Aristotle:

- 4th century BCE Greek philosopher and scientist
- Wrote several scientific works
- His work laid the foundation for scientific study through the medieval era
- Gravity-Theory of falling objects

Ptolemy:

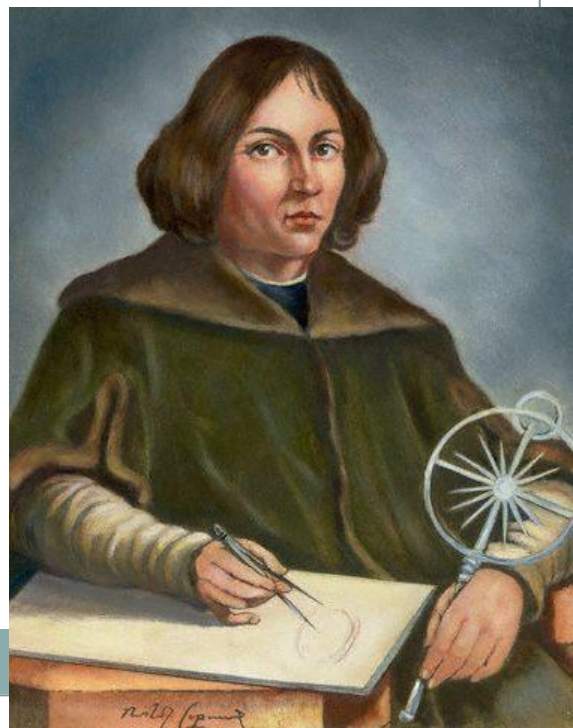
Ptolemy

- 2nd century CE Greek astronomer, mathematician, and geographer
- Greatest astronomer who lived
- Created the Geocentric model of the universe
- Believed that Earth resided at the center while planets circled in different, crystal like spheres

Nicholas Copernicus:

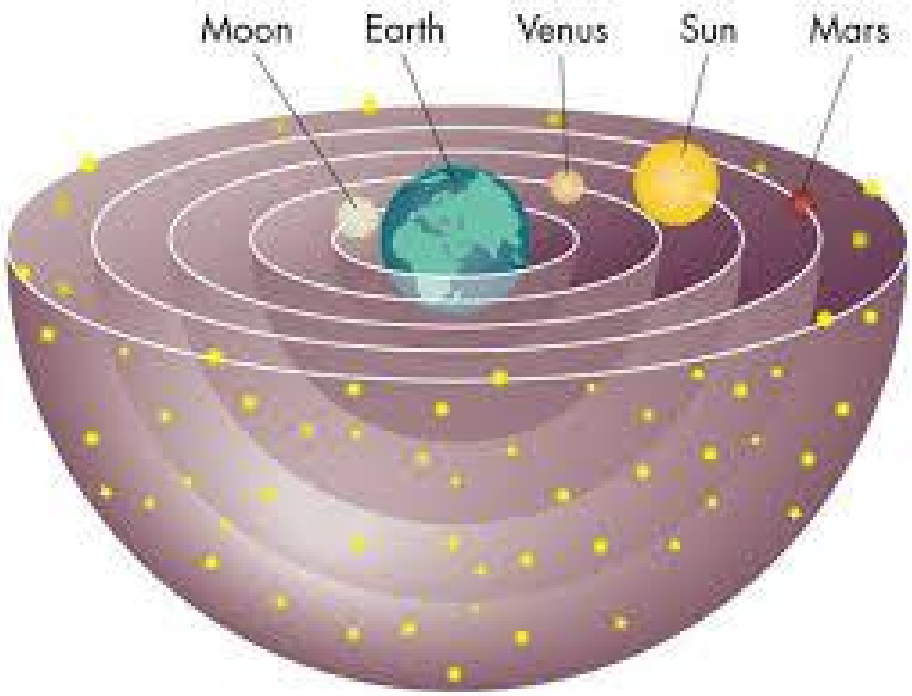
The Heliocentric Model

- Polish astronomer
- Published the book *On the Revolutions of the Heavenly Spheres*
- Came up with the Heliocentric universe where all the planets circled the sun, the moon circled the Earth, and the Earth was on an axis
- Mathematical errors (he divided by zero)
- The size of the universe is limited
- Contradicted the church's beliefs



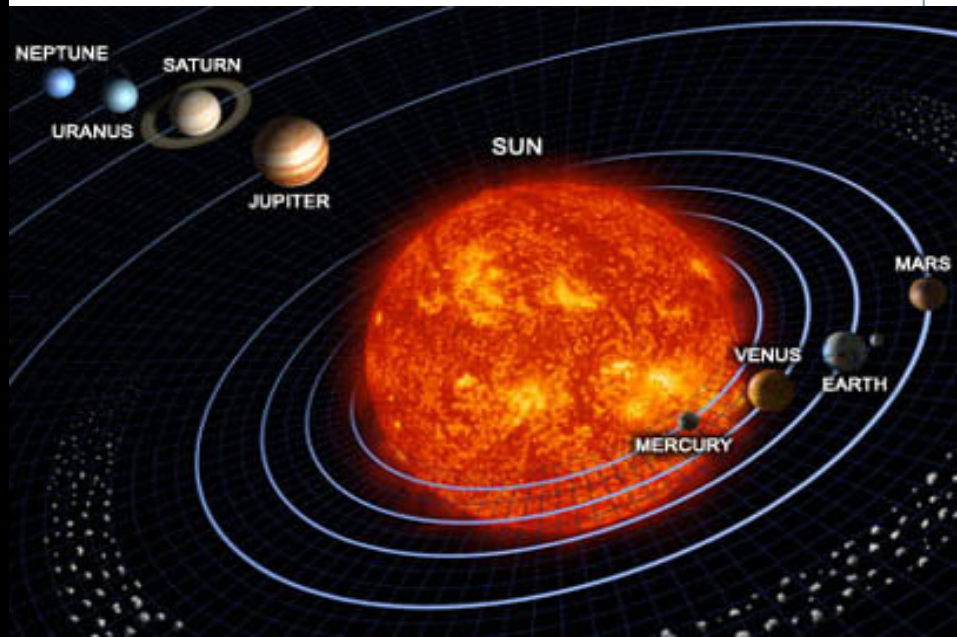
Geocentric:

- The Earth is at the center of the universe; all heavenly bodies move around the Earth



Heliocentric:

- The Sun is at the center of the universe; all heavenly bodies move around the Sun including the Earth



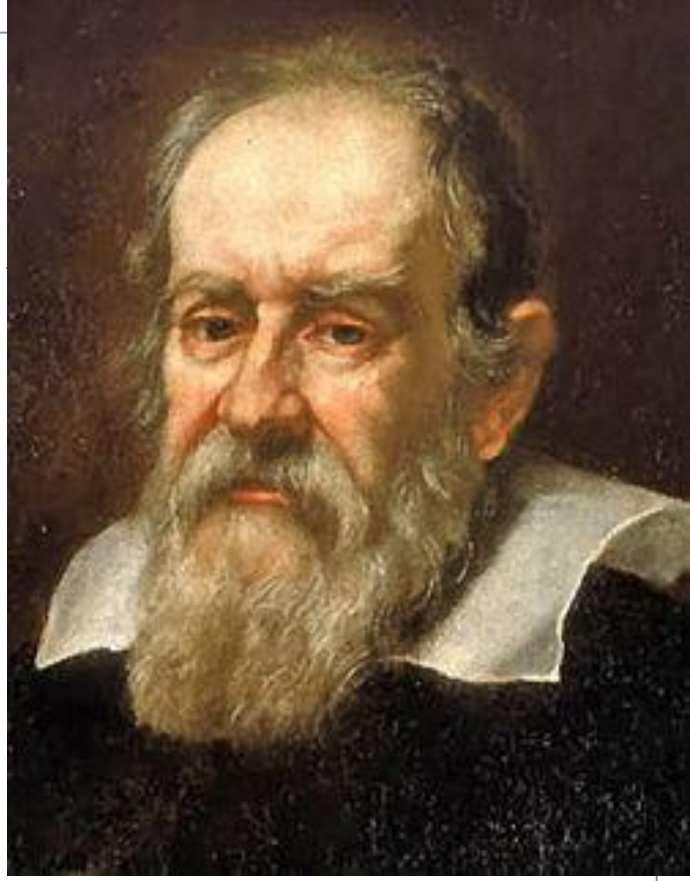
Tycho Brahe:

- Danish astronomer
- Amassed accurate astronomical data
- Theorized a system distinct from both the Ptolemaic and Copernican ones
- Argued that the Moon and Sun revolved around the Earth while other planets revolved around the Sun

Johannes Kepler:

- German astronomer and mathematician
- Student of Brahe
- Didn’t agree with Tycho’s interpretation of data
- Disagreed with Copernicus, claiming that other bodies moved in elliptical motion, as opposed to circular motions
- Theorized three laws of planetary motion using Tycho’s data

Galileo Galilei:



- Italian mathematician, astronomer
- "Father of Modern Science"
- First European to use a telescope to examine the moon's craters and mountains as well as the moons of Jupiter
  - Proved that planets and moons are composed of material and not pure light as suggested by Ptolemy

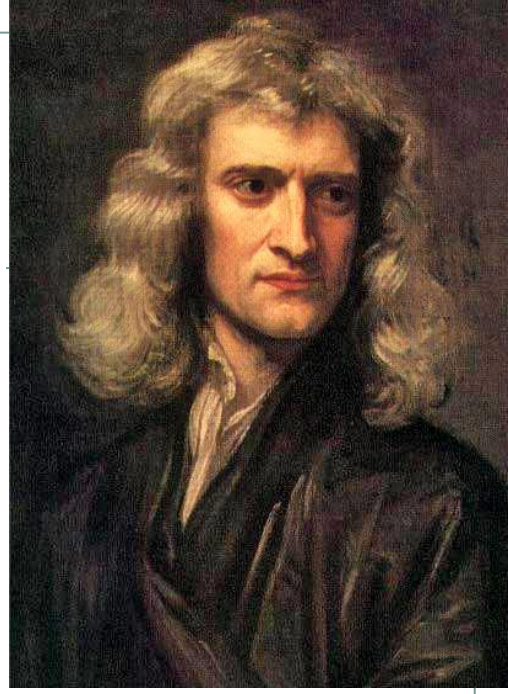
Galileo Galilei

Galileo vs. the Church:

- Galileo had proven Copernicus's heliocentric model of the universe
- The church condemned heliocentric conceptions of the universe
- 1633- Galileo is brought to trial by the Catholic Church for heresy
  - An opinion that goes against the teachings of the Church
- Galileo recants, but he is put under house arrest for the rest of his life

Sir Isaac Newton:

Sir Isaac Newton



- English astronomer, physicist, and mathematician
- Synthesized the works of Copernicus, Kepler and Galileo
- Wrote *Mathematical Principles of Natural Philosophy*, this work is known as the The Principia
- In the Principia, Newton defined three laws of motion that govern the planetary bodies
- Universal law of Gravitation- explains why the planetary bodies do not go off in straight lines but instead continue to orbit around the sun

- *Legend holds that Newton "discovered" gravity when an apple fell on his head from a nearby tree, although many believed Newton, who loved to tell stories, many believe he made the whole thing up*

Sir Isaac Newton Cont.:

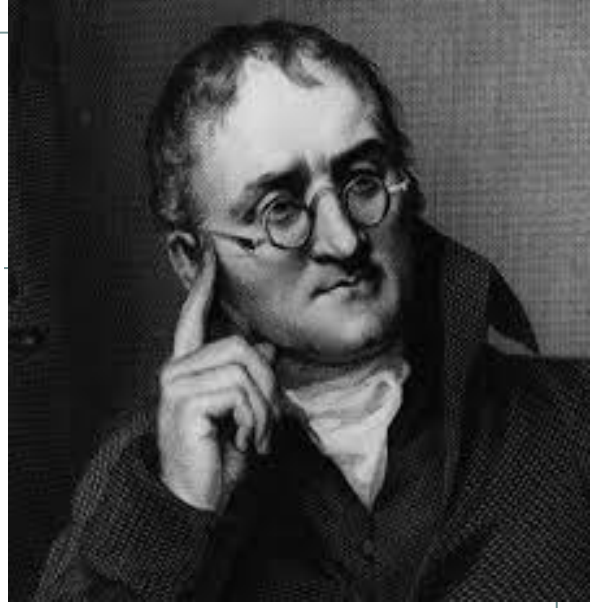
Made many innovations:

- white light is composed of different colors and rainbows
- nervous system is electrical
- calculated sound waves
- found the density of the Earth
- established Calculus

Newton's Legacy:

- He gave the world a picture of the universe as a huge, regulated, and uniformed machine

John Dalton:



- John Dalton develops the first scientific atomic theory, which is sometimes called the billiard ball model

Dalton's Atomic Theory:

1) All matter is composed of tiny particles called atoms which cannot be subdivided

2) The atoms of an element have identical properties while the atoms of different elements have other properties

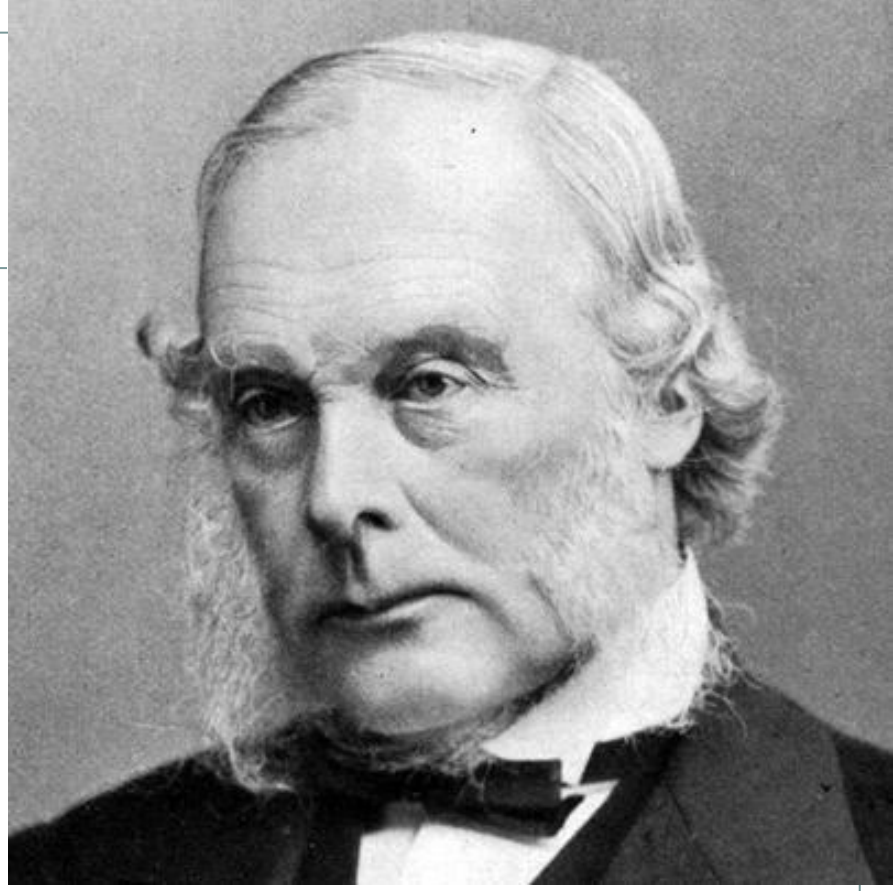
3) Atoms combine in small whole number ratios to form chemical compounds

4) Reactions involve reorganization of atoms (combine, separate, rearrange); the atoms themselves do not change

Louis Pasteur:

- Pasteur discovered how to remove bacteria from different liquids
- Discovered that heating materials will kill bacteria within it- pasteurization
- Helped explain why immunization works

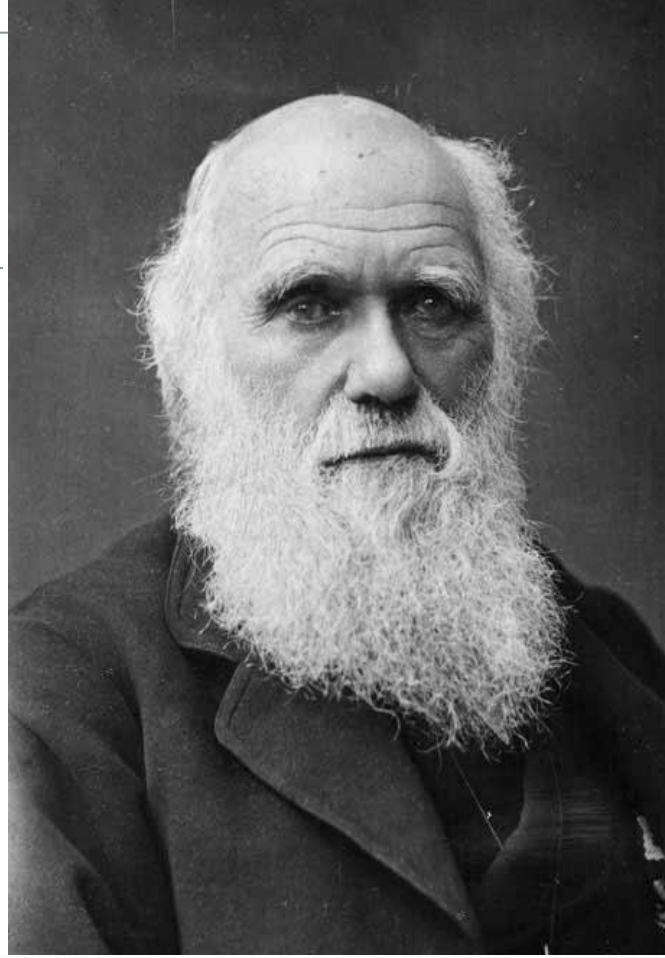
Joseph Lister:



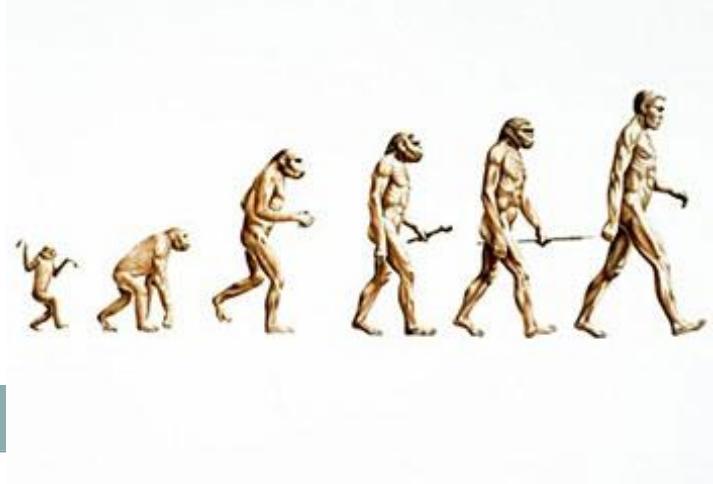
- Lister was known for using antiseptics in hospitals
- Lister would use strong chemicals to kill bacteria in operating rooms
- Antiseptics, as they would later be called, prevented the spread of infection within hospitals

Charles Darwin:

Islands of Theory: Charles Darwin and Why Evolution Occurs



- Pioneered the evolutionary theory
- Proposed the origin of species resulting from natural selection:
  - Organisms produce many offspring
  - Competition for food, territory, mates, etc.
  - Those with best traits survive
  - Organisms change over many generations
- Time Frame: Millions of Years



Exit-slip:

- **What are the main two theories on the universe? Describe them.**
- **Who proved the Copernican Theory?**
- **Why did the Church not like Galileo's theory?**
- **What is pasteurization?**