

The Scientific Revolution and the Enlightenment (1500–1780)

The Scientific Revolution of the sixteenth and seventeenth centuries changed the way educated people looked at the world. It evolved from the Renaissance's stress on the importance of individuals to understand the world around them, and was the key factor that moved Europe from a worldview that was primarily religious to one that was primarily secular. Although a more secular society was likely not their goal, Luther's and Calvin's attacks against the authority of the pope provided a powerful example of how to challenge traditional authority. Their questioning attitudes produced an environment that encouraged the inquiry necessary for science to flourish.

Science in the Middle Ages was designed to help a person reach a better understanding of God and not the world. A medieval scientist would have found it inconceivable to examine the universe outside the realm of religion. During the Renaissance from the 1300s until the early 1500s, science was still considered a branch of religion, and scientific thought held that the earth was a stationary object at the center of the universe. Beginning with Copernicus, however, who taught that the earth revolved around the sun, Europeans began to reject Aristotelian-medieval scientific thought. Copernicus, Galileo, and Newton developed a new concept of a universe based on natural laws, not a mysterious God.

The new scientific approach promoted critical thinking. Nothing was to be accepted on faith. Belief in miracles and superstition was replaced by reliance on reason and the idea that rational thinking would uncover a plan governing the universe. This critical analysis of everything in society from religion to politics and the optimism that the human mind could find the solution to everything was known as the **Enlightenment**. Sixteenth- and seventeenth-century intellectuals, writers, and philosophers were optimistic that they could change society for the better. Writers, such as David Hume and Immanuel Kant, were primarily interested in teaching people how to think critically about everything, while philosophers, such as Voltaire, Montesquieu, Rousseau, Smith, and Diderot, were not revolutionaries but reformers who criticized the existing social, political, and economic structures in order to improve them. They found their hope in **Enlightened Despots**, or monarchs, the most important of whom were Frederick the Great of Prussia, Joseph II of Austria, and Catherine the Great of Russia, who would improve the lives of their subjects and encourage the pursuit of knowledge. However, societal reform was not accomplished by these despots, but came instead through the revolutionary forces that were instrumental to the French Revolution at the end of the eighteenth century.

The Scientific Revolution

To understand how the Scientific Revolution dramatically altered the way society viewed the world and the role of man in society, you must realize that the medieval worldview was ruled by the ideas of the third-century B.C.E. Greek philosopher, Aristotle, the second-century B.C.E. Egyptian philosopher, Ptolemy, and theologians. Their ideas had been recovered during the Middle Ages as Western Europe began to trade with the East. Medieval theologians, such as St. Thomas Aquinas, brought these writings into harmony with Christian doctrines. The philosophy of Aquinas was known as **scholasticism**. The Aristotelian view of the world supported the Ptolemaic view of a motionless earth at the center of the universe, and this world was made up of four elements: earth, air, fire, and water. This view offered a common-sense approach for Christians, who put human beings at the center of the universe. Although widely accepted during the Renaissance, the traditional view of science began to be questioned by various rulers, such as Florence's Medici family, who supported the investigations of Galileo.

The views of Aristotle and Ptolemy were shattered by **Nicholas Copernicus** (1473–1543). In his book *On the Revolutions of the Heavenly Spheres* (not published until after his death in 1543 because he feared the ridicule of fellow astronomers), Copernicus suggested that the sun was the center of the universe and that the earth and planets revolved in circular orbits. This **Heliocentric Theory** that the sun—and not the earth—was the center of the universe contradicted contemporary scientific thought and challenged the traditional teachings of hundreds of years. Copernicus' book had enormous scientific and religious consequences. By characterizing the earth as just another planet, he destroyed the impression that the earthly world was different from the heavenly world.

Religious leaders understood the significance of Copernicus' findings all too well; of him, Luther is reported to have said, "The fool wants to turn the world of astronomy upside down." Calvin, like Luther, also condemned Copernicus. The Catholic Church, however, reacted slowly and did not declare Copernicus' theory false until 1616, continuing to hold to the view that the earth was the center of the universe. The slow reaction of the Church reflected the slow acceptance of Copernicus' theory. Other events created doubts about traditional astronomic ideas as well, such as the discovery of a new star in 1572 and the appearance of a comet in 1577. These events began to dramatically alter the acceptance of the earth as a motionless object.

Copernicus' ideas influenced others in the field of science. A Danish astronomer, **Tycho Brahe** (1546–1601), set the stage for the study of modern astronomy by building an observatory and collecting data for over twenty years on the location of the stars and planets. His greatest contribution was this collection of data, yet his limited knowledge of mathematics prevented Brahe from making much sense out of the data.

Johannes Kepler (1571–1630), a German astronomer and assistant to Brahe, used his data to support Brahe's data and Copernicus' idea that the planets move around the sun in elliptical, not circular, orbits. Kepler's three laws of planetary motion were based on mathematical relationships and accurately predicted the movements of planets in a sun-centered universe. His work demolished the old systems of Aristotle and Ptolemy.

While Kepler was examining planetary motion, **Galileo Galilei**, a Florentinian (1564–1642), continued the attack on traditional views of science. Using observation rather than speculation to help him formulate ideas—such as his laws on the motion of falling bodies—Galileo established **experimentation**, the cornerstone of modern science. He applied experimental methods to astronomy by using the newly invented telescope. Using this instrument, he discovered the four moons of Jupiter, and that the moon had a mountainous surface, much like the earth. His discovery destroyed an earlier notion that planets were crystal spheres (the earth was the center of the universe and around it moved separate, transparent crystal spheres: the moon, the sun, five planets, and fixed stars), and challenged the traditional belief in the unique relationship between the earth and the moon. Galileo's evidence reinforced and confirmed the theory of Copernicus. Following the publication of his book, *Dialogue Concerning the Two Chief World Systems* (1632), which openly criticized the works of Aristotle and Ptolemy, Galileo was arrested, imprisoned, tried for heresy by the Papal Inquisition, and forced to publicly recant his views. In modern times, Galileo's trial has come to symbolize the conflict between religious beliefs and scientific knowledge.

The greatest figure of the Scientific Revolution was **Sir Isaac Newton** (1642–1727), an Englishman. In his book *Principia Mathematica* (1687), he integrated the ideas of Copernicus, Kepler, and Galileo into one system of mathematical laws to explain the orderly manner in which the planets revolved around the sun. The key feature of his thesis was the **law of universal gravitation**. According to this law, every body in the universe attracts every other body in precise mathematical relationships. Newton's law mathematically proved that the sun, moon, earth, planets, and all other bodies moved in accordance with the same basic force of gravitation. Such proof showed that the universe operated by rules that could be explained through mathematics and that a religious interpretation was not the sole means of comprehending the forces of nature.

The Scientific Revolution also led to a better way of obtaining knowledge. Two important philosophers were **Francis Bacon** (1561–1626) and **René Descartes** (1596–1650). Both were responsible for key aspects in the improvement of scientific methodology. Francis Bacon was an English politician and writer, who advocated that new knowledge had to be acquired through an **inductive**, or experimental, reasoning process (using specific examples to prove or draw a conclusion from a general point) called **empiricism**. Bacon rejected the medieval view of knowledge based on tradition, and believed instead that it was necessary to collect data, observe, and draw conclusions. This approach is the foundation of the scientific method.

René Descartes was a French mathematician and philosopher. Like Bacon, he scorned the traditional science and broke with the past by writing the *Discourse on the Method* (1637) in French rather than Latin, which had been the intellectual language of the Middle Ages. Unlike Bacon, Descartes stressed deductive reasoning. He believed that it was necessary to doubt everything that could be doubted. His famous quote—"Cogito ergo sum" ("I think therefore I am")—proved his belief in his own existence and nothing else. He believed that, as in geometry, it is necessary to use deductive reasoning and logic to determine scientific laws governing things. Descartes' view of the world (now called **Cartesian Dualism**) reduced natural law to matter and the mind, or the physical and the

spiritual. Bacon's inductive experimentalism and Descartes' deductive, mathematical, and logical thinking combined into the scientific method, which began taking hold of society in the late seventeenth century.

Some consequences of the Scientific Revolution include the following:

- A scientific community emerged whose primary goal was the expansion of knowledge. Learned societies like the French Academy of Sciences and the Royal Society of London were founded to promote the growth of scientific ideas among different countries.
- A modern scientific method arose that was both theoretical and experimental, and its practitioners refused to base their conclusions on traditional and established sources or ancient texts. The belief that human reason was the vehicle that would unlock the secrets of the universe ended the dominance of religion on society. The Age of Reason in the eighteenth century, with its faith in the rational and skeptical mind, would provide the background for the Enlightenment.

There was little connection, however, between science and technology. The Scientific Revolution had little effect on daily life before the nineteenth century. The revolution in science in the sixteenth and seventeenth centuries was primarily an intellectual one.

The Enlightenment

The Scientific Revolution was the single most important event that fostered the creation of a new intellectual movement in the late seventeenth and early eighteenth centuries called the **Enlightenment**, or, sometimes, the **Age of Reason**—a time period defining the generation that came of age between the publication of Newton's ideas in 1687 and the death of Louis XIV in 1715. The Enlightenment's core tenet was that natural law could be used to examine and understand all aspects of society.

The Enlightenment's leaders believed that by using scientific methods, they could explain the laws of society and human nature. It was an optimistic creed—armed with the proper methods of discovering the laws of human nature, enlightened thinkers were convinced they could solve all problems. They believed it was possible to create a better society and people and that progress was inevitable. They were free from the restraints of religion and focused instead on improving economic and social conditions. Consequently, the movement was profoundly secular.

Some important enlightened thinkers include the following:

- **Thomas Hobbes** (1588–1679). An English writer, Hobbes was influenced by the experimental attitude toward nature and decided to apply it to politics. Writing at the time of the English Civil War, Hobbes was forced to flee London to Paris in 1648 because he feared for his life. In 1651 he wrote *Leviathan*, a title he chose after the sea monster from the Book of Job. Hobbes believed that humans in their original state of nature were unhappy. In the state of nature, Hobbes asserted that man was quarrelsome, turbulent, and forever locked in a war against all. He supported an absolute monarch (although he did not support the Divine Right Theory of government) because he thought that man needed protection from destroying himself and an all-powerful ruler was the best source of such protection. Thus, man enters a social contract to surrender his freedom to an absolute ruler, in order to maintain law and order. The subject could never rebel and the monarchs had the right to put down any rebellion by any means possible.
Hobbes's ideas never won great popularity. In England, **Royal Absolutism**, a cause he supported, never gained acceptance. He was overshadowed by his contemporary John Locke.
- **John Locke** (1632–1704). Like Hobbes, Locke was interested in the world of science. His book, *Two Treatises of Government* (1690), was written as a philosophical justification for the Glorious Revolution, which refers to the bloodless overthrow of James II in 1689 and the end of absolutism in England. This work translated his belief in natural law into a theory of government that became known as **The Social Contract**. Locke argued that man is born basically good and has certain natural rights of life, liberty, and property. To protect these natural rights, people enter into a social contract to create a government with

limited powers. Locke believed that if a government did not protect these rights or exceeded its authority, the people have a right to revolt, if necessary. Locke's ideas of **consent of the governed**, a social contract, and the right of revolution influenced the writing of the United States' Declaration of Independence and the Constitution of the United States. Locke's ideas also laid the foundation for the criticisms of absolute government in France.

It was in France that the Enlightenment reached its highest development. Some of the reasons for this were the following:

- French was the international language of the educated class.
- In addition to being the wealthiest and most populous country, France was the cultural center of Europe.
- Although critical books were often banned by the French censors and their authors jailed or exiled, the writers were not tortured or executed for their statements. Thus, the French intellectuals battled powerful forces but did not face the overwhelming difficulties of writers in Eastern or Central Europe.

The French used the term **philosophe** (*philosopher*) to describe the thinkers of the age. The philosophes were committed to bringing new thought to all of Europe. They wanted to educate the economic and social elite but not necessarily the masses. Philosophes, who were not allowed to criticize either the Church or state openly, circulated their work in the form of books, plays, novels, dictionaries, and encyclopedias, using satire and double meaning to spread their messages and thus preventing their writings from being burned or banned. **Salons**, gatherings organized by wealthy women held in large drawing rooms in their homes, were also used to help philosophes avoid trouble with authorities. At these meetings, philosophes would gather to discuss politics, philosophy, and current issues. These discussions allowed the writers greater freedom to spread their words. Enlightened thinkers considered themselves part of an intellectual community. They shared their ideas through books, personal letters, and visits back and forth amongst themselves.

Some of the important French philosophes included the following:

- **Baron de Montesquieu** (1689–1755) was a French aristocrat who wanted to limit royal absolutism. In his book, *The Spirit of Laws* (1748), he urged that power be separated among three branches of government: executive, legislative, and judicial. Each branch would check the other branches, thus preventing despotism and preserving freedom. Montesquieu admired the British system of government and was critical of the absolutism of the French monarchy because all power was concentrated in one person. His theory of the separation of powers greatly influenced the framers of the United States Constitution.
- **Voltaire** (1694–1778): Born François-Marie Arouet, Voltaire is considered to be the greatest of all the Enlightened philosophes. Educated by Jesuits, he challenged the authority of the Catholic Church. Although he believed in God, his God was a distant deistic God—a clockmaker who built an orderly universe and then let it operate under the laws of science. Voltaire hated religious intolerance, urged religious freedom, and thought that religion crushed the human spirit. In his book, *Candide*, he wrote against the evils of organized religion, and in his *Treatise on Toleration*, he argued for religious tolerance. Voltaire denounced organized religion because it exploited people's ignorance and superstitions. Deism was intended to construct a more natural religion based on reason and natural law. His most famous anti-religious statement was “*écrasez l'infâme*” (“crush the horrible thing”).

In 1717, he was imprisoned in the Bastille for eleven months, after which he was forced to live in exile for three years in Great Britain, a period of time that greatly influenced the rest of his life. Like Montesquieu, Voltaire came to admire Britain's system of government. He praised their limited monarchy, respect for civil liberties, and freedom of thought. He promoted freedom of thought and respect for all. Typical of his outlook is the statement attributed to him: “I disapprove of what you say, but I will defend to the death your right to say it.” Voltaire became a European celebrity who in 1743 lived in the court of Frederick the Great of Prussia, and became a supporter of Enlightened Despotism.

- **Jean-Jacques Rousseau** (1712–1778). Like other Enlightened writers, Rousseau was committed to individual freedom. However, he attacked rationalism and civilization, considering them to be destroying rather than liberating man. Instead, spontaneous feeling was to replace and complement the coldness of intellectualism. According to Rousseau, man was basically born good and needed protecting from the corrupting influences

of civilization. These ideas would later greatly influence the Romantic Movement of the nineteenth century, which rebelled against the culture of the Enlightenment.

Rousseau's book, *The Social Contract*, published in 1762, begins with the famous line, "All men are born free but everywhere they are in chains." He believed that as social inequalities develop, people enter into a social contract agreeing to surrender their individual rights to the community and the general will, or the will of the majority, in order to be free—thus creating a government as a necessary evil to carry out the general will. If the government fails, people have the right to replace it. Although Rousseau's concept of the general will appealed to democrats and nationalists after the French Revolution of 1789, it has also been used by dictators like Adolf Hitler to justify totalitarian rule by claiming that a dictator or one-party ruler speaks for the general will to which all citizens owe obedience.

In 1762, Rousseau also published *Émile*, a book that stirred controversy because of its attacks on civilization and its new theory of education. He criticized education that focused on the development of reason and logical thinking and advocated greater love, tenderness, and understanding towards children. Rousseau argued for more humane treatment of children and for children to develop naturally and spontaneously. Children had to explore nature as a way to raise their emotional awareness. *Émile* helped to change the educational and child-rearing practices in eighteenth-century Europe.

- **Denis Diderot** (1713–1784) published his writings and the ideas of many Enlightened philosophers in his *Encyclopedia* (1751). This 25-volume collection of political and social critiques, which included writers such as Voltaire and Montesquieu, attacked abuses of the French government, including religious intolerance and unjust taxation. The *Encyclopedia* was an example of the eighteenth-century belief that all knowledge could be organized in a systematic and scientific fashion. Diderot hoped that this information would help people to think and act rationally and critically.

The **physiocrats** were economic thinkers in eighteenth-century France who developed the first complete system of economics. Like the philosophes, the physiocrats looked for natural laws to define a rational economic system. However, the physiocrats, unlike the philosophes, were close to the government as advisors. Some famous physiocrats include the following:

- **François Quesnay** (1694–1774) was the French leader of the physiocrats and a physician to Louis XV. He supported a hands-off, or *laissez-faire*, approach to the government's involvement in the economy.
- **Adam Smith** (1727–1790) was a Scottish economist. While not an actual physiocrat member, Smith had met with the physiocrats on the continent and adopted and refined many of their ideas. In his *Wealth of Nations*, published in 1776, the same year as the United States' Declaration of Independence, Smith argued against strict government control of mercantilism. He outlined the nucleus of the economic system that came to be known as **capitalism**. Smith believed in a *laissez-faire* approach to business. He argued that individuals should be left to pursue their own economic gain. The role of the state is to act as a policeman who intervenes only when necessary. Smith thought that the invisible hand of supply, demand, and competition would ensure that people would act in the best interest of everyone.

Women and the Enlightenment

French women helped spread the Enlightenment through their salons where the philosophes mixed with the most brilliant thinkers of Europe. Women helped to promote the careers of the philosophes. As Louis XIV grew closer to death, the Court of Versailles had begun to lose its luster. Thus, many wealthy aristocratic ladies began to host small gatherings in their Paris townhouses. Women like **Marie-Thérèse Geoffrin** (1699–1777) and **Claudine Tencin** (1682–1749) gave the philosophes access to useful social and political contacts. Madame Geoffrin, who hosted two dinners each week, became so well known that she regularly corresponded with the king of Sweden and Catherine the Great of Russia.

The women of the Enlightenment were also able to help the philosophes avoid trouble with authorities and even secured pensions for some of them. The **Marquise de Pompadour** (1721–1764), the mistress of Louis XV, played a role in preventing the censoring of the *Encyclopedia Britannica* and blocked the circulation of work attacking the philosophes. However, the philosophes were not on the whole strong supporters of women's rights. Although many criticized the overly religious education of women, they did not advocate any radical changes in the social

conditions of women. Although Montesquieu believed that women were not inferior to men and should have a wider role in society, he supported a traditional view of family and marriage and expected men to dominate these institutions. The writings of the authors in the *Encyclopedia* were also unfavorable to women. The editors almost exclusively recruited men and saw no need to include articles about women. The writers may have disagreed about the social equality of women, but in general, women were discussed primarily in traditional roles (daughters, wives, and mothers) and motherhood was their most important occupation. Rousseau, who was a political radical, urged a traditional role for women. In his novel, *Émile*, he claimed there should be separate spheres for men and women. Women were assigned the domestic sphere because of their physiological limitations. Rousseau excluded women from political life and felt they should not be granted equal education with men. Inspired partially by the French Revolution, **Mary Wollstonecraft** (1759–1797), who wrote *A Vindication of the Rights of Woman* in 1792, criticized Rousseau for seeking to limit the hopes of women. Wollstonecraft was demanding the basic rights and liberties that the Enlightened male writers had been advocating throughout the century.

Enlightened Despotism

Many philosophes believed that Enlightened reform would come by way of Enlightened monarchs. **Enlightened Despots** were rulers who tried to justify their absolute rule by claiming to rule in the people's interest by making good laws, promoting human happiness, and improving society. Encouraged and instructed by philosophes like Voltaire who did not trust the masses and believed that change had to come from above and not from the people, the monarchs of Prussia, Russia, and Austria were able to mesh their need for a more effective state with the need for economic, educational, and social reform. The most notable Enlightened Despots of these countries include the following:

- **Frederick the Great** (b. 1712, ruled 1740–1786) of Prussia. As King of Prussia, Frederick invited Voltaire to his court and sought his advice on how to be an Enlightened ruler. He did away with the torture of accused criminals, improved the educational system, allowed his subjects to believe as they wished in religion, and promoted industry, agriculture, and commerce. He was an efficient statesman and made Prussia into the best-ruled nation in Europe. **Immanuel Kant** (1724–1804) of Germany, the greatest German philosopher of his age, suggested that Frederick was an Enlightened ruler because he allowed freedom of the press and gave Catholics and Jews permission to settle in Prussia.
- **Peter the Great** (b. 1672, ruled 1682–1725) of Russia was a contemporary of Louis XIV of France. Technically, he might not be considered an Enlightened Despot because he never tried to justify his absolutism by claiming to rule in the people's interest. Nevertheless, he was responsible for trying to make Russia a part of Europe after centuries of domination by the Mongols. Peter's efforts to westernize Russia included introducing his country to Western ideas in science, education, military training, and industry. He ordered his male subjects to shave their traditional long beards and discard their oriental garments. He also extended control over the Russian Byzantine Church. Western artisans were invited to the country and, with their workers, helped to build a new seaport on the Gulf of Finland called St. Petersburg, his "window to the West." This seaport provided a trade route with Western Europe.
- **Catherine the Great** (b. 1729, ruled 1762–1796) of Russia. The German wife of the Russian czar, Peter III, Catherine deposed her husband and ruled as an autocrat. She read the works of Montesquieu and Voltaire and imported Western culture to Russia. She also revised and codified Russian law, patronized the arts, created hospitals, and undertook other public welfare projects. The Pugachev serf uprising of 1773 led her to reverse her trend towards reform of serfdom and return to nobles the absolute control of their serfs.
- **Maria Theresa** (b. 1717, ruled 1740–1780) of Austria realized upon inheriting the throne that Austria was weak, and so she began a series of reforms. She established a national army, limited the power of the Catholic Church, revised the tax system and the bureaucracy, and reduced the power of the lord over the serfs. She also improved the educational system.
- **Joseph II** (b. 1741, ruled 1780–1790) of Austria furthered the reforms of his mother, Maria Theresa. He abolished serfdom and introduced a single tax for everyone, a physiocratic idea. He granted religious tolerance to Calvinists and Lutherans, and eliminated many of the restrictions on Jews. Joseph abolished capital punishment, reformed the educational and judicial system, and established hospitals. After his death, his brother **Leopold II** (b. 1747, ruled 1790–1792) was forced to back away from these reforms as a way to quell a series of peasant and aristocratic revolts.

Chronology of the Scientific Revolution and the Enlightenment

1543	Posthumous publication of <i>On the Revolution of the Heavenly Spheres</i> by Copernicus.
1590	The first microscope is made by Zacharias.
1605	Publication of <i>The Advancement of Learning</i> by Sir Francis Bacon.
1608	The telescope is invented.
1609	Publication of <i>On the Motion of Mars</i> by Johannes Kepler.
1616	The Catholic Church bans Copernicus' ideas.
1628	Publication of William Harvey's theory of blood circulation.
1632	Publication of <i>Dialogue Concerning the Two Chief World Systems</i> by Galileo.
1633	Galileo is imprisoned for heresy.
1637	Publication of René Descartes' <i>Discourse on Method</i> .
1642–1646	The Civil War in England.
1642	The birth of Isaac Newton.
1651	Thomas Hobbes' <i>Leviathan</i> is published.
1655	Evangelista Torricelli constructs the first mercury barometer.
1682	Edmond Halley observes a "new" comet.
1687	Publication of Isaac Newton's <i>Principia</i> .
1690	John Locke publishes <i>Two Treatises on Government</i> .
1694	François Arouet (Voltaire) is born.
1712	Jean-Jacques Rousseau is born.
1734	Voltaire publishes <i>Letters on the English</i> .
1739–40	David Hume publishes <i>A Treatise of Human Nature</i> .
1743	Antoine Lavoisier, "father of modern chemistry," is born.
1748	Baron de Montesquieu publishes <i>The Spirit of Laws</i> .
1751	Denis Diderot publishes the first volume of the <i>Encyclopedia</i> .
1756	Wolfgang Amadeus Mozart, composer, is born in Austria.
1759	Voltaire publishes <i>Candide</i> .
1762	Catherine the Great begins her rule in Russia.
1768–1771	<i>The Encyclopedia Britannica</i> is published.
1776	America's Declaration of Independence is created; Adam Smith publishes <i>The Wealth of Nations</i> .

Sample Multiple-Choice Questions

- During the Scientific Revolution and the Enlightenment, the works of many scientists and philosophers were similar in that they
 - relied heavily on the idea of medieval thinkers.
 - favored an absolute monarchy as a way of improving economic conditions.
 - received support from the Catholic Church.
 - supported the Divine Right Theory of government.
 - examined natural laws governing the universe.
- Which statement was a belief of many writers of the Enlightenment?
 - The wealthy class should govern society.
 - Democracy is the best form of government.
 - Kings are responsible only to God.
 - Ideas can be proven by reason.
 - Traditional values are important.
- Which of the following European rulers cannot be considered an Enlightened monarch or despot?
 - Catherine the Great
 - Maria Theresa of Austria
 - Joseph II
 - Frederick the Great
 - Elizabeth I
- John Locke and Jean-Jacques Rousseau would be most likely to support
 - a return to feudalism in Europe.
 - a government ruled by a Divine Right monarchy.
 - a society ruled by the Church.
 - the right of citizens to decide the best form of government.
 - a government ruled by Enlightened Despots.
- Which of these men proposed the Heliocentric Theory of the universe?
 - Aristotle
 - Descartes
 - Copernicus
 - Kepler
 - Ptolemy
- "In every government, there are three sorts of power . . . when the legislative and executive are united in the same person or in the same body of magistrates, there can be no liberty because . . . the same monarch or senate . . . (may) enact tyrannical laws."

The author of this passage was

 - Montesquieu
 - Bossuet
 - Voltaire
 - Hobbes
 - Louis XIV
- Voltaire's statement, "*écrasez l'infâme*" ("crush the horrible thing"), refers to
 - the government of Louis XIV.
 - the Catholic Church.
 - the military.
 - the middle class.
 - the poor.
- In what way did women in the Enlightenment play an important role?
 - They wrote books supporting the ideals of the Enlightenment.
 - They acted as representatives of the royal families in Europe.
 - They spread the ideals of the Enlightenment in their salons.
 - They were supported by men in their goal for equal rights.
 - They were encouraged by the rising middle class to play a greater role in society.

9. "Every individual generally neither intends to promote the public interest, nor knows how much he is promoting it. . . . He is . . . led by an invisible hand to promote an end, which was no part of his intention."

This passage reflects the ideas of

- A. Adam Smith.
- B. Thomas Hobbes.
- C. Baron Montesquieu.
- D. John Locke.
- E. Jean-Jacques Rousseau.

10. The phrase, "*Cogito ergo sum*" ("I think, therefore I am"), has been attributed to

- A. Galileo Galilei.
- B. William Harvey.
- C. René Descartes.
- D. Johannes Kepler.
- E. Sir Francis Bacon.

Multiple-Choice Questions: Answers and Explanations

- 1. E.** Scientists of the sixteenth and seventeenth centuries believed that by using reason and observation, one could determine the natural laws that governed the universe. The English scientist Sir Isaac Newton, for instance, calculated the natural law of gravity to help explain the operation of the forces of nature. The philosophers of the eighteenth-century Enlightenment believed that science and reason could explain the laws of society, and in their writings tied together the ideas of the Scientific Revolution. Both scientists and philosophers of this period rejected the ideas of the Middle Ages, which they believed were based on superstition and not reason. They also challenged the authority of the Catholic Church, which had rejected the ideas of Copernicus and Galileo, and were critical of the Divine Right Theory. These scientists and philosophers instead supported absolute monarchs who promoted economic and social progress for the people.
- 2. D.** A belief of the Enlightenment was that ideas can be proven by reason. In the eighteenth century, French philosophes believed that one could use reason to understand the universe and rejected traditional ideas based on authority. They also believed that government existed not for the wealthy but was a social contract between the people and the government. Most of the philosophes opposed democracy. According to Voltaire, the best form of government was monarchism or Enlightened Despotism. They also rejected the notion that the king was responsible only to God. These writers criticized traditional values that were based on superstition and blind obedience to the past.
- 3. E.** Elizabeth I (1558–1603), Queen of England, was born before the era of Enlightened Despotism. She preserved Protestantism in England and achieved world power for England. Catherine the Great of Russia, Maria Theresa of Austria, Joseph II of Austria, and Frederick the Great of Prussia were Enlightened Despots. They justified their absolutism by claiming to govern in the people’s interest, and sought to advance society by promoting social justice. Catherine the Great encouraged legal reforms; Maria Theresa created a system of compulsory education in every community; Joseph II wanted to make all persons equal before the law; and Frederick the Great promoted religious freedom.
- 4. D.** John Locke and Jean-Jacques Rousseau would be most likely to support the citizens’ right to decide the best form of government. Locke and Rousseau believed that people entered into social contracts to protect their basic rights and create a government; hence Enlightened Despotism was anathema to their way of thinking. According to Locke, if the government fails to live up to its obligations, people have a right to change it. Rousseau asserted that people make the laws and the rule of the majority is supreme. Both philosophers were widely influential: Locke’s ideas influenced the framers of the Constitution of the United States, while Rousseau has been hailed as a champion of democracy for advocating that political authority lies with the people. Neither of these writers supported a society governed by the Catholic Church; instead, they rejected feudalism and challenged the Church’s authority.
- 5. C.** Copernicus proposed the Heliocentric Theory of the universe, which stated that the earth revolved around the sun and that the sun was the center of the universe. Aristotle was a Greek philosopher who believed that a motionless earth was fixed at the center of the universe. Descartes was a French scientist and mathematician who today is considered the founder of analytic geometry. Kepler, a German astronomer and mathematician, determined that planets follow an elliptical, not a circular, path about the sun. Ptolemy was an Egyptian astronomer who placed the earth as a stationery object with the sun revolving around it.
- 6. A.** The author of this passage is Montesquieu, who argued in his work *The Spirit of Laws* that governmental power had to be separated among three branches—executive, legislative, and judicial, each checking the other—instead of permitting power to be concentrated in one person, the king. This type of government would prevent despotism. Bossuet and Louis XIV believed in a Divine Right Theory in which all power was bestowed on the king by God. Voltaire believed in Enlightened Despotism and was a member of the Court of Frederick the Great. Hobbes claimed that only an absolute ruler with unlimited power could restore order to society.

7. **B.** Voltaire's statement refers to the Catholic Church. Although educated by Jesuits, Voltaire was critical of the perceived bigotry and narrow-mindedness that he felt was at the core of all religious tradition. He was a Deist who believed that God created the universe and then allowed it to act according to scientific law. Concerning choices A, C, D, and E, Voltaire wrote *The Age of Louis XV* in 1745 and portrayed him as a dignified ruler. Voltaire did not write about the military but did praise the poor for their simple piety.
8. **C.** The salons or townhouses of wealthy women provided the meeting places for the philosophes to discuss their ideas and how these ideas could become a vehicle for correcting the abuses of society. These salons provided the philosophes with the opportunity to meet important political people. Through the efforts of these wealthy women, the ideals of the Enlightenment became known and they also protected many writers from censorship. The women of the Enlightenment did not write books about the Enlightenment nor did they act as representatives of the royal families. In France, Madame Pompadour protected Enlightenment writers from persecution by the royal family. Neither the male writers, like Rousseau, nor the rising middle class encouraged women to play a greater role in society.
9. **A.** This passage reflects the ideas of Adam Smith in *The Wealth of Nations* (1776). Smith's ideas embodied a policy called *laissez-faire*, which enabled the bourgeoisie to further their own economic interests, but also increased the national wealth. Smith argued that the "invisible hand" of free competition for one and for all disciplined the greed of selfish individuals and provided the most effective means of increasing the wealth of both rich and poor. Hobbes believed in absolute government. Montesquieu proposed that separation of powers provided the best form of government. Locke and Rousseau promoted the Social Contract theory of government in which the government was formed to protect the rights of the people.
10. **C.** René Descartes was the French scientist and mathematician who wrote *Discourse on Method*, in which he claimed that all experience is validated by observation of natural phenomena. Descartes stripped away his belief in everything except his own existence. The other choices are incorrect for the following reasons: Galileo Galilei's observation of the heavens confirmed Copernicus' theory; William Harvey was an English physician who demonstrated that blood circulated through the body; Johannes Kepler was a German astronomer whose observations showed that the planets followed an elliptical orbit around the sun; and Sir Francis Bacon popularized the scientific method of observation.