between 1500 and 1650.

Charles realized that the Spanish and Holy Roman empires had become too large for one man to rule. In 1556 he gave up his throne and divided the vast lands among members of his family. Charles's son **Philip II** received Spain and its possessions. His branch of the family became known as the Spanish Habsburgs. Charles's brother Ferdinand I was already king of Hungary and Bohemia. Now he became Holy Roman Emperor and head of the Austrian Habsburgs.

King Philip II of Spain personally managed the daily operations of the royal government.

✓ **READING CHECK: Finding the Main Idea** What were some of the factors that led Charles to split up his lands?



Philip II

Unlike his father, Philip II was born and educated in Spain. He ruled from 1556 until his death in 1598. Philip was a dedicated monarch who worked long hours at being king. His goal was to strengthen Spain's hold as Europe's leading power. Philip built a new royal residence, El Escorial, 25 miles from Madrid. From there he took control of every facet of government. This nearly paralyzed his administration. Philip also saw himself as the leader of the Counter-Reformation. A very devout Catholic, he ordered the Spanish Inquisition to stamp out heresy at home. Abroad, Philip involved Spain in wars to defend Catholicism and bring glory to Spain. These efforts were so costly that taxes could never keep up with expenses. As bankers charged more and more interest on loans to Spain, the country's financial woes increased.

Although Philip was unable to defeat all the enemies of Spain and Catholicism, he did manage to defeat the Ottoman Empire in the Mediterranean. His attempted invasion of Protestant England by the huge Spanish Armada in 1588, however, ended in disaster. An attempt to invade France to prevent a Protestant from becoming king was also an expensive failure. Yet these setbacks were not the costliest errors in Philip's policy making.

✓ **READING CHECK: Drawing Inferences** Why might the kind of control that Philip exerted over his government paralyze his administration?

The Rise of the Dutch

Philip II's most costly policies were those toward the Netherlands, one of Europe's great trading centers since the Middle Ages. Philip had inherited the Netherlands. Because Calvinism was becoming popular in the area, Philip treated his Dutch subjects harshly. First, he ignored the Netherlands' long tradition of self-rule. He insisted that he, rather than the local nobles, held all authority. Second, he taxed Dutch trade heavily to pay for Spanish wars. Third, he persecuted the Calvinists. These actions turned the people's distrust of Philip to outright rebellion.

The Netherlands break from Spain. In 1568 William of Orange led a revolt against Philip. The people of the Calvinist northern provinces lived on land below sea level. Large dikes protected the land. The people opened the dikes, flooding the countryside and leaving Philip's army helpless. William sent small bands of soldiers on quick raids to keep the Spanish army confused. Today this military technique is called **guerrilla warfare**.

In 1579 under William's leadership, the northern provinces declared their independence from Spain. William was killed in 1584, but his descendants continued the war with Spain on and off until 1648. The southern provinces were heavily Catholic and remained under Spanish control as the Spanish Netherlands.

Dutch society. Because the Netherlands lay on the North Sea, the Dutch were a seafaring people. They built very efficient ships and were expert sailors. For these reasons, they ruled European commerce throughout the 1600s. Their ships carried most of Europe's trade and the city of Amsterdam became a world financial center. All segments of Dutch business stood as models of efficiency.

Calvinists became the dominant religious group in the Netherlands. Generally, however, the Dutch followed policies of religious tolerance. Amsterdam became a lively cultural center. Scholars such as René Descartes and artists such as Rembrandt and Vermeer thrived in this comfortable setting.

The Dutch colonial empire. In 1602 the Dutch East India Company was founded. It had total control over trading between the Netherlands and the East Indies. The first Dutch overseas colony was founded on the island of Java in 1619. The Dutch took over the entire island, with its valuable crops of sugar, tea, coffee, and spices. From Java, they expanded westward to Sumatra and eastward to the Spice Islands. Their colony at the Cape of Good Hope allowed them to supply and protect their trade routes to Asia.

The Dutch also gained a foothold in Japan. Because the Dutch did not come as missionaries, the Japanese allowed them to open a trading center in Nagasaki. In the Western Hemisphere the Dutch established colonies in the West Indies, South America, and North America. In 1626 they purchased Manhattan Island from the Native Americans and built the city of New Amsterdam there.

The Dutch colonial empire was much different from that of the Spanish. The Dutch never tried to convert conquered peoples to Christianity. They did not force them to speak Dutch or live under the laws of the Netherlands. The Dutch came as traders, with the sole intention of making money. This goal reflected their businesslike society.

✓ **READING CHECK: Drawing Inferences** In what ways did the Dutch gain access to trading opportunities that other countries had missed?

CONNECTING TO

Art

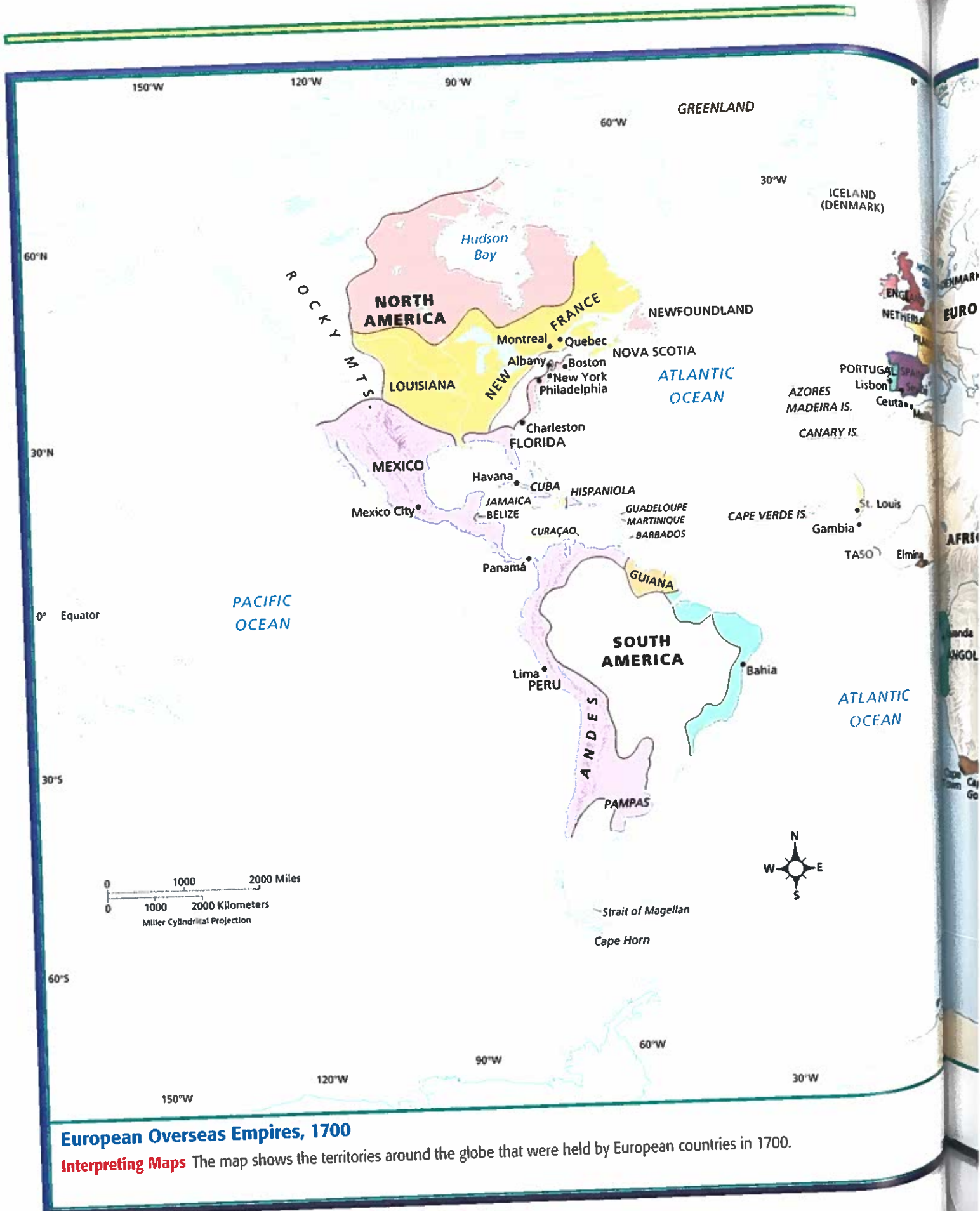
Painting: *Young Woman with Water Jug*

In the 1600s the economy of the Netherlands prospered. Dutch merchants grew rich enough to buy handsome silks and linens for their wives. Some commissioned artists to paint for them. Dutch artists such as Rembrandt and Vermeer flourished. This painting, one of Vermeer's finest works, gives us a close look at Dutch daily life.

Understanding the Arts

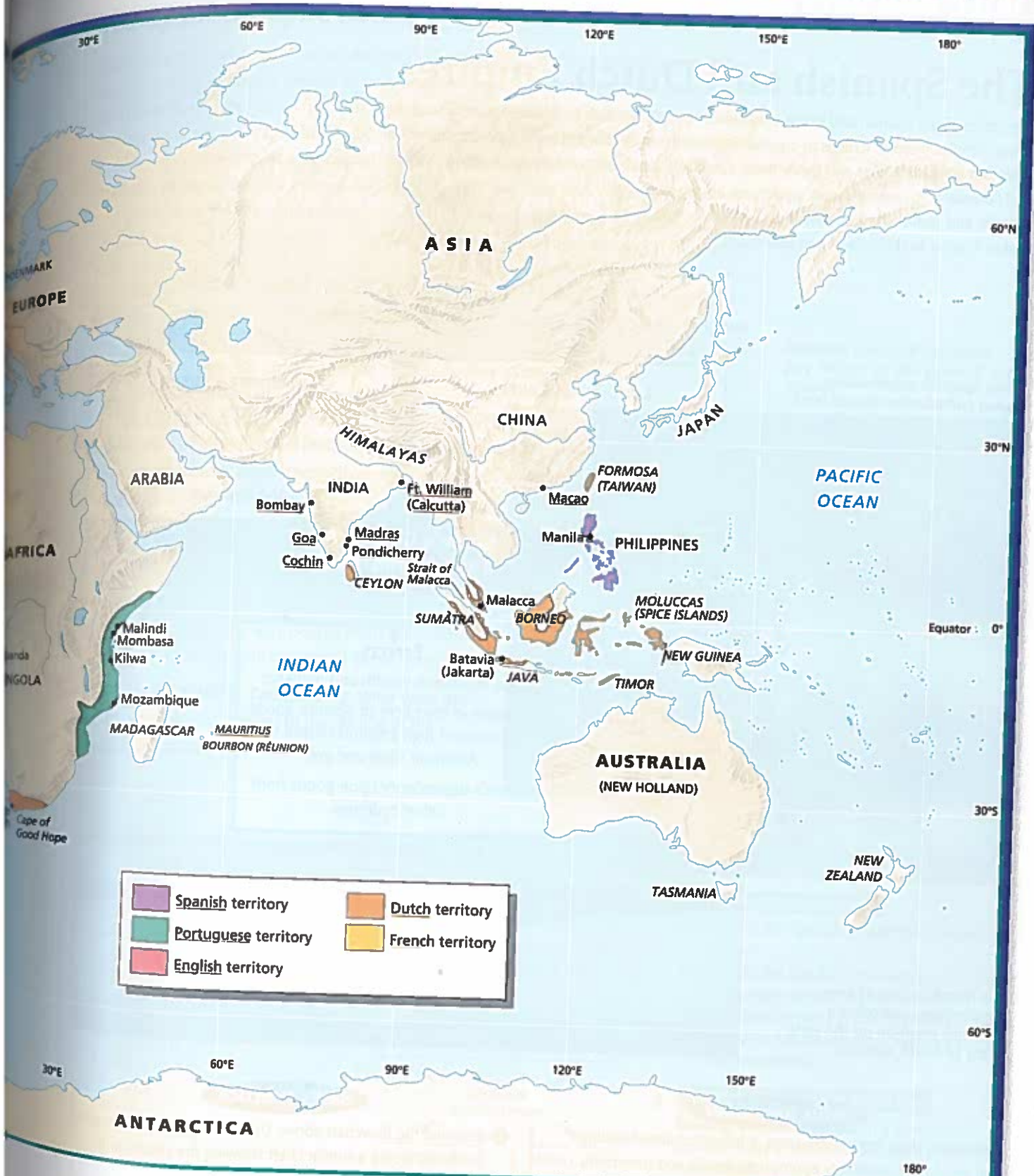
What does this painting tell us about life in the Netherlands in the 1600s?





European Overseas Empires, 1700

Interpreting Maps The map shows the territories around the globe that were held by European countries in 1700.



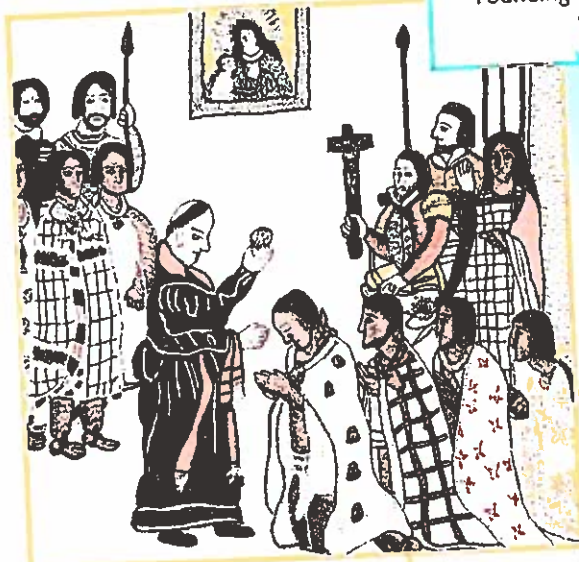
Skills Assessment: The World in Spatial Terms What patterns can you identify regarding the distribution of European colonies in 1700?

The Spanish and Dutch Empires

The stories of the Spanish and Dutch empires can be complicated. Sometimes in order to understand complex material it helps to organize information in the form of a chart. Charts can include such formats as time lines and family trees, as well as classification charts, organization charts, and flowcharts. In making charts, readers are able to organize, simplify, and summarize information in a way that often makes it easier to understand and remember.

Causes and Effects of Spain's Age of Empire

Some Spanish missionaries hoped colonization would lead to the conversion of Native Americans to Catholicism.



LONG-TERM CAUSES
 Columbus's landing in the Caribbean
 Spanish exploration and conquest
 Founding of colonies in North and South America

IMMEDIATE CAUSES
 Conquest of the Aztec by Cortés, 1521
 Conquest of the Inca by Pizarro, 1533
 Spanish treasure fleets from the Americas

Spain's Golden Age
 1492 to mid-1600s

EFFECTS
 Rise in Spanish wealth and influence
 Increase in the prices of Spanish goods because of high inflation caused by American silver and gold
 Spain's dependency upon goods from other countries



The Dutch colony of New Amsterdam controlled a strategic position on the east coast of North America.

Skills Reminder

To create a chart from written text, it helps to follow headings and word cues to identify appropriate details and determine what facts support the chart. Make sure you present the information in a clear and easy-to-follow manner using such visual aids as heading, lines, or arrows. The final product should help to visually summarize and order information.

Skills Practice

- 1 Examine the flowchart above. Using the information in your textbook, create a similar chart showing the causes and effects of the Dutch Empire.
- 2 What were some of the differences in the Spanish and Dutch empires? What other questions do the charts raise?

The Spanish Empire Declines

Many factors played a part in the decline of the Spanish Empire. A growing population meant that more people needed to be fed, clothed, and housed. At the same time, gold and silver flowed into Spain from the colonies. Shortages and this increase in the amount of money drove prices up in Spain. Because it cost more to produce goods in Spain than in any other country, demand for Spanish-made products declined. This loss of markets, in turn, led to a general decline in Spain's industry and commercial activity.

A capable middle class might have helped Spanish industries to develop. Many Spanish nobles, however, preferred military service. Others chose careers in the church rather than in secular life. In addition, the Spanish crown expelled first the Jews and then the Moriscos—Moorish converts to Christianity—from Spain. Unfortunately for the Spanish economy, many of those expelled were skilled bankers, businesspeople and commercial leaders, and artisans. The persecution of the Jews and the Moriscos conducted by the Spanish crown and the church further weakened Spain's economy and drained talent and capability from the country.

Much of the empire's wealth simply passed through Spain and was used to buy goods from other countries. With the gold and silver they received for goods sold in Spain, countries such as France, England, and the Netherlands grew strong. They developed their own industries at Spain's expense.

At home, people became discontented with high taxes and inflation. Along with agricultural failures, this discontent drove many people from their homes. Eventually, many people emigrated from Spain.

Moorish rulers of Granada pay tribute to the Spanish royal couple.

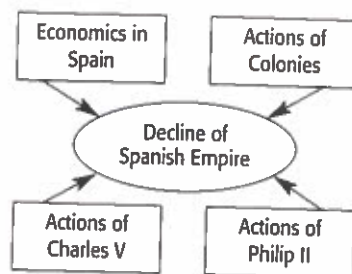


- ✓ **READING CHECK: Categorizing** What were the major problems that led to the decline of the Spanish Empire?

SECTION 4 REVIEW

- Define** and explain the significance:
viceroy
guerrilla warfare
- Identify** and explain the significance:
Ponce de León
Hernán Cortés
Moctezuma II
Francisco Pizarro
Charles V
Philip II
William of Orange

- Identifying Cause and Effect**
Copy the web diagram below. Fill in each box to show how it contributed to the decline of the Spanish Empire.



- Finding the Main Idea**
 - How did the Spanish expand their colonial empire?
 - How did the Dutch colonial empire differ from the Spanish colonial empire?
 - What developments limited the ability of the Spanish to fully benefit from their vast and rich overseas empire?

5. Writing and Critical Thinking

Making Generalizations In a diary entry, describe a day in the life of a Spanish colonist in the Americas.

Consider:

- ways in which things would have been better or worse than in Spain
- what was involved in meeting and dealing with native peoples



Homework Practice Online

keyword: SH3 HP7



Review

Creating a Time Line

Copy the time line below onto a sheet of paper. Complete the time line by filling in the events, individuals, and dates from the chapter that you think were significant. Pick three events and explain why you think they were significant.



Writing a Summary

Using standard grammar, spelling, sentence structure, and punctuation, write an overview of the events in the chapter.

Identifying People and Ideas

Identify the following terms or individuals and explain their significance:

- | | |
|------------------------|-------------------------|
| 1. heliocentric theory | 6. Christopher Columbus |
| 2. Galileo Galilei | 7. triangular trade |
| 3. mercantilism | 8. Middle Passage |
| 4. Vasco da Gama | 9. Hernán Cortés |
| 5. tariffs | 10. Philip II |

Understanding Main Ideas

SECTION 1 (pp. 138-139)

The Scientific Revolution

- How did the study of nature change during the Scientific Revolution?
- What were some of the important scientific discoveries made during this period?

SECTION 2 (pp. 136-137)

The Foundations of European Exploration

- What kinds of changes in science and economics made European exploration possible?
- What role did mercantilism play in the way European countries dealt with their colonies?

SECTION 3 (pp. 200-202)

Voyages of Portugal and Spain

- What new knowledge did early Portuguese explorers provide that increased successful exploration?
- How did the voyages of Christopher Columbus influence the world?
- What were some of the factors leading to the Atlantic slave trade?

SECTION 4 (pp. 203-211)

The Spanish and Dutch Empires

- What led to the successful rise of Dutch exploration in the 1600s?
- What factors led to the decline of the Spanish Empire?

Reviewing Themes

- Science, Technology & Society** How did the era known as the Scientific Revolution lead to developments in other areas of society?
- Economics** How did the theory of mercantilism influence nations' decisions to explore and colonize?
- Global Relations** What determined the kinds of relationships that European explorers formed with conquered peoples?

Thinking Critically

- Comparing and Contrasting** Compare and contrast the ways in which the Portuguese, Spanish, and Dutch went about exploration and colonization.
- Supporting a Point of View** Which European nation engaged in exploration, trade, and colonization during the age of exploration had the greatest effect on other peoples? Explain your answer.
- Sequencing** Trace the events leading to the rise and decline of the Spanish Empire.

Writing About History

Categorizing Many factors influenced European exploration. In turn, exploration had many effects on both Europeans and non-Europeans. Fill in the following chart, listing the political, economic, cultural, and technological influences of European expansion on both Europeans and non-Europeans.

Effects of European Conquest		
	Europeans	Non-Europeans
Political		
Economic		
Cultural		
Technological		

Building Social Studies Skills

Interpreting Maps

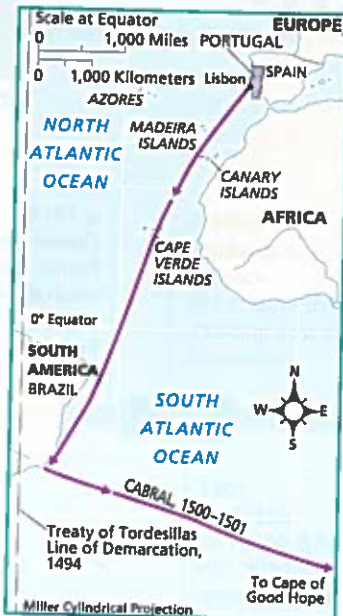
Study the map below. Then use the information to answer the questions that follow.

Cabral's Route, April 1500

1. Which of the following correctly describes Cabral's course from Lisbon to the Cape of Good Hope?

- First south, then west
- First southwest, then southeast
- First northwest, then northeast
- First southeast, then southwest

2. Cabral did not intend to follow the course he did. He was blown off course. Why was this course change significant? Give specific reasons.



Problem Solving

Read the following quote written in 1517 by a Spanish priest in Mexico. Then answer the questions.

"As the Indians saw that the Spaniards did not attack them . . . they came . . . unarmed with kindly faces. . . They asked the captain by signs what he wanted to which he replied 'water to drink.' The Indians showed him a round walled-up well of good water . . . where [the Spaniards] took all the water needful for the ships. . . When day broke, all the Indians came out of their town armed with bows and arrows, shields and lances . . . to tell [the Spaniards] to go to their ships. The Spaniards obeyed their order. . ."

- Which of the following is the best explanation of why the Indians changed their behavior toward the Spanish?
 - The Indians thought the Spanish had stayed too long.
 - The Indians had only pretended to be kind.
 - Water was scarce and the Spanish had taken too much.
 - The Indians realized the Spanish were after their gold.
- Why did you choose the statement you did in question 3? Explain your reasoning, using a problem-solving process.

Alternative Assessment

Building Your Portfolio

Economics

The idea of a favorable balance of trade developed during the 1500s and the 1600s. Today, most nations still take steps to keep their imports and exports balanced. Using your textbook and other sources, find statistics and other information about economic processes that countries such as the United States, Great Britain, and Japan use to maintain favorable trade balances. Summarize your findings in a poster.

Link to TODAY

internet connect

Internet Activity: go.hrw.com

KEYWORD: SH3 WH7

Choose a topic on Exploration and Expansion to:

- research the Scientific Revolution and create a database of scientists, dates, and contributions.
- learn more about an explorer described in this chapter.
- explain the political, economic, and cultural impact of Spanish expansion in Mesoamerica and Andean South America.