

SIT DOWN. NOTEBOOKS
OUT. WE HAVE A LOT TO
COVER

The Scientific Revolution

Background

- *What did the Renaissance do?*
 - The Renaissance sparked interest and curiosity about many things, allowing people to start to think for themselves
- *What did the Reformation question?*
 - The Reformation led people to question and challenge the original views of God, the church, and salvation

- *At the same time as the Reformation...*
 - Individuals began to challenge the way people viewed their place in the Universe. This became known as the Scientific Revolution.

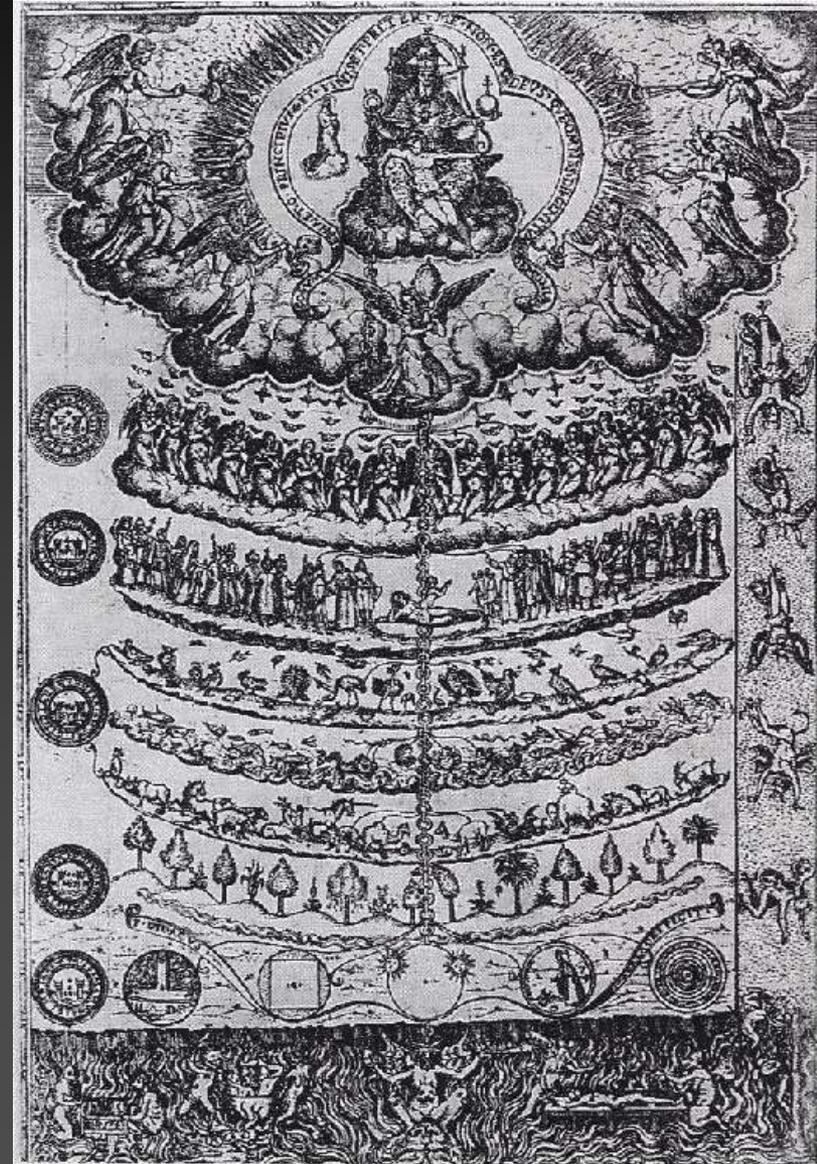
What was the Scientific Revolution?

- The Scientific Revolution was a new way of thinking about the natural world.
- Based on:
 - careful observation of nature
 - a willingness to question widely accepted beliefs
 - Reason
- Result: the expansion of scientific knowledge



The Old World-View

- Primarily Religious
- Scholasticism and deductive reasoning
 - Start with pre-determined outcomes
 - The Bible
 - Classical antiquity
 - Aristotle (384-322 BCE)
 - Ptolemy (83-161 CE)
 - The great “Chain of Being”
- “Science” = “Natural Philosophy”
- **Aristotle and Aquinas are the most influential**



Video

- As we watch the following video, write two things you think are important

The Ptolemaic/Aristotelian System



Geocentric (What does this mean?)

Earth in the Middle

What have we studied so far that
calls all of this into question?

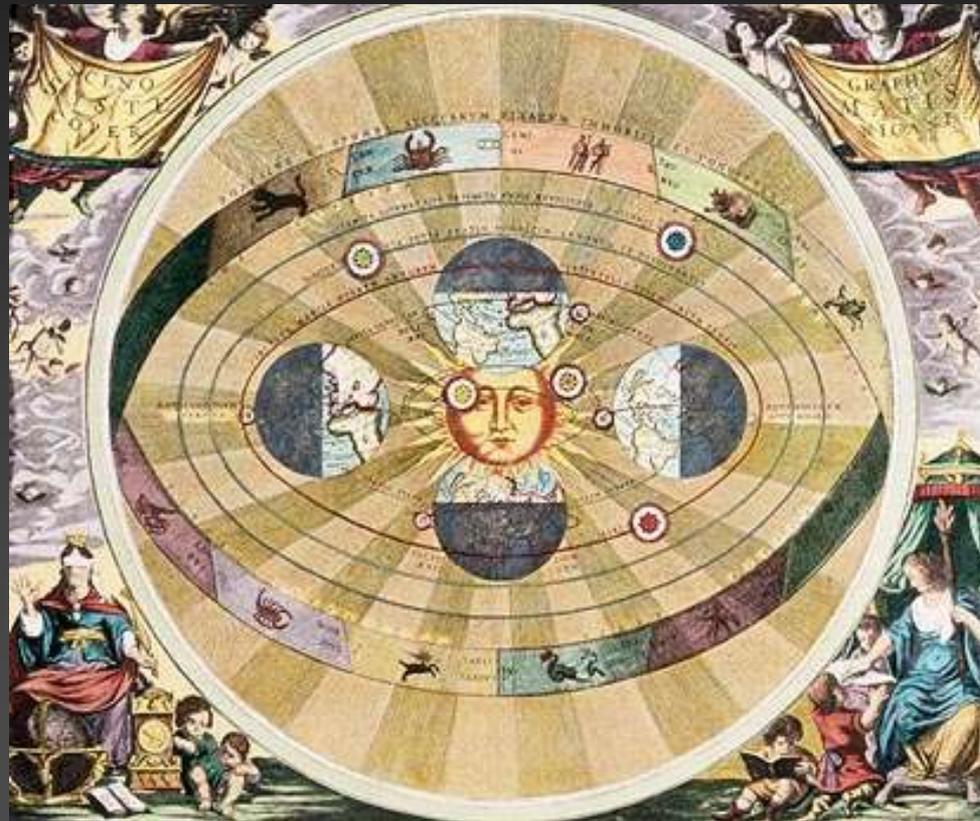
Emerging Skepticism

- Michel de Montaigne (1533-1592)
 - "*Que sais-je?*" (What do I know?)
 - Nothing



Toward a Working Model of the Universe

Nicolaus Copernicus (1473-1543)



Heliocentric- Sun in the Middle

Copernicus

- *On the Revolutions of Heavenly Spheres*
 - Heliocentrism
 - Argued that the earth revolved around the sun
 - Directly challenges the OLD ORDER and to an extent the bible
 - Churches (both Protestant and Catholic) condemn Copernican theory, begin persecution of heliocentric supporters

Tycho Brahe (1546-1601) and Johannes Kepler (1571-1630)



Elliptical Orbits

Astronomists

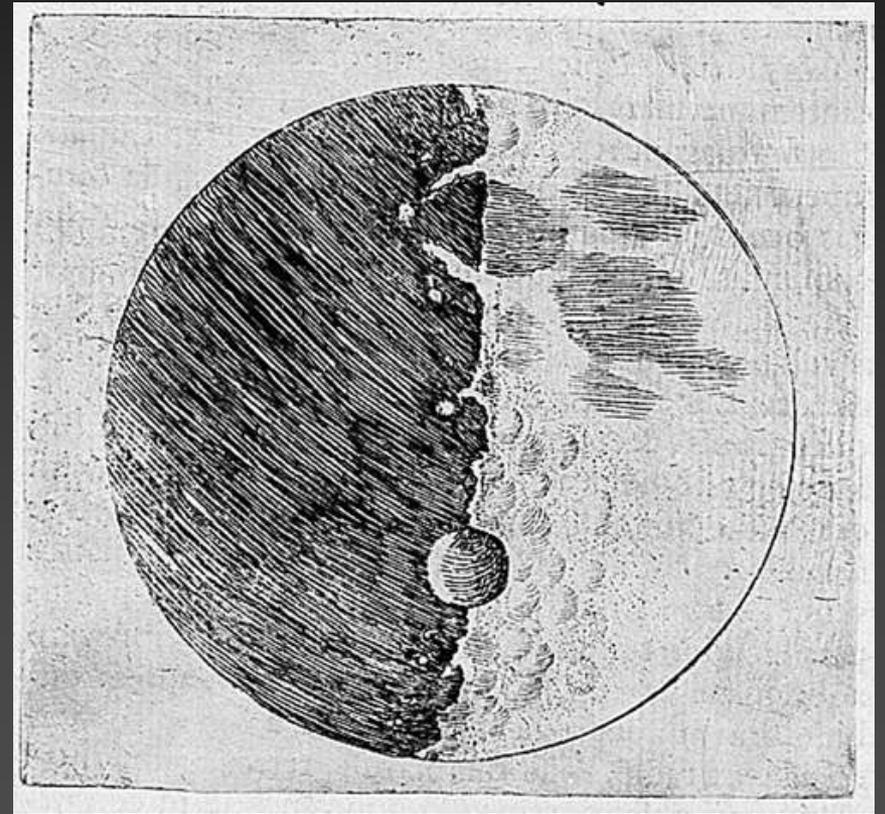
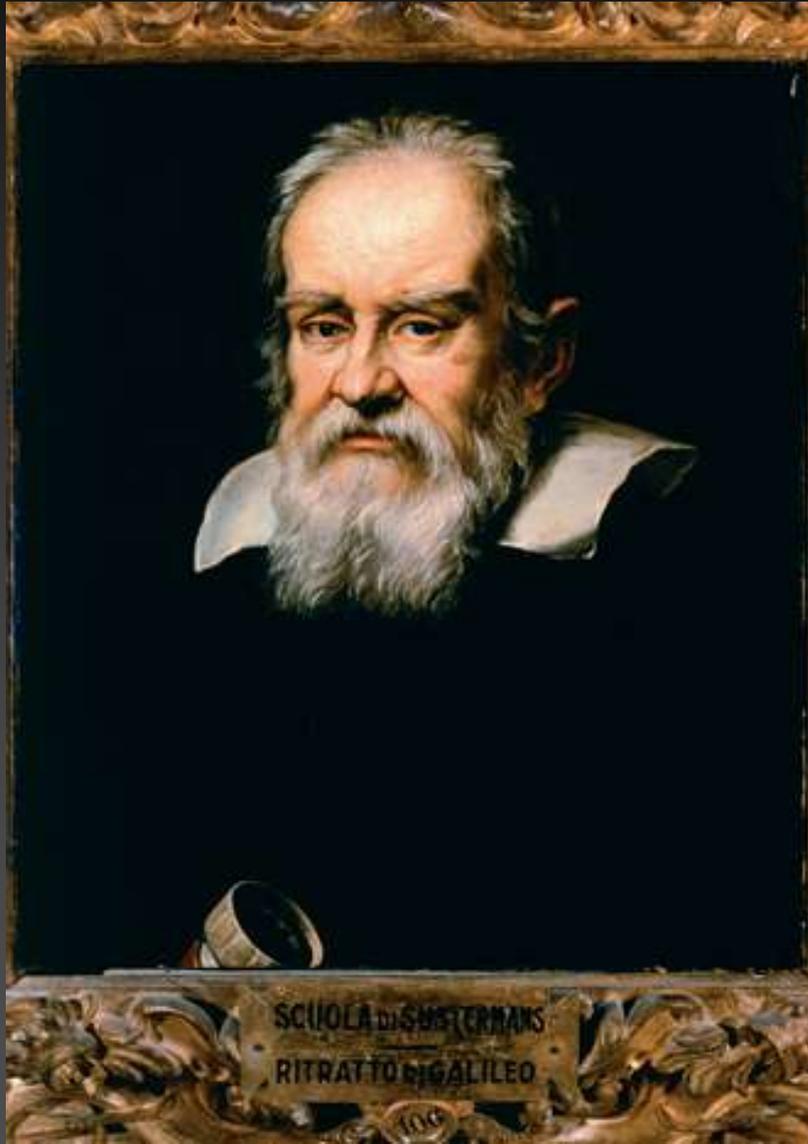
Brahe

- Builds best observatory in Europe and collects data on universe
- His data later proves Copernicus' theory

Kepler

- Protestant, assistant to Brahe
- Mathematically proves Copernican theory
- Three laws of planetary motion

Galileo Galilei (1564-1642)



Video

- As you watch the following video write down 2 important things about Galileo

Galileo 1564-1642

- Develops the law of motions
- Validates heliocentric view with the telescope
- Catholic Church deems him to be heretical
 - Galileo is forced to retract his support of Copernican theory
 - What does this show?



Galileo facing the Roman Inquisition by Cristiano Banti (1857)

Sir Isaac Newton (1642-1727)



PHILOSOPHIÆ
NATURALIS
PRINCIPIA
MATHEMATICA.
DEFINITIONES.

DEFINITIO I. (*)

Quantitas Materia est mensura eiusdem orta ex illius Densitate & Magnitudine conjunctim.

QUANTITAS materiae est mensura eiusdem orta ex illius densitate & magnitudine conjunctim. *Idem intellige de Nive & Pulveribus per compressionem vel liquefactionem*

Tom. I. A

*Lien prime definitiones NEWTONIANÆ sūt aliquo populari viderentur explicatio-
nem; in ista tamen opere castel hinc, necesse fore ista rationi proximanda iudicamus,
que ad maiora viam ferunt. Primum que in posterius sequitur enuncietur Mediatione prin-
cipia transferre non alio se erit, sicut in Lectione labori parantur, cum ad magis conueni
seruare negotium demonstrationem ferio.*

(*) r. Materiam est substantiam reus illi, mobilis, extensibilis: Spacium pa-
tensque praeus, solida per tempera-
tum est illa inuenta, penetrabilis, sui

Newton (1642-1727)

- ***Principia***

- THE MOST IMPORTANT SCIENCE BOOK MADE
- Combines the work of Copernicus, Kepler, and Galileo into a theory explaining the design of the universe
- God does not have an active participation in the natural world and is not needed to explain nature
 - **DIRECT CHALLENGE TO THE OLD VIEW**
 - **Foundation of deism**

From Science to Philosophy

Francis Bacon (1561-
1626)



René Descartes (1596-
1650)



Baconian Thought

- *The Advancement of Learning* (1605)
- *Novum Organum* (1620)
- Anti-scholasticism
 - Empiricism
 - Knowledge only comes from sensory experience
 - Inductive reasoning
 - Start with a question, end with a certainty
 - Modern scientific method

Video

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Cartesian Thought

- *Discourse on Method* (1637)
- Systematic doubt
 - “*Cogito ergo sum*”
 - I think therefore I am
- Deductive reasoning
- Rationalism
- “Cartesian Dualism”
 - Divided all existence into the spiritual and the material
 - Spirituality can only be examined through logic. The material world is subject to scientific method

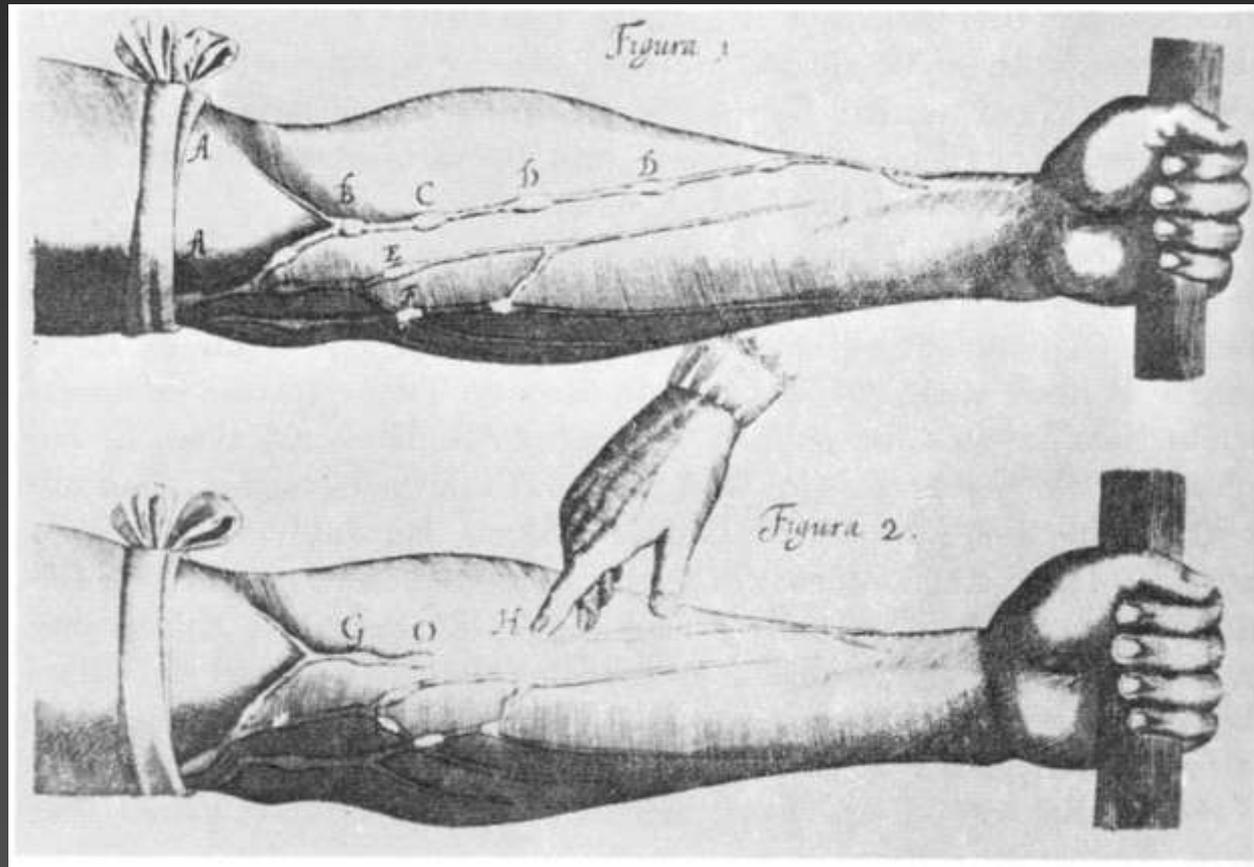
Modern Application

Baconian empiricism and induction
+ Cartesian rationalism and deduction

= The modern scientific method

William Harvey (1578-1657)

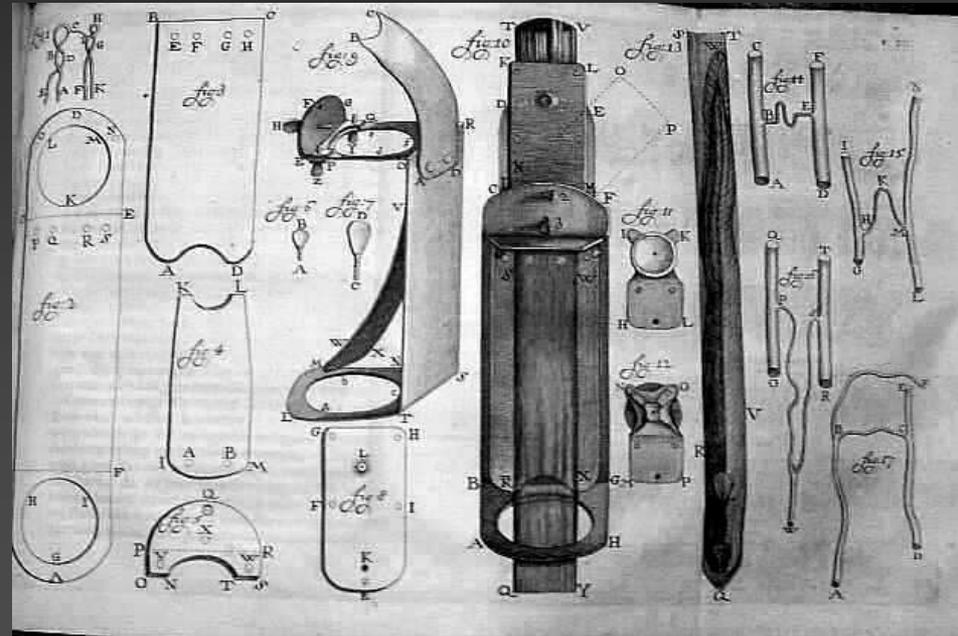
- *On the Movement of the Heart and Blood* (1628) (how blood circulates)



Anton van Leeuwenhoek (1632-1723)



Father of the Microscope



Women in the Scientific Revolution

- The same factors that had historically excluded women from participating in intellectual life continued during this time
- Margaret Cavendish broke the mold and actively participated in the scientific community
 - We will see more participation of women during the Enlightenment

