Unit 2: Change in Thought and Knowledge - The Renaissance and the Scientific Revolution

"In Italy for thirty years under the Borgias they had warfare, terror, murder and bloodshed but they produced Michelangelo, Leonardo da Vinci and the Renaissance. In Switzerland, they had brotherly love; they had five hundred years of democracy and peace and what did that produce? The cuckoo clock."- Orson Wells

After reading the Renaissance section you should understand:

- Renaissance politics, culture, and art in Italy.
- The northern Renaissance that followed that in Italy.
- Italian politics, wars, and foreign intervention in Italy by France and Spain.

After reading the Scientific Revolution section you should understand:

- The astronomical theories of Copernicus, Brahe, Kepler, Galileo, and Newton.
- The emergence of new scientific institutions.
- The role of women in early science.
- The relationship between science and religion.
- New directions in philosophy and political science
- The emergence of Baroque art

Potential Renaissance FRQ/LEQs

- To what extent and in what ways may the Renaissance be regarded as a turning point in the Western intellectual and cultural tradition?
- Describe and analyze the ways that the development of printing altered both the culture and politics of Europe during the period 1450-1600.
- Explain the ways that Renaissance humanism transformed ideas about the individual's role in society.
- To what extent is the term "Renaissance" a valid concept for a distinct period in early modern European History?
- To what extent and in what ways did women participate in the Renaissance?
- Discuss how Renaissance ideas are expressed in the Italian art of the period, referring to the specific works and artists.
- Analyze the influence of humanism on the visual arts in the Italian Renaissance. Use at least THREE specific works to support your analysis.

Potential Scientific Revolution FRQ/LEQs

- Describe the impact of the Scientific Revolution on European thought and culture.
- How did the developments in scientific thought from Copernicus to Newton create a new conception of the universe and of humanity's place within it?
- Describe the new astronomy of the sixteenth and seventeenth centuries and analyze the ways in which it changed scientific thought and methods.
- *"Nature and nature's laws lay hid* in *night! God said 'Let Newton be, • and all was light"* The couplet was Alexander Pope's way of expressing the relationship between the Scientific Revolution and Christianity. What was the effect of seventeenth-century science on Christianity, and how did each react to each other?
- Explain the development of the scientific method in the seventeenth century and the impact of scientific thinking on traditional sources of authority.

- Assess the impact of the Scientific Revolution on religion and philosophy in the period 1550 to 1750.

Major Unit Assignments

- The Renaissance Notes
- The Renaissance Study Guide
- The Scientific Revolution Notes
- The Scientific Revolution Study Guide
- Scientific Philosophy Fair Simulation
- APPARTS Essay: 1513- Excerpts from The Prince- Machiavelli
- Art Analysis and Interpretation Assignment - Renaissance and Baroque Art

Textbook Reading Sections
Renaissance – p. 49- 63, p 66-68
Scientific Revolution – p. 452-473

The Renaissance Study Guide
Terms to Identify

Act of Supremacy
Agricola, Rudolf
Alberti, Leon Battista
Alexander VI
Aligheiri, Dante
Bruni, Leonardo
Castiglione, Baldassare
chiaroscuro
Chrysoloras, Michael
Ciompi Revolt
Cisneros, Jimenez de
civic humanism
Concordat of Bologna
condottieri
Council of Ten
Donation of Constantine
Erasmus, Desiderius
Florentine Academy
Ghibelline
Giotto
Golden Bull
grandi
Guelph
Gutenberg, Johann
humanism
humanitas
Hutten, Ulrich von
Julius II
League of Venice
linear perspective
Lorenzo the Magnificent
Machiavelli, Niccolo
mannerism
Medici, Cosimo de
Michelangelo
Mirandola, Pico della
More, Thomas
Petrarch, Francesco
Pisan, Christine de
Platonism
podesta
popolo grosso
popolo minuto
quinto
Raphael
Renaissance
Reuchlin, Johann
Savonarola, Girolamo
Spanish Inquisition
studia humanitatis
Torquemada, Tomas de
Treaty of Lodi
Valla, Lorenzo
Vinci, Leonardo da

Renaissance Unit Questions

Why did the Renaissance begin in Italy?

How would you define "Renaissance Humanism"? In what ways was the Renaissance a break with the Middle Ages and in what ways did it owe its existence to medieval civilization?

How was the idea of "courtier" and "gentleman" developed during this age?

In what ways was Renaissance art different from Medieval art? What new techniques and concepts allowed Renaissance artists to make such an impact?

Why did slavery exist during the Renaissance when emphasis was being placed on the worth of humans and their unique qualities? How could Humanism and slavery exist at the same time?

How was the Renaissance different outside of Italy?

Textbook DQs

The Renaissance Garden p 53

What kinds of gardens existed in the Middle Ages and early Renaissance?

How did religion give meaning to gardens?

How were gardens maintained and what kinds of fruits and vegetables did they contain?

Is the "Renaissance Man" a Myth? p. 56

Who or what are Pico and Durer's glorified humans? Is the vaunted Renaissance man real or fictional?

Why were Renaissance artists so fixated on the perfect body and mind?

Is Martin Luther's rejoiner (the bondage of the human will) truer to life or is it religious misanthropy?

Leonardo da Vinci Plots the Perfect Man p. 59

Compare Leonardo''s study of the human form with that of Adam and Eve by northern Renaissance painter Lucas Cranach the Elder (which appears later in the chapter) Which of these images is truer to real life?

Is Leonardo's Virtuian man a true representation of human perfection or a representation of man as a perfect machine?

Outside DQs

Michelangelo and Pope Julius - Outside Primary Reading

Did Michelangelo hold his own with the pope?

What does this interchange suggest about the relationship of patrons and artists in the Renaissance?

Were great artists like Michelangelo so revered that they could do virtually as they pleased?

"I was at this restaurant. The sign said "Breakfast Anytime." So I ordered French Toast in the Renaissance." – Steven Wright

Michelangelo and Pope Julius - Outside Primary Reading

Vasari here describes how Pope Julius (r 1503-1513) the most fearsome and worldly of the Renaissance popes forced Michaelangelo to complete the Sistine Chapel before Michelangelo was ready to do so.

[The pope was very anxious to see the decoration of the Sistine Chapel completed, and constantly inquired when it would be finished.] On one occasion, therefore, Michaelangelo replied, "It will be finished when I shall have done all that I believe is required to satisfy Art."
"And we command," rejoined the pontiff, "that you satisfy our wish to have it done quickly," adding that if it were not at once completed, he would have Michaelangelo thrown headlong from the scaffolding. Hearing this, our artist, who feared the fury of the pope, and with good cause, without taking time to add what was wanting, took down the remainder of the scaffolding, to the great satisfaction of the whole city, on All Saints' day, when Pope Julius went into that chapel to sing mass. But Michaelangelo had much desired to retouch some portions of the work a secco, as had been done by the older masters who had painted the stories on the walls. He would also have gladly added a little ultramarine to the draperies and gilded other parts, to the end that the whole might have a richer and more striking effect.

The pope, too, hearing that these things were still wanting, and finding that all who beheld the chapel praised it highly, would now fain have had the additions made; but as Michaelangelo thought reconstructing the scaffold too long an affair, the pictures remained as they were, although the pope, who often saw Michaelangelo, would sometimes say, "Let the chapel be enriched with bright colors and gold; it looks poor." When Michaelangelo would reply familiarly, "Holy Father, the men of those days did not adorn themselves with gold; those who are painted here less than any, for they were none too rich; besides which they were holy men, and must have despised riches and ornaments."

The Scientific Revolution Study Guide

Terms to Identify

Bacon, Francis
baroque
Brahe, Tycho
Cavendish, Margaret
Chatelet, Emilie
Christinia
Copernicus, Nicholas
Descartes, Rene
Enlightenment
empiricism
epicycle
Galilei, Galileo
Harvey, William
Heliocentric
Hobbes, Thomas
Kepler, Johannes
Locke, John
mechanism
Newton, Isaac
Pascal. Blaise
Ptolematic system
revolution
Royal Society of London
Rubens, Peter
scientific induction
Scientific Revolution
Swift, Jonathan
Urban VIII

Scientific Revolution Unit Questions

What was the impact of the scientific revolution on women?

Galileo, Brahe, Kepler and Newton: Which made the most important contribution to the Scientific Revolution, and why?

What were the chief factors accounting for the condemnation of Galileo?

How did Pascal seek to reconcile faith and reason?

Textbook DQs

Rene Decartes and Jonathan Swift Debate the Scientific Enterprise p. 164-166

How does Decartes compare the usefulness of science with previous speculative philosophy?

What, if any, limits does Decarts place on the extension of scientific knowledge?

Why might Swift's presentation be seen as an expression of jealousy of the growing influence of science?

How does Swift's passage refute the promise of science championed by Bacon and Decartes?

The Science of Healthy Eating - Secondary p 175

What connections did early modern physicians make between food and diet?

How did they determine what foods were healthy and which were unhealthy?

Outside DQs

Copernicus Ascribes Movement to The Earth - Outside Primary Reading

How does Copernicus justify his argument to the Pope?

How important was historical precedent and tradition to the pope?

Might Copernicus have thought that the pope would be especially susceptible to such an argument, even though what Copernicus proposed (the movement of the earth) contradicted the Bible?

Margaret Cavendish Questions the Fascination With Scientific Instruments - Outside Primary Reading

Why might Margaret Cavendish think that the experiments which were reported about new optical instruments dealt with superficial wonders?

Why does she contrast experimental philosophy with the beneficial arts?

Do you find a feminist perspective in her comparison of men of the Royal Society with boys playing with bubbles?

Galileo Discusses the Relationship of Science to the Bible - Outside Primary Reading

Is Galileo's argument based on science or theology?

Did the church believe that nature was as much a revelation of God as the Bible was?

As Galileo describes them, which is the surer revelation of God, nature or the Bible?

Why might the pope reject Galileo’s argument?

Copernicus Ascribes Movement to The Earth - Outside Primary Reading

Copernicus published De Revolutionibus Othium Caelestium (On the Revolutions of the Heavenly Spheres) in 1543. In his preface addressed to Pope Paul III, he explained what had led him to think that the earth moved around the sun and what he thought were some of the scientific consequences of the new theory

I may well presume, most Holy Father, that certain people, as soon as they hear that in this book about the Revolutions of the Spheres of the Universe I ascribe movement to the earthly globe, will cry out that, holding such views, I should at once be hissed off the stage. For I am not so pleased with my own work that I should fail duly to weigh the judgment which others may pass thereon; and though I know that the speculations of a philosopher are far removed from the judgment of the multitude --- for his aim is to seek truth in all things as far as God has permitted human reason so to do --- yet I hold that opinions which are quite erroneous should be avoided.

Thinking therefore within myself that to ascribe movement to the Earth must indeed seem an absurd performance on my part to those who know that many centuries have consented to the establishment of the contrary judgment, namely that the Earth is placed immovably as the central point in the middle of the Universe, I hesitated long whether, on the one hand, I should give to the light these my Commentaries written to prove the Earth's motion, or whether, on the other hand, it were better to follow the example of the Pythagoreans and others who were wont to impart their philosophic mysteries only to intimates and friends, and then not in writing by word of mouth …

These misgivings and actual protests have been overcome by my friends ... [one of whom (ed note: Osiander Rheticus)] often urged and even importuned me to publish this work which I had kept in store not for nine years only, but to a fourth period of nine years ... They urged that I should not, on account of my fears, refuse any longer to contribute the fruits of my labors to the common advantage of those interested in mathematics. They insisted that, though my theory of the Earth's movement might at first seem strange, yet it would appear admirable and acceptable when the publication of my elucidatory comments should dispel the mists of paradox. Yielding then to their persuasion I at last permitted my friends to publish that work which they have so long demanded.

That I allow the publication of these my studies may surprise your Holiness the less in that, having been at such travail to attain them, I had already not scrupled to commit to writing my thoughts upon the motion of the Earth. How I came to dare to conceive such motion of the Earth, contrary to the received opinion of the Mathematicians and indeed contrary to the impression of the senses is what your Holiness will rather expect to hear. So I should like your Holiness to know that I was induced to think of a method of computing the motions of the spheres by nothing else than the knowledge that the mathematicians are inconsistent in these investigations.

For, first, the mathematicians are so unsure of the movements of the Sun and Moon that they cannot even explain or observe the constant length of the seasonal year. Secondly, in determining the motions of these and of the other five planets, they use neither the same principles and

hypotheses nor the same demonstrations of the apparent motions and revolutions. Some use ... eccentrics and epicycles. Yet even by these means they do not completely attain their ends...

Margaret Cavendish Questions the Fascination With Scientific Instruments - Outside Primary Reading

Margaret Cavendish, Duchess of Newcastle, was the most scientifically informed woman of seventeenth century England. She read widely in natural philosophy and had many acquaintances who were involved in the new science. Although she was enthusiastic about the promise of science, she also frequently criticized some of its leading proponents, including Decartes and Hobbes. She was skeptical of the activities of the newly established Royal Society of London, which she was once permitted to visit. She believed some of its members had become overly enthusiastic about experimentation and new scientific instruments for their own sakes and had begun to ignore the practical questions that she thought science should address. In this respect, her criticism of the Royal Society and its experiments is a Baconian one. She thought the society had replaced scholastic speculation with experimental speculation and that both kinds of speculation ignored problems of immediate utility

Art has intoxicated so many mens brains, and wholly imployed their thoughts and bodily actions about phaenomena, or the exterior figures of objects, as all better Arts and Studies are laid aside. . .But though there be numerous Books written of the wonders of these Glasses, yet I cannot perceive any such, at best, they are but superficial wonders, as I may call them. But could Experimental Philosophers find out more beneficial Arts then our Fore-fathers have done, either for the better increase of Vegetables and brute Animals to nourish our bodies, or better and commodious contrivances in the Art of Architecture to build us houses, or for the advancing of trade and traffick. . . it would not onely be worth their labor, but of as much praise as could be given to them: But as Boys that play with watry Bubbles. . . are worthy of reproof rather then praise; for wasting their time with useless sports; so those that addict themselves to unprofitable Arts, spend more time then they reap benefit thereby.

Galileo Discusses the Relationship of Science to the Bible - Outside Primary Reading

The religious authorities were often critical of the discoveries and theories of the sixteenth and seventeenth century science. For years before his condemnation by the Roman Catholic Church in 1633 Galileo had contended that scientific theory and religious piety were compatible. In his Letter to Grand Duchess Christina of Tuscany written in 1615 he argued that God had revealed truth in both the Bible and physical nature and that truth of physical nature did not contradict the Bible if the latter was properly understood. Galileo encountered difficulties regarding this letter because it represented a layman telling church authorities how to read the Bible

The reason produced for condemning the opinion that the earth moves and the sun stands still in many places in the Bible one may read that the sun moves and the earth stands still. Since the Bible cannot err; it follows as a necessary consequence that anyone takes an erroneous and heretical position who maintains that the sun is inherently motionless and the earth movable.

With regard to this argument, I think in the first place that it is very pious to say and prudent to affirm that the holy Bible can never speak untruth-whenever its true meaning is understood. But I believe nobody will deny that it is often very abstruse, and may say things which are quite different from what its bare words signify.

This being granted, I think that in discussions of physical problems we ought to begin not from the authority of scriptural passages but from sense experiences and necessary demonstrations; for the holy Bible and the phenomena of nature proceed alike from the divine Word the former as the dictate of the Holy Ghost and the latter as the observant executrix of God's commands. It is necessary for the Bible, in order to be accommodated to the understanding of every man, to speak many things which appear to differ from the absolute truth so far as the bare meaning of the words is concerned. But Nature, on the other hand, is inexorable and immutable; she never transgresses the laws imposed upon her, or cares a whit whether her abstruse reasons and methods of operation are understandable to men. For that reason it appears that nothing physical which sense experience sets before our eyes, or which necessary demonstrations prove to us, ought to be called in question (much less condemned) upon the testimony of biblical passages which may have some different meaning beneath their words. For the Bible is not chained

in every expression to conditions as strict as those which govern all physical effects; nor is God any less excellently revealed in Nature's actions than in the sacred statements of the Bible. . .

. . . I do not feel obliged to believe that the same God who has endowed us with senses, reason and intellect has intended us to forego their use and by some other means to give us knowledge which we can attain by them. He would not require us to deny sense and reason in physical matters which are set before our eyes and minds by direct experience or necessary demonstrations. This must be especially true in those sciences of which but the faintest trace (and that consisting of conclusions) is to be found in the Bible.
. . .It follows as a necessary consequence that, since the Holy Ghost did not intend to teach us whether heaven moves or stands still, whether its shape is spherical or like a discus or extended in a plane, nor whether the earth is located at its center or off to one side, then so much the less was it intended to settle for us any other conclusion of the same kind. And the motion or rest of the earth and the sun is so closely linked with the things just named, that without a determination of the one, neither side can be taken in the other matters. Now if the Holy Spirit has purposely neglected to teach us propositions of this sort as irrelevant to the highest goal (that is, to our salvation), how can anyone affirm that it is obligatory to take sides on them, that one belief is required by faith, while the other side is erroneous? Can an opinion be heretical and yet have no concern with the salvation of souls? Can the Holy Ghost be asserted not to have intended teaching us something that does concern our salvation? I would say here something that was heard from an ecclesiastic of the most eminent degree: "That the intention of the Holy Ghost is to teach us how one goes to heaven, not how heaven goes."