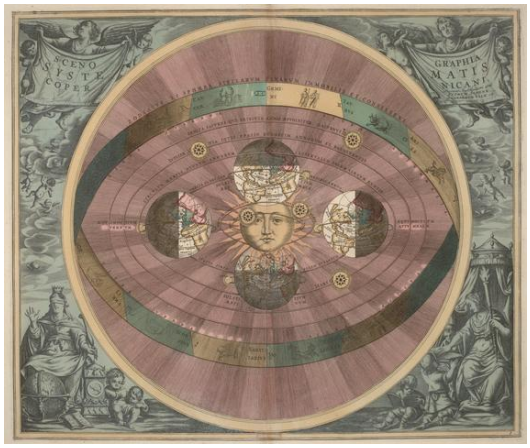
Scientific Revolution

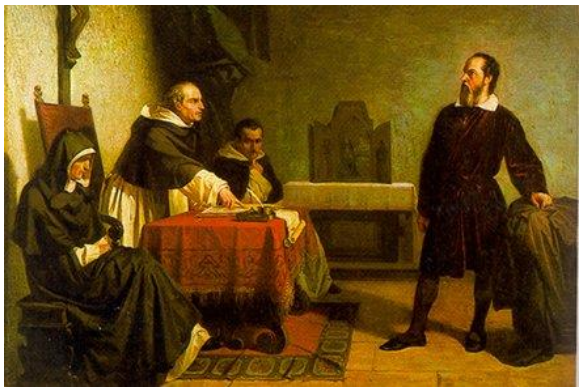
- **Background**
  - "*Intellectual Revolution*"
  - 17th Century age of genius
  - About Ideas, not technology
  - Science before the Scientific Revolution
    - Aristotle
      - 4th Century B.C.E.
      - Geocentric – earth is center of the universe
      - Outward – more pure; crystalline spheres
      - Natural Tendency is rest
        - Things have to be moved
          - Prime mover=God
    - Ptolemy
      - Based on Aristotle's universe
      - 80 concentric spheres from earth
        - Angels fly around
      - Stars were fixed points of light
      - All heavenly bodies revolved around earth
        - All luminous
    - Galen
      - To cure illness = to let out evil spirits
      - Led to practice of Blood Letting
    - Bible
      - Main source of knowledge
    - Dante
      - Hell is the center of the earth
    - Middle Ages
      - Scholasticism
        - Science used to prove religion
    - Renaissance
      - 7 Liberal Arts
      - Not Much Science
      - One Great Scientists
        - Da Vinci
          - Did not communicate ideas
      - Applied reason to scientific data
      - Paved way for enlightenment



Scientists of the Scientific Revolution

- Bacon
  - 1561-1623
  - Scientific Method
    - Inductive (detail -> General)
  - ***Insauratio Magna*** (Great Renewal)
  - Did not understand mathematics
  - Reject everything unless you can prove it
  - Little influence on later scientists; but changed the thought process

- Descartes
    - 1596-1650
    - Deductive (General -> Detail)
    - Mathematician
        - Inventor of Coordinate Geometry
    - *Discourse on Method*
        - Doubted all previous knowledge
    - *Cogito ergo sum*
        - "I think, therefor I am"
    - How to prove what we know
- Copernicus
    - 1473-1543
    - Polish Astronomer
    - **Heliocentric** – earth rotates around the sun
    - Stars were fixed
- Galileo
    - 1564-1642
    - Invented telescope
        - Moon is not luminous
        - Stars and planets are NOT perfect
    - Challenged the church
        - Recanted his beliefs



- Tyco Brahe
    - 1546-1601
    - Built an observatory
- Johannes Kepler
    - Orbits of the planets
    - Elliptical Orbits
        - Ovals
        - Move at different speeds
- Newton
    - Principia
    - Combined all knowledge
    - Theories of gravity and inertia
        - Natural laws
    - Invented calculus
    - Colors are combinations of primary colors
    - Particles of matter attract one another
- Cavendish
    - Woman
    - Created Scientific Gatherings
- Spread of Scientific Revolution
    - Eastern Europe not greatly impacted
    - Protestants more open to new ideas

Religious Implications

- Most scientists were religious
- Heliocentric
    - Man not center of the universe
        - Reduced standing of mankind

- Fixed Heavens
    - Discovered exploding stars, comets, eclipses, etc.
        - Universe is constantly changing
            - Earth like others
                - Christians did not like this notion
        - Heavens are infinite
    - Movement of university is natural state
        - Hand of *Prime Mover* not necessary for planetary motion
    - Universe is mathematical in structure
        - ***Laws of Mechanics*** (laws of motion)
- Increased confidence in human powers
    - Dignity of man
    - Not dependent on God
    - Human reason

Practical Implications

- Demand for evidence
- Law
    - Judge lost discretionary powers
        - To procedure
        - Rules of evidence
            - Belief in witchcraft ended
            - Confession obtained under torture less convincing
        - Hearsay evidence excluded
        - Legal counsel common
            - Rise of attorneys
- Historical Scholarship
    - *Demand for evidence*
        - Collected old primary sources
        - Study of inscriptions on ancient buildings
        - Paleography
            - Science of dating
    - Interest in chronology
    - Questioned religion
        - Origins of books of Old and New Testament
        - Miracles questioned

Governmental Implications

- John Locke
    - Political Scientist
    - State of nature
        - Men have natural rights
    - **Social Contract**
        - Men give government power, government must act in men's best interests
    - **Empiricism**
        - Environment shapes experiences
            - All knowledge comes from sense experience
            - All equal, All able to learn
    - **Liberalism**
        - Improve human nature by improving society
        - Confidence in social programs

- **Natural Law**
  - 17th Century
  - Right vs. Wrong
    - Right is natural
  - Universal
    - No difference in heritage, customs
  - Discovery of natural law through reason