

Reading Guide to the Scientific Revolution: New Directions in Thought and Culture in the 16th and 17th Centuries.

DIRECTIONS: Study each document or reading—respond to the questions in your notes. Organize your notes in like fashion. Leave room after each reading for additional discussion notes.

EVE OF THE SCIENTIFIC REVOLUTION:

Michael Postan, “Why Was Science Backward in the Middle Ages” (p. 229-231 Sherman):

- Why was scientific innovation lacking in the Middle Ages?
- What typically medieval traits discouraged the men of the Middle Ages from Scientific exploration?

Sir George Clark, “Early Modern Europe: Motives for the Scientific Revolution.” (p. 231)

- What led men to engage in scientific work in the 17th century more so than in the preceding centuries?

Rembrandt van Rijn, “The Anatomy Lesson of Dr. Tulp” (p. 228-231)

- The changing views toward science and medicine as suggested by this painting
- How does this painting reflect what is being discussed in the first two readings?

Chapter 14 Introduction (p. 449-450 Kagan):

- What scientific changes swept through Europe in the 16th and 17th centuries?
- What was the study of science called in this era?
- What other two forces in history *simultaneously* challenged European thought and culture? What impact did these two forces have on European thought?
- How would you define the term “Scientific Revolution”? How does the author define this era? In what ways was the event truly revolutionary?

EVENTS AND CHARACTERISTICS OF THE SCIENTIFIC REVOLUTION:

Nicolaus Copernicus Rejects an Earth-Centered Universe (p 450-455 Kagan):

- Describe the Ptolemaic System. (Key terms: Ptolemy, Geocentrism, Aristotle, epicycle, deferent)
- Discuss the contributions of Copernicus, Brahe, Kepler, Galileo, and Newton to the new science of the 16th and 17th century? Which do you think made the most important contributions and why?

Philosophy Responds to Changing Science (p.455-457 Kagan):

- How did the proponents of the new science seek to explain the world? How did this view influence society? Explain.
- According to Francis Bacon...
 - What was the goal or purpose behind the new science?
 - What approach should natural philosophers employ in the search of truth and in the discovery of new knowledge?

Women in the World of the Scientific Revolution (p. 467-468 Kagan):

- What factors prevented women from fully participating in the new science?
- Discuss the contributions of Margaret Cavendish.

CHALLENGES TO THE SCIENTIFIC REVOLUTION:

The New Science and Religious Faith (p. 468-469 Kagan):

- What potential challenges did the new science pose to religion?
- Describe the case of Galileo.

Galileo Galilei, "Letter to Christina of Tuscany: Science and Scripture." 1615. (p. 226-227 Sherman)

- According to Galileo, what kind of topics or questions are appropriately scientific and which are appropriately religious?
- How do Galileo's views relate to Petrarch's who wrote in an earlier time?
- Why are Galileo's views so crucial to the new movement in science?

"The Papal Inquisition of 1633: Galileo Condemned." (p. 227 Sherman)

- Why were Galileo's views so threatening to the Church?
- What are some long-term consequences of the Church's stance toward these views?

Selected Quotes From the Scientific Revolution:

DIRECTIONS: Study each of the following quotations...seek to understand how each reflects ideas and characteristics of the Scientific Revolution.

Galileo Galilei, "Philosophy is written in that great book which ever lies before our eyes—I mean the universe—but we cannot understand it if we do not first learn the language and grasp the symbols in which it is written. This book is written in the mathematical language, and the symbols are triangles, circles, and other geometrical figures, without whose help it is impossible to comprehend a single word of it; without which one wanders through a dark labyrinth.", quoted in E.A. Burt, *The Metaphysical Foundations of Modern Physical Science*, Garden City, NY: Anchor-Doubleday, 1954. p. 75.

Isaac Newton said, "If I had seen farther, it is by standing upon the shoulders of giants." Quoted in a letter to Robert Hooke, a fellow scientist in England.

Sir Francis Bacon, "The men of experiment are like the ant, they only collect and use; the reasoners resemble spiders, who make cobwebs out of their own substance. But the bee takes a middle course: it gathers its material from the flowers of the garden and of the field, but transforms and digests it by a power of its own. Not unlike this is the true business of philosophy." quoted in Franklin Baumer, *Main Currents of Western Thought*, 4th Ed. New Haven, CT: Yale University Press, 1978. p. 281.

Andreas Vesalius, "I am not accustomed to saying anything with certainty after only one or two observations." "*Epistola rationem modumque propinandi radicis Chynae decocti*" (Letter on the China Root), translated by Charles Donald O'Malley. In Charles Donald O'Malley, *Andreas Vesalius of Brussels, 1514-1564* (2nd Ed., 1964), 201.

Ambroise Paré, a French field surgeon, wrote about the following medical breakthrough, "Eventually my oil ran out and I was forced to use in its place a digestive made of the yolks of eggs, rose-oil and turpentine. That night I could not sleep, fearing that because of my lack of cauterization I would find the wounded dead or poisoned. This made me wake up very early to visit them. Beyond my hope, I found those for whom I had used the digestive feeling little pain, their wounds without inflammation, having slept fairly well through the night. Those to whom I had applied the boiling oil I found feverish, with their wounds very painful and swollen. Then I decided never more to burn thus cruelly poor men wounded with gunshot." Quote in '*Apology and Treatise*' (1575)

Galileo Galilei, 'In questions of science the authority of a thousand is not worth the humble reasoning of a single individual'.

Albert Einstein, "Science without religion is lame, religion without science is blind."