

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:

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 relate to what we've already learned this year?

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 Sherman)

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

CHANGING VIEWS SCIENTIFIC VIEWS:

Changing Views of the Universe (p 72-73 Ellis):

- Who defined and supported the geocentric model of the universe?
- Discuss the contributions of Copernicus, Brahe, Kepler, and Galileo. Which do you think made the most important contributions and why?

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?

A New Scientific Method (p. 73-74 Ellis)

- How did Francis Bacon and Rene Descartes each approach the scientific method?
- What role did Margaret Cavendish play in the Scientific Revolution? (class notes)

Breakthroughs in Medicine and Chemistry (p. 75-76 Ellis):

- Describe the contributions of Andreas Vesalius, William Harvey, Anton von Leeuwenhoek, and Robert Boyle.

Isaac Newton Links the Sciences (p. 76 Ellis):

- How did Newton use observations of nature to explain the movements of the planets?
- What are his most important contributions to science and mathematics?

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."