



GRADE 5 LOUISIANA SOCIAL STUDIES

# Renaissance and Reformation

Leeuwenhoek's Microscope



## Reader



John Calvin

Cathedral of Santa Maria del Fiore



Printing Press

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# Renaissance and Reformation

Reader





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ISBN: 979-8-88970-087-6





# Renaissance and Reformation

## Table of Contents

Chapter 1	<b>The Renaissance</b> .....	2
Chapter 2	<b>The Reformation</b> .....	16
Chapter 3	<b>The Scientific Revolution</b> .....	28
Glossary	.....	37



# Chapter 1

## The Renaissance

**A Rebirth of Learning** The period from 1300 to 1600 CE in Italy and 1450 to 1650 CE in northern Europe is called the Renaissance. The word *renaissance* means rebirth. It was a rebirth because people rediscovered ideas from long ago. Many of these ideas were from **classical** Greece and Rome. Europeans rediscovered old books and built new buildings like those from ancient times. They also became hugely interested in history—not only classical and European history but also that of other civilizations.

### Vocabulary

**classical**, adj. relating to the literature, art, architecture, or ideas of the ancient Greek and Roman world

### The Framing Question

What factors helped bring about the age known as the Renaissance?

By the end of the Renaissance, Europeans had access to large amounts of information from the ancient world. The rebirth of old ideas led to new ones, especially in the arts, philosophy, science and religion. European culture flourished as these new ideas took hold.





The Renaissance was a time of renewed interest in old ideas and development of new technologies.



## Before the Renaissance

Educated people in ancient Rome knew both Latin and Greek. The Romans respected Greek ideas about medicine, math, and philosophy. After Rome fell in 476 CE, many important texts were lost during the Middle Ages. Education also became less valued over time. People in western Europe didn't speak or read much Greek. In fact, very few people could read or write at all.

One institution that remained from the Roman Empire was the Catholic Church. Catholic monks preserved some Latin books in **monasteries**, especially Christian works. Still, a lot of knowledge was lost.

### Vocabulary

**monastery**, n. a building where a community of monks lives, worships, and works together

Over time, as European kingdoms became wealthier and more powerful, they increased contact with other societies, like those of Muslim Spain and Orthodox Constantinople. While Catholic monks in western Europe studied Latin, Muslims in places such as the Middle East and North Africa read, translated, and studied Greek texts. They even



Muslim scholars translated texts, including medical texts like this one, from Greek into Arabic.



improved on what the Greeks knew. Students in Islamic societies learned about medicine, math, and astronomy. Muslim scholars wrote books about science, medicine, philosophy, and law.

When Europeans visited places where Muslim scholars worked, such as Spain, they were impressed. And so European scholars began translating the works of Muslim scholars into Latin. They brought these translated texts back to Europe. As a result of this desire for education, centers of learning, called **universities**, were created in Europe. The number of students began to grow. At first, universities mostly taught **theology** and law. Students learned from Latin texts. They became interested in philosophy and religion. Some used their education to become lawyers or priests. This movement was called Scholasticism, which emphasized a style of reasoning that copied academic debate and appealed to the authority of classical philosophers like Aristotle. These schools were one way that the ideas of the Renaissance were shared. Universities became so important that rulers and governments wanted them in their own regions. Universities are still important centers of learning.

## Italian Cities

Italy was not one country at this time. Instead, it was made up of several small states, each with its own government and customs. Naples and Sicily were kingdoms in the south. The Papal States, ruled by the **pope**, were in the center. In the north were many small city-states. These city-states would often fight over land, but they also

### Vocabulary

**university**, n. a school where advanced learning is taught

**theology**, n. the study of religious faith, practice, and experience

**pope**, n. the head of the Roman Catholic Church

traded with one another. In general, the people of these states took pride in their cities. They built large buildings, churches, and marketplaces.

Italian cities such as Venice and Genoa became very rich during the Middle Ages, mostly from trade. People would take goods from Europe, such as English wool, and sell them in cities on the southern and eastern

Mediterranean Sea. They would then bring luxury items, such as spices and silk, back to Italy to sell all over Europe.

Venice was one of the wealthiest Italian cities in Europe. Venice is built on a group of islands connected by bridges. It is unique because it is surrounded by water. Because of the city's distinctive layout, it didn't need protective walls. Venice's leader was called the **doge**. The doge was elected from among the richest residents. Many residents of Venice were skilled at trading and controlled the ports in the eastern and southern Mediterranean Sea. They brought back luxury goods such as spices, silk, rugs, and ceramics to sell in Europe.

### Italian Kingdoms and City-States



Italy was divided into several kingdoms and city-states that competed for power.

#### Vocabulary

**doge**, n. the head of government of the city of Venice



Trading helped other Italian cities become rich, too. Florence became famous for its high-quality fabric made from English wool. People all over Europe bought this fabric. Many citizens in Florence belonged to a *guild*. Guilds were groups of skilled workers called *artisans* who shared a trade. They built important buildings and created art. Florence was also known for its international banking system, which used **credit**. It even had its own coin, called the *florin*. The government of Florence was different from other Italian cities. It was run by nine randomly chosen people called *priors*. Priors only served two months, so they never gained too much power.

### Vocabulary

**credit**, n. a system of buying now and paying later based on a person's honesty and ability to pay

Rome was another important Italian city. Rome was the home of the Catholic Church. Many Europeans came to Rome to pray or celebrate religious holidays. The leader of the Catholic Church, the pope, was also the bishop of Rome. The pope was extremely active in European politics. Between 1309 and 1377 CE, the pope and Church leaders moved to the city of Avignon in France. For a time, Rome became smaller and poorer. Eventually, a new pope moved back to Rome, but there was disagreement over who should become the next pope. This caused a split in the Church called the Great Western Schism, which lasted until 1417 CE. Eventually, a Church council agreed on a single pope.

## Humanism

Around 1300 CE, Italian lawyers and church officials were spending their free time reading and writing. They read Roman authors like Cicero and Seneca. One of Cicero's ideas that caught the attention



of Renaissance readers was *humanitas*, or human nature. People who believed these ideas were called *humanists*. Humanists celebrated the beauty and potential of human achievements, often emphasizing worldly accomplishments and individual potential. This focus on human achievements and the **secular** world could be seen as a departure from the Church's emphasis on spiritual matters and the afterlife.



Petrarch was an Italian scholar who spread humanist ideas through his writing.

One famous humanist was Francis Petrarch (1304–74 CE).

Petrarch collected ancient Roman texts. Inspired, he became a poet and writer. He also collected Greek texts, but these didn't become popular until after his lifetime.

In the late 1300s CE, as humanists gained access to Greek texts, they began to read and translate them. These included works by Homer, Sophocles, and others. They also studied ancient Hebrew texts. Scholars created new editions and translations of the Bible. Later humanists such as Erasmus (1466–1536 CE) built on the work of those who came before them. Erasmus was considered one of the greatest thinkers of his era.

### Vocabulary

**secular**, adj. not religious or faith based



Humanism spread throughout Europe in the sixteenth century. Its ideas began to impact fields such as science, art, and architecture.

## Renaissance Art and Architecture

With the growth and wealth of Italian cities came new art and architecture. Growing cities needed new walls, city halls, and churches. Other types of art and architecture developed out of new cultural ideas.

Wealthy people wanted their homes to look beautiful, too.

Humanists developed architectural styles based on the splendor and designs of ancient buildings. A book by an ancient builder named

Vitruvius was uncovered, and soon, architects began

designing buildings similar to the ones in ancient Rome. A Roman architect named Filippo Brunelleschi (1377–1446 CE) studied ancient Roman buildings. He used a Roman style to design the dome of Florence’s cathedral—the largest dome built at the time.

Renaissance artists used ancient ideas to develop their own styles. Painters wanted to create art that looked realistic and even three-dimensional. Artist Leon Battista Alberti (1404–72 CE) copied the



Brunelleschi designed the dome of the Cathedral of Santa Maria del Fiore based on ancient Roman architecture.



ancient Roman idea of linear **perspective**. Other artists used mathematical principles to make painted objects look closer or farther away. They also studied the human body in order to make people look more realistic and beautiful in their paintings. With these developments, artists gained more respect in society. People came to Florence from all over Europe to learn how to create art.

### Vocabulary

**perspective**, n. an art technique used to make something that is flat appear to have depth, in addition to height and width

## Florence Leads the Renaissance

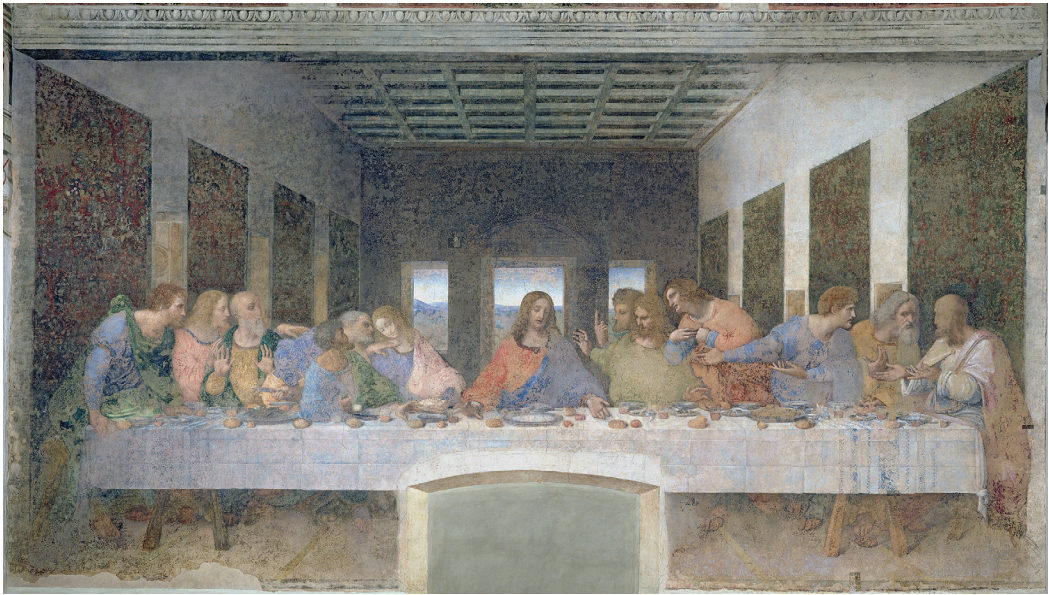
Florence was well known for its cloth industry. It became even more famous for banking. The Medici family was a very powerful family in Florence. They were bankers who became very wealthy. The Medici family used their money and influence to support artists, architects, and writers. They were called **patrons** because they paid for these people to create beautiful art. Most cities in northern Italy had patrons and artists, and the Medici family's patronage helped make the Italian Renaissance one of the most creative periods in history. Artists and writers in Florence had what they needed to invent, create, and craft. This creativity inspired others to think about themselves and the world in new and exciting ways.

### Vocabulary

**patron**, n. a person who gives money or other support to someone, such as an artist

Cosimo de' Medici (1389–1464 CE) became the richest and most powerful man in Florence. He believed learning was important, so he helped organize and fund a library for the city. He also funded the building of churches. This helped bring important Church





Leonardo da Vinci's *Last Supper* depicts Jesus's final meal with his followers before his crucifixion.

meetings to Florence. Cosimo was not the only Medici to become a patron. His son Piero and his grandson Lorenzo continued the family tradition. They supported great artists like Leonardo da Vinci (1452–1519 CE) and Michelangelo Buonarroti (1475–1564 CE).

Leonardo da Vinci became famous for his paintings, such as the *Mona Lisa* and the *Last Supper*. He also made detailed sketches of plants, people, and even flying machines. He was skilled in art, science, and engineering. He **exemplified** the Renaissance ideal of exposure to all domains of learning.

### Vocabulary

**exemplify**, v. to be an example of

Another important person from Florence was Niccolò Machiavelli (1469–1527 CE). Machiavelli was a writer, philosopher, and political thinker. He worked for the Florentine government and wrote about how government should work. His book *The Prince* explained his political ideas. The book argues that rulers should



be judged by how well they protect their people, not by how kind they are. Machiavelli believed rulers needed to be practical. They had to make tough decisions to protect their citizens, even if those decisions were unpopular. He argued that rulers needed to be both loved and feared to stay in power. Machiavelli's ideas about politics and government were groundbreaking and helped shape how people think about politics in the modern world.

## Rome in the Renaissance

In the mid-fifteenth century, Church officials returned to Rome after ruling from France for a period of time. They found many buildings, roads, and the pope's residence in disrepair. The Church moved the papal residence to St. Peter's Basilica. Built by the Roman emperor Constantine in the fourth century CE, the basilica needed to be restored. The Sistine Chapel was also built as a private chapel for the pope.

Many artists traveled to Rome to create art for the new churches. Some, including Michelangelo, painted the walls and ceilings of buildings with elaborate

**frescoes**. Michelangelo's fresco in the Sistine Chapel is considered one of the greatest works of art in Western civilization, featuring famous images like *The Creation of Adam*. The Sistine Chapel remains an important place of worship and culture today.

### Vocabulary

**fresco**, n. a wall painting made on wet plaster

## The Printing Press

Many of the ideas of the Renaissance originated in Italy. However, one of the most important technological developments came





Michelangelo painted frescoes on the ceiling of the Sistine Chapel depicting biblical events and the history of the Church.

from Germany. Johannes Gutenberg (d. 1468 CE) was a goldsmith who created a movable-type printing press in the 1440s CE. This printing press involved three technologies. The first was the press itself, already used by Romans to compress grapes and olives to make wine and oil. The second was paper, a more recent invention from East Asia that arrived in Europe through Muslims in Spain. The final technology was movable metal letters, called type.



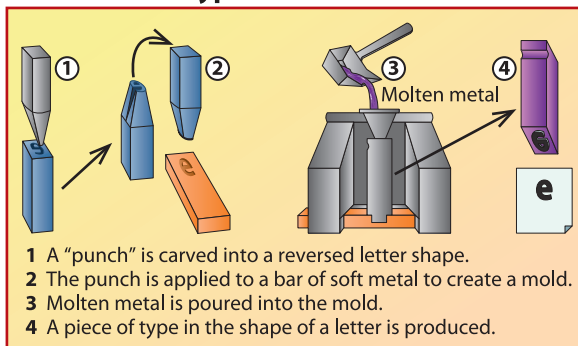
Gutenberg assembled rows of metal letters for each page of a text. Like stamps, printers would ink these rows of letters before pressing a page.

Before the printing press, books were very difficult and expensive to make.

They were often copied by hand. With the printing press, books could be made much faster and for less money. This meant that more people had access to them, and as a result, more people began learning to read. The Bible was a popular book to print at the time, as were short sermons and engravings. In addition, rulers could use the printing press to inform citizens about new laws. The printing press spread knowledge and ideas much faster than ever before. This helped spark creativity and innovation.

Humanist artists and writers began to create works of art and literature that focused on individuals and their emotions. The Renaissance also saw the development of theater. William Shakespeare was an English playwright who wrote at least thirty-seven plays between about 1590 and 1613 CE. His plays were known for their complex characters. The printing press was developed during Shakespeare's lifetime and enabled his plays to be printed, reprinted, and shared in the years after he wrote them. The printing press is considered by many to be one of the most important inventions of all time and a key factor in the development of modern society.

### How to Make Type



Gutenberg used several steps to make letters for the printing press.



## **PRIMARY SOURCE: EXCERPT FROM MACHIAVELLI'S *THE PRINCE***

But we now come to the case where a citizen becomes prince not through crime or intolerable violence, but by the favor of his fellow-citizens. . . . To arrive at this position depends not entirely on worth or entirely on fortune, but rather on cunning assisted by fortune. One attains it by help of popular favor or by the favor of the aristocracy. For in every city these two opposite parties are to be found, arising from the desire of the populace to avoid the oppression of the great, and the desire of the great to command and oppress the people. . . .

. . . The prince can win [the people's] favor in many ways, which vary according to circumstances, for which no certain rule can be given, and will therefore be passed over. I will only say, in conclusion, that it is necessary for a prince to possess the friendship of the people; otherwise he has no resource in times of adversity.



## Chapter 2

# The Reformation

**Religious Reformation** In 1500 CE, Christians in western and central Europe went to church and prayed in the same way. Even in different countries, church services were similar. But one hundred years later, things had changed. In some countries, new ideas and styles of worship took hold. Some churches housed beautiful works of art, while others were plain and simple. Some church services were given in Latin, while other services were given in local languages, such as German. The way the churches were organized and even how they were built varied as well. However, major changes were coming to the Church and Christianity. This period was called the Reformation.

### The Framing Question

What factors helped bring about the age known as the Reformation?





The Reformation was a time of debate over new and old ideas within the Church.



## Signs of Change

During this era, religion was incredibly important in Europe. However, different ideas developed about how Christians should think, act, and worship. In addition to these new ideas, the rebuilding of Rome in the aftermath of the Great Western Schism was expensive. The Church needed to find a way to raise money. The Church began asking people to pay money for **indulgences** to receive forgiveness for their sins. To many, buying one's way into heaven seemed corrupt, and was not in keeping with Biblical teachings.

### Vocabulary

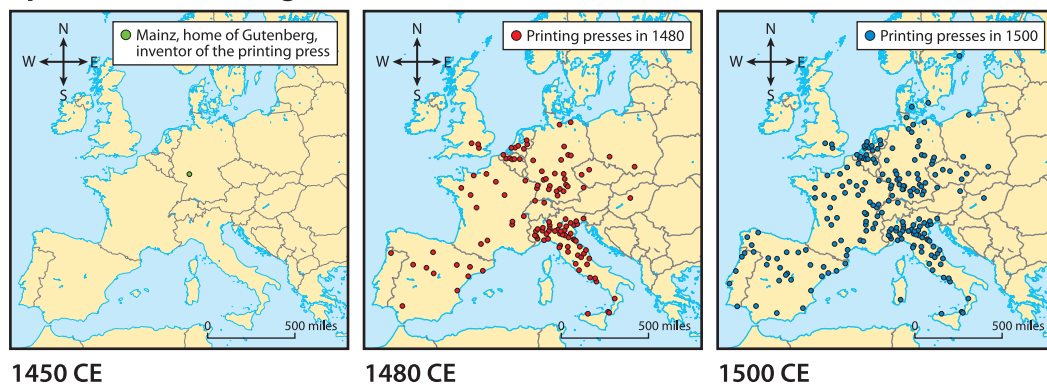
**indulgence**, n.  
the removal or reduction of certain punishments for sin, linked to a special act of penance

Humanist and Renaissance ideas also had a significant impact on religion and the Church. Renaissance humanists stressed reason and logic over tradition and sought inspiration in the classical. These new ways of thinking led some individuals to question the authority of the Church and its practices. A group of **reformers** emerged.

### Vocabulary

**reformer**, n. a person who challenges existing ideas in an institution

### Spread of the Printing Press



The printing press was key in spreading the ideas of the Reformation.



These reformers shared many humanist ideals, but where the Renaissance sought a rebirth of classical learning, the reformers looked to the simplicity of the early Church as a model. The spread of the reformers' ideas was aided by the invention of the printing press. Information was more quickly dispersed, and more and more people could read the reformers' ideas.

However, many religious and governmental leaders in Europe wanted to use these new religious divisions to gain more power. These rulers were especially interested in promoting their own ideas about religion to solidify their rule.

## Martin Luther

Martin Luther (1483–1546 CE) was the most famous Church reformer. He lived in the Holy Roman Empire (approximately present-day Germany). He was a professor, a priest, and a monk.

Luther had strong ideas about right and wrong and what the Church should do. One of the major issues Luther had with the Church concerned the sale of indulgences. The Church was selling forgiveness to people for money instead of teaching them about religion. Luther thought this was wrong.

Luther also disagreed with the Church on other issues. He made a list of all the things he



Martin Luther hung his ninety-five theses on the door of a Wittenberg cathedral in 1517 CE.

thought the Church was doing wrong and posted it on a church door for everyone to see. These were called Luther's ninety-five **theses**. People debated Luther's ideas, but he refused to back down. Because of this, Luther was declared a **heretic** in 1521 CE by Pope Leo X. However, Luther

### Vocabulary

**thesis**, n. an idea or opinion

**heretic**, n. a person who goes against the accepted teachings of a religion

was protected and hidden by the Duke of Saxony and moved to a faraway castle. There, he continued to write and teach about religion. Luther translated parts of the Bible into German. His teachings were very popular, and many people read his writing.

Luther and another reformer, Philipp Melanchthon (1497–1560 CE), developed a full set of their religious ideas. They believed that people could be saved through faith in Jesus Christ alone (*sola fide*). They also believed people should look only to the Bible (*sola scriptura*) for guidance instead of following religious leaders. They thought all people had spiritual responsibility, not just religious leaders. Because of these ideas, they felt there was no need for priests, nuns, monks, or even monasteries.

Some of the rulers in the Holy Roman Empire thought that these changes were a good idea. Others wanted to keep things the way they were. This would eventually cause a civil war. In 1556 CE, it was decided that each area could choose whether to follow Luther's ideas or stay with the traditional ways of the Catholic Church.

## John Calvin

Religious leaders in northern Europe also fought for reforms. John Calvin (1509–64 CE) was another important religious reformer.



Calvin studied theology and Luther's teachings. He was studying in Paris when the king of France began persecuting reformers. The king feared that the religious civil war in the Holy Roman Empire would make its way to France. So Calvin fled to Geneva, a French-speaking city in Switzerland, where church reforms were already happening. Calvin would spend most of his life in Geneva.



French theologian and reformer John Calvin studied theology and Martin Luther's teachings in Paris, France.

Calvin and his supporters shared several ideas with Luther. They agreed with his idea of *sola scriptura*. They carefully studied Paul's letter to the Romans in the Bible. Their interpretation of Paul's writings was that God, as all-powerful and all-knowing, already knew who would be saved. This belief was called **predestination**. Calvinists called these saved people *the elect*. Like Luther, Calvin thought that people were only saved by their personal faith, but he also thought that faith was a gift of divine grace that God freely gave to his elect. Calvin's reforms gradually spread across cities along the river Rhine into parts of France, Scotland, England, and some regions of central Europe.

### Vocabulary

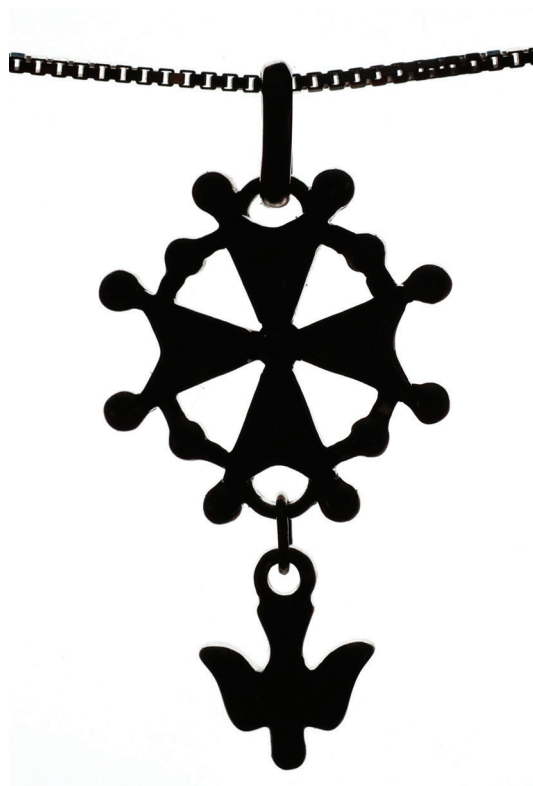
**predestination**,  
n. the idea that a  
person's salvation has  
already been decided  
by God

## Response to the Reformation

The response to the Reformation was mixed. Some people supported the changes and joined the new Protestant churches that were formed. Others wanted to keep things the way they were and stayed loyal to the Catholic Church. As more and more religious ideas took shape, political leaders of countries had choices to make about their lands' religion.

## Politics and Religion Meet

The idea that rulers had the responsibility to control their people's religion was not new. Since about 700 CE, most of Spain had been ruled by Muslim leaders. These rulers allowed Jews and Christians to live in Muslim territory for hundreds of years as long as they paid an extra tax. By the sixteenth century, Christian nobles had conquered the last remaining Muslim territory in Spain. The new Christian rulers of Spain decided to unite the area under Christianity, so they ordered all of the Jewish people in their kingdom to convert to Christianity. More than one hundred thousand Jews were forced out of Spain. They moved to Belgium, Italy, the Ottoman Empire, and countries in North Africa.



The French Huguenots wore this pendant as a symbol of their faith.



The Reformation made the situation more complex. Different Christian groups saw one another as heretics. In France, those who followed Calvinism were called Huguenots. Huguenots and Catholics began a series of religious wars in the mid-sixteenth century, culminating in the St. Bartholomew's Day Massacre in 1572 CE.

The Protestant Reformation in Europe caused leaders of the Catholic Church to become concerned about losing power. They launched their own reform movement during the sixteenth and seventeenth centuries, known as the Counter-Reformation (c. 1501–1650 CE). They wanted to stop the spread of Protestantism and bring people back to the Catholic Church.

The Counter-Reformation emphasized education for priests, founded many schools and universities, and attempted to stop corruption within the Church. The Catholic Church also appealed to people through **Baroque** art and music.



Baroque art and music, like this painting of Mary Magdalene, was popular because it was dramatic, evoked emotion, and was easily interpreted.

### Vocabulary

**Baroque**, adj. relating to a style of European art popular in the seventeenth and eighteenth centuries

The Counter-Reformation contributed to a period of religious conflict across Europe. Each faith tried to attract more people.

One of these conflicts was a war that lasted for decades. The Thirty Years' War was a series of conflicts between several countries in Europe. It lasted from 1618 to 1648. The war began as a dispute between the Catholic Church and Protestant groups. It became a power struggle between European states. Countries such as France and Sweden saw the war as a way to expand their territories. During the war, many people lost their lives to violence, famine, and disease. The Treaty of Westphalia, signed in 1648, marked the end of the war. It established the right of individual nations to govern themselves without interference from other nations. It also marked the end of the Holy Roman Empire as a major political force in Europe.

## Reform Comes to England

England also faced violence when reform issues mixed with politics. King Henry VIII (1492–1547 CE) wanted a son to inherit his throne. However, his wife, Catherine of Aragon, gave birth to a daughter, Mary I (1516–58 CE). Henry wanted to end the marriage and marry a woman named Anne Boleyn. The Catholic



Henry VIII left the Catholic Church and declared himself the ruler of the Church of England.



pope would not allow it, so Henry declared himself the ruler of the Church of England. This allowed him to end his marriage to Catherine and marry Anne Boleyn in 1532 CE.

Henry VIII completely reformed his new church. He closed England's monasteries. He took property and wealth belonging to eight hundred religious houses. Henry went on to marry a third time and finally had a son, whom he named Edward VI (1537–53 CE). Edward continued church reforms during his short reign. But when he died, his older sister Mary I became queen and returned England to Catholicism. Her **purges** forced many English Protestants to flee to other countries.

When Mary I died in 1558 CE, she was succeeded by her younger sister, Elizabeth I (1533–1603 CE). Queen Elizabeth I restored the Church of England. England became Protestant once again. The royal family of England continued to have disagreements about religion for many years. Some of the religious groups that formed during this time chose to use the colonization of North America to establish new religious communities there.



Queen Mary I returned England to the Catholic Church for a brief time.

### Vocabulary

**purge**, n. a removal from a group or place in a sudden or violent way

## Limiting the Spread of Ideas

Because the printing press made access to texts easier, more citizens became literate. Information spread faster than ever before. Some governments and leaders began to try to slow the flow of new ideas. In England, Elizabeth I would not let printers publish books that supported Catholic ideas. The city of Geneva, where John Calvin lived, also regulated what could be printed. In Rome, the Catholic Church had a list of forbidden books that included writings by Martin Luther and John Calvin.

## The Reformation's Impact

The Reformation was a time of great change in Europe during the sixteenth century. It had a major impact on politics. Religious tensions led to wars and conflicts that lasted centuries. The movement also reshaped society. Protestant beliefs emphasized individual interpretations of the Bible and the importance of education. The Reformation shaped Europe and the rest of the world, influencing religion, politics, and culture for centuries to come.

**Dominant Churches and Religions in Europe (Mid-1500s CE)**



By the mid-1500s CE, Europe was home to a variety of religions.



## PRIMARY SOURCE: EXCERPTS FROM THE NINETY-FIVE THESES

21. Thus those preachers of indulgences are in error who say that, by the indulgences of the Pope, a man is loosed and saved from all punishment.

27. They preach man [man-made doctrine], who say that the soul flies out of purgatory as soon as the money thrown into the chest rattles.

28. It is certain that, when the money rattles in the chest, avarice [greed] and gain may be increased, but the suffrage [answered prayers] of the Church depends on the will of God alone.

32. Those who believe that through letters of pardon [indulgences], they are made sure of their own salvation, will be eternally damned along with their teachers.

# Chapter 3

## The Scientific Revolution

**A Shifting Lens** Between the 1500s and 1700s CE, Europeans experienced a major shift in how they viewed themselves and their place in the world. During this time, humanist, Reformation, and Counter-Reformation ideas resulted in new philosophies about religion and personal beliefs. More and more, people used science and reason to explain the world around them. This period became known as the Scientific Revolution.

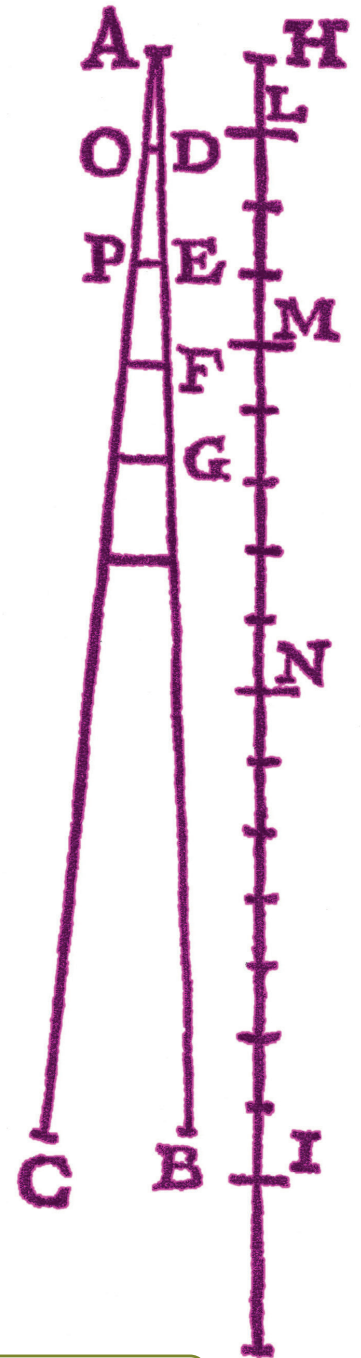
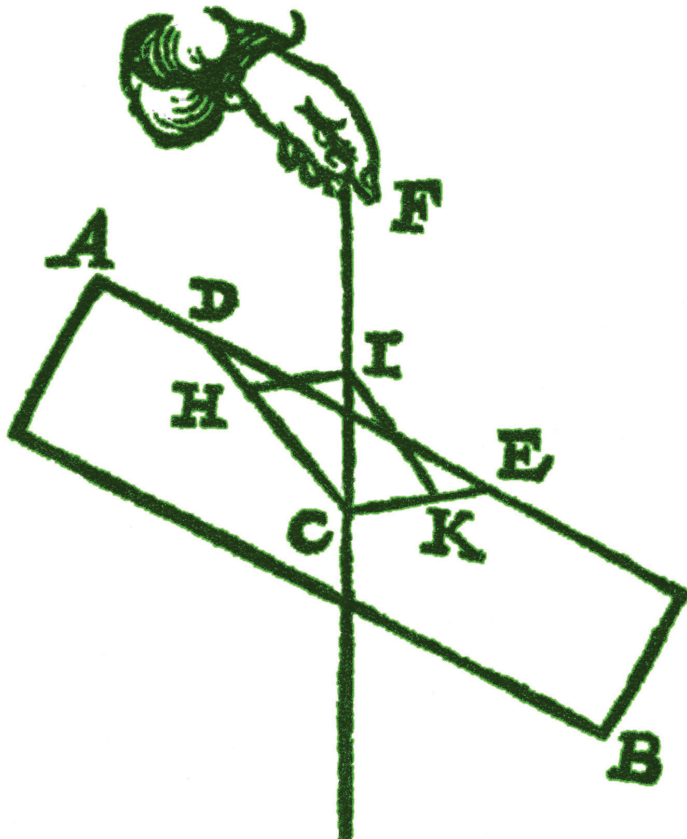
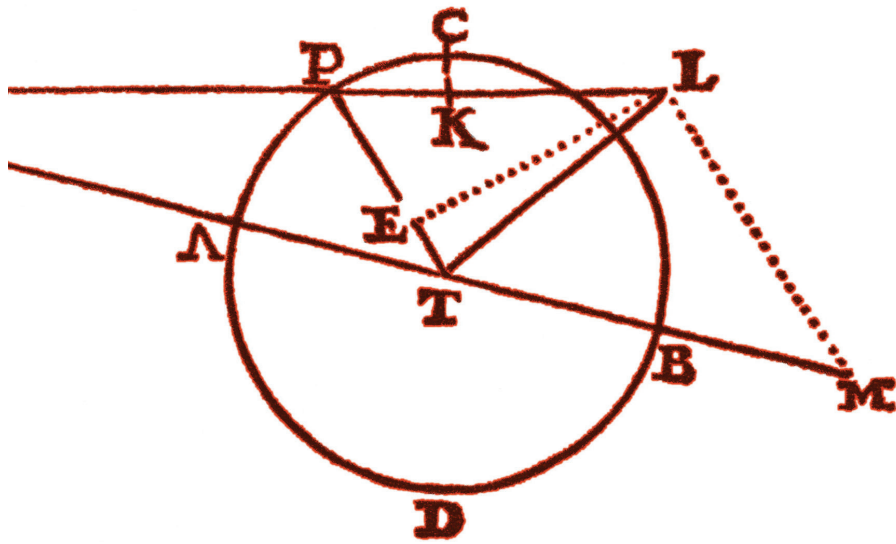
### The Framing Question

What new ideas were introduced during the Scientific Revolution?

The late 1500s CE and early 1600s were a time of major change in Europe. Christianity was transformed as the Protestant Reformation swept across Europe. These new ideas and perspectives made Europeans rethink their own beliefs about people and the world around them.

European politics also changed during this time. Governments focused on keeping central control. They did this by having more official paperwork and systems to keep track of things. This helped leaders control their countries more effectively.





Early physics diagrams from the Scientific Revolution illustrate Isaac Newton's explanation for the ebb and flow of the tide, Galileo's law of free fall, and Simon Stevin's diagram of the balance of forces on an inclined plane.

## A New View of the Universe

At the same time, Europeans were experiencing radical new ways of viewing the universe. For centuries, Europeans believed in a **geocentric** view of the universe, where Earth was at the center. This idea came from an ancient Greek astronomer named Claudius Ptolemy. By the 1500s CE, better tools and new observations had shown that Ptolemy's model was not accurate. As a result, more and more people began to question it.

A Polish astronomer named Nicolaus Copernicus (1473–1543 CE) was the first to propose a new idea about the universe. He suggested a **heliocentric**

view, where the sun was at the center of the universe. Copernicus also believed that the planets, including Earth, orbited around the sun. Other scientists, like Dutch astronomer Tycho Brahe and German astronomer Johannes Kepler, found proof to support this idea. They discovered that planets move in an oval shape around the sun.

### Vocabulary

**geocentric**, adj.  
describing Earth as the center of the universe

**heliocentric**, adj.  
describing the sun as the center of the universe



Nicolaus Copernicus developed the theory of a heliocentric universe, in which the sun is the center of the universe.



In 1609, Italian astronomer Galileo Galilei built a more powerful telescope. This allowed him to see the moon and Jupiter more closely. He found that the moon had mountains and valleys, and that Jupiter had its own moons. This challenged the belief that Earth was unique in the universe. Galileo wrote and published a book called *The Starry Messenger* in 1610. His book supported the heliocentric view of the universe. His discoveries and book made him famous. He was even given the job of court mathematician and astronomer by the Grand Duke of Tuscany.

Galileo's work brought new attention to the ideas of Copernicus. This angered some in the Catholic Church. They believed these ideas went against what was written in the Bible. Galileo was put on trial in a court called the Inquisition, and his books were banned. After he was found guilty at trial, he was placed under house arrest.

## Advancements in Medicine

The Scientific Revolution looked not only upward to the stars and sky but also inward into the human body. Most knowledge about the human body came from a Roman doctor named Galen. He had studied the body through observation and **dissection**. However, like Ptolemy's understanding of the universe, Galen's work had led to an incomplete understanding of the body.

### Vocabulary

**dissection**, n. the act of cutting something into parts in order to study it

In the 1500s CE, an anatomy professor named Andreas Vesalius used dissection to study the human body. He found Galen's mistakes,

proving there was still a lot to learn. One of Vesalius's students, William Harvey, used Vesalius's findings to create his own theory about how blood moves throughout the body.

Harvey's work showed that blood, pumped by

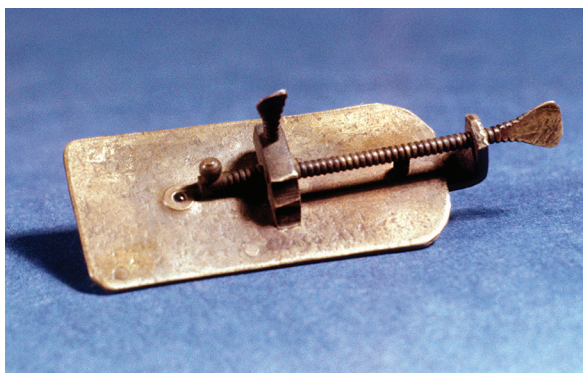
the heart, moves throughout the body in arteries and veins. This knowledge led to a better understanding of other body systems, like the respiratory system. It also led to medical improvements like better wound care.

More discoveries were made with the microscope, invented in 1590 CE. Dutch scientist Antonie van Leeuwenhoek used his microscope to study bacteria. He also looked at muscle fibers, blood cells, and the structures of wood and crystals. His work helped scientists understand the tiny world of microbiology.

## The Pursuit of Knowledge

As you have read, the printing press helped spread new ideas as well as rediscovered ideas. New printing centers emerged in cities such as Venice and Frankfurt. Frankfurt even established an annual book fair where printers and booksellers could showcase their works.

Writers could make money from selling books. Printed Bibles were in high demand, and were more affordable than handwritten ones. Some printers even sold individual parts of the Bible, such



Antonie van Leeuwenhoek used a microscope he invented to gain a greater understanding of the human body.



as the Gospels and Psalms, which were less expensive.

The printing press not only helped spread scientific discoveries, but also helped spread new philosophical thinking. English philosopher Francis Bacon didn't like the old ways of learning and acquiring knowledge, which relied on intellectual debates and arguments. Instead, he believed that knowledge could only be gained by looking at nature and testing it. He thought scientists should observe and collect data from nature and use that information to explain the world.

Bacon's way of studying the world helped scientists make many new discoveries during his time. It still guides scientific inquiry today. He also believed that science should be used to solve real-life problems and improve people's lives. These ideas made a big impact on science.

French philosopher René Descartes was a mathematician who believed that the world could be explained using math, specifically **geometry**. Like Bacon, Descartes didn't trust everything he



Francis Bacon was an English philosopher who believed observation was the way to gain knowledge of the natural world.

### Vocabulary

**geometry**, n. a branch of mathematics that studies the measurements and relationships between lines, angles, surfaces, and shapes

had been taught; instead, he relied on **skepticism**. Descartes wrote four laws of logic to create a **rational** view of the world. Bacon believed in using senses to observe the world, while Descartes believed in using reason. Both ideas influenced Sir Isaac Newton, another important figure of the Scientific Revolution.

### Vocabulary

**skepticism**, n. a method of looking at information and evidence through questioning and doubt

**rational**, adj. based on reason and logic

## Newton's Laws

English physicist Isaac Newton lived during a period of great scientific discovery. He used the ideas of Francis Bacon and René Descartes to create a new scientific method. He felt it important to gather experimental data and use math to understand the universe.



Isaac Newton developed a theory of color based on his observation that a prism splits white light into the many colors that form the visible spectrum.



Newton is known for his work in physics, mathematics, and astronomy. He discovered basic laws governing the universe, such as the law of gravity. He helped explain how objects move and why they move in certain ways. His discoveries helped scientists better understand the universe. Newton's work demonstrated that the universe follows rules that can be discovered and understood through scientific study. Many people considered Newton the greatest genius of his time.

## **A Changing World**

The Scientific Revolution brought about changes throughout the world. Scientists continued to make new discoveries and inventions. The knowledge they gained helped reshape society. Advancements in medicine improved people's quality of life. Meanwhile, new technologies would eventually make it possible to study everything from the tiniest atoms to the largest galaxies.

The Scientific Revolution also influenced other areas of society. New political and economic systems emerged that were based on rational thinking and scientific principles. Citizens began to question traditional beliefs and institutions. This would eventually lead to a greater emphasis on individual freedom and human rights.

## **PRIMARY SOURCE: EXCERPT FROM GALILEO'S LETTER TO GRAND DUCHESS CHRISTINA OF TUSCANY (1615)**

To command professors of astronomy that they must themselves see to confuting [arguing against] their own observations and demonstrations is to ask the impossible, for it is not only to command them not to see what they do see, and not to understand what they do understand, but to seek for and to find the contrary. . . .

. . . It is not in the power of any creature to make them to be true or false, otherwise than as, in fact, they are.



# Glossary

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## B

**Baroque, adj.** relating to a style of European art popular in the seventeenth and eighteenth centuries (23)

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## C

**classical, adj.** relating to the literature, art, architecture, or ideas of the ancient Greek and Roman world (2)

**credit, n.** a system of buying now and paying later based on a person's honesty and ability to pay (7)

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## D

**dissection, n.** the act of cutting something into parts in order to study it (31)

**doge, n.** the head of government of the city of Venice (6)

---

## E

**exemplify, v.** to be an example of (11)

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## F

**fresco, n.** a wall painting made on wet plaster (12)

---

## G

**geocentric, adj.** describing Earth as the center of the universe (30)

**geometry, n.** a branch of mathematics that studies the measurements and relationships between lines, angles, surfaces, and shapes (33)

---

## H

**heliocentric, adj.** describing the sun as the center of the universe (30)

**heretic, n.** a person who goes against the accepted teachings of a religion (20)

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## I

**indulgence, n.** the removal or reduction of certain punishments for sin, linked to a special act of penance (18)

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## M

**monastery, n.** a building where a community of monks lives, worships, and works together (4)

---

## P

**patron, n.** a person who gives money or other support to someone, such as an artist (10)

**perspective, n.** an art technique used to make something that is flat appear to have depth, in addition to height and width (10)

**pope, n.** the head of the Roman Catholic Church (5)

**predestination, n.** the idea that a person's salvation has already been decided by God (21)

**purge, n.** a removal from a group or place in a sudden or violent way (25)

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## R

**rational, adj.** based on reason and logic (34)

**reformer, n.** a person who challenges existing ideas in an institution (18)

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## S

**secular, adj.** not religious or faith based (8)

**skepticism, n.** a method of looking at information and evidence through questioning and doubt (34)

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## T

**theology, n.** the study of religious faith, practice, and experience (5)

**thesis, n.** an idea or opinion (20)

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## U

**university, n.** a school where advanced learning is taught (5)







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