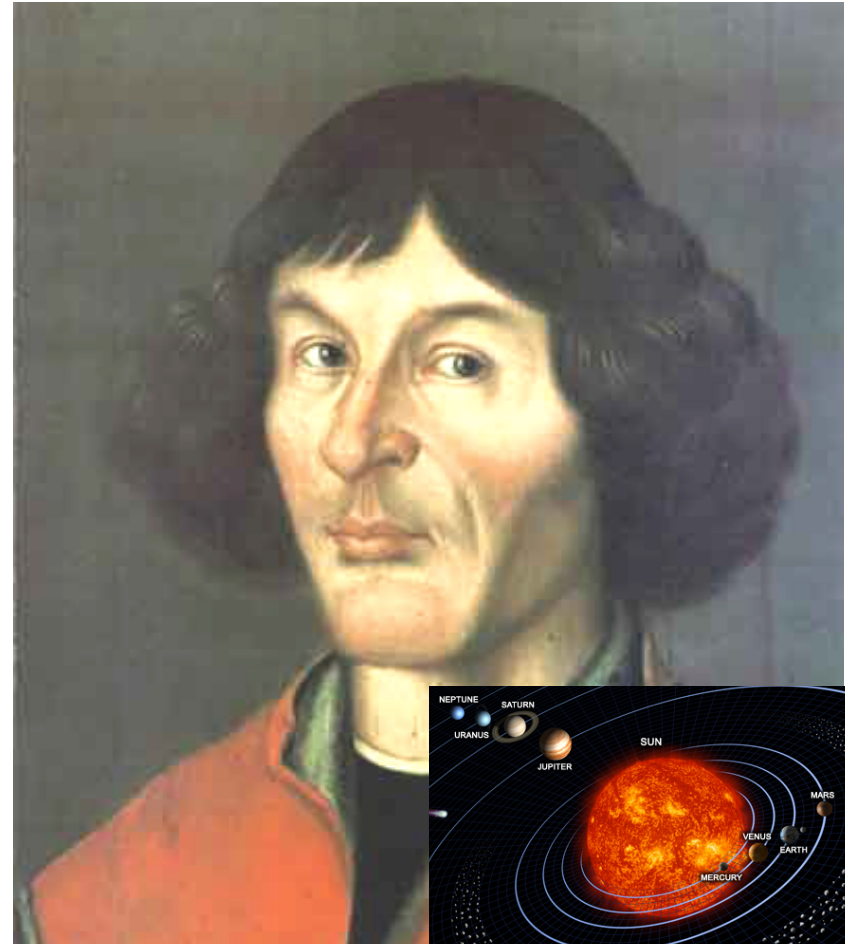# SSWH13 The student will examine the intellectual, political, social, and economic factors that changed the world view of Europeans.

a. Explain the scientific contributions of Copernicus, Galileo, Kepler, and Newton and how these ideas changed the European world view.
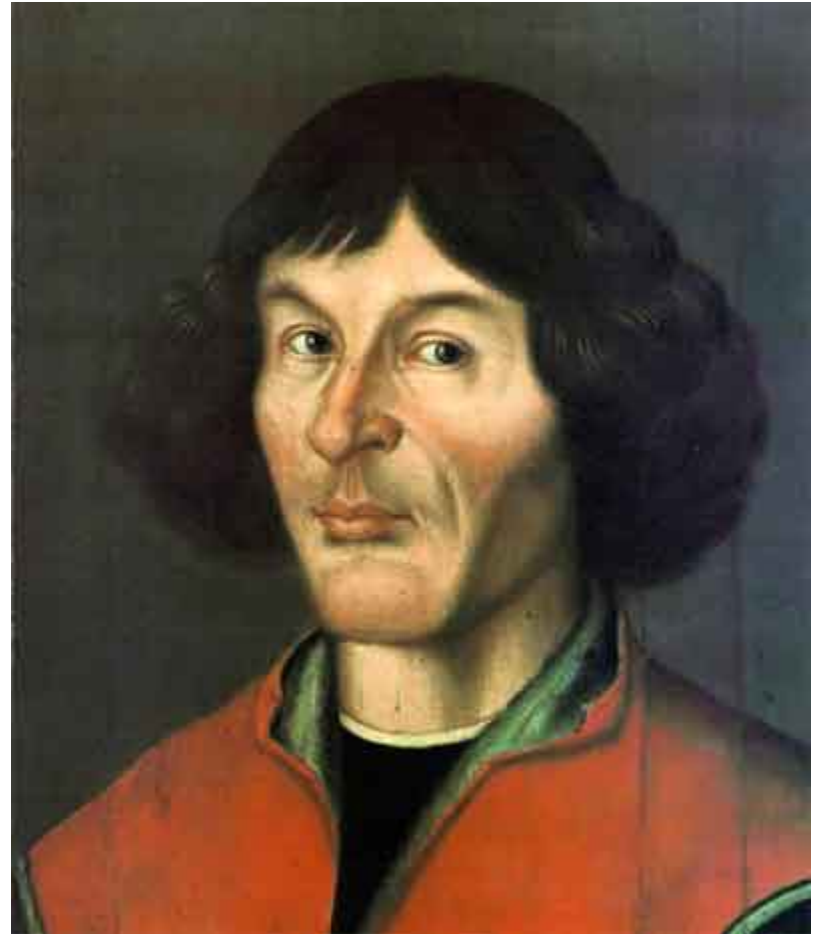
Copernicus (1500s)

- Copernicus was a Polish astronomer and mathematician who founded the idea that the Earth rotated on it's axis, and revolved around the Sun (heliocentric)

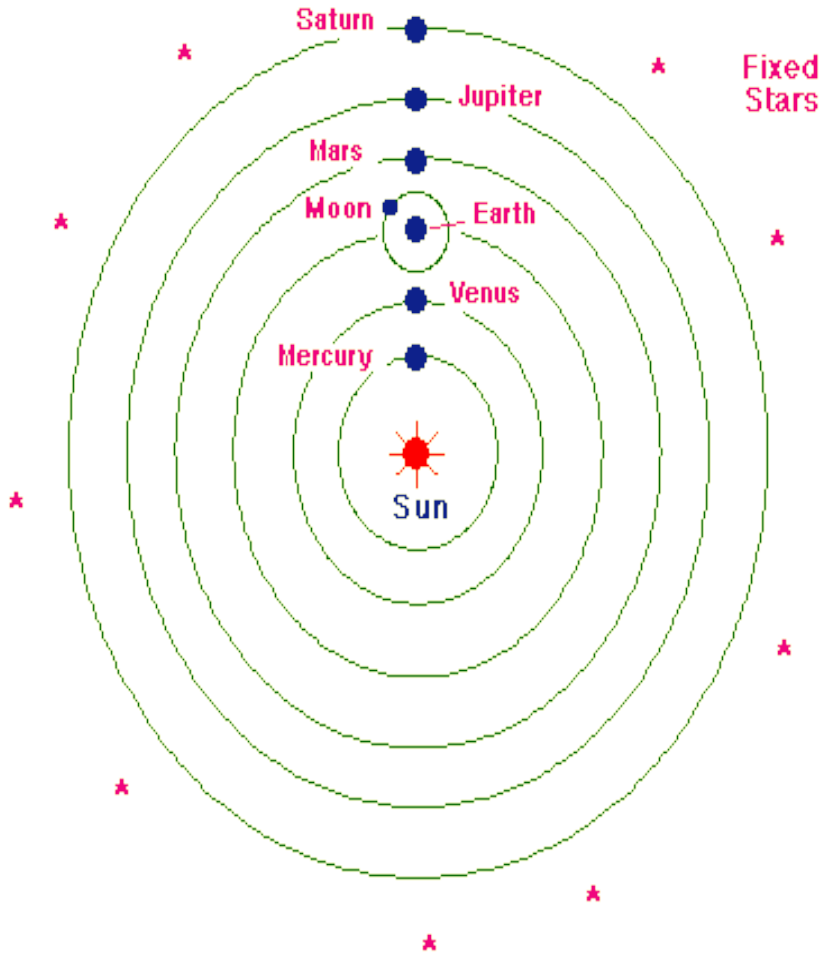- Popular belief was that the Earth was the center of the universe

Nicolaus Copernicus

- Introduced the Heliocentric theory.

- It states that the stars, the earth, and other planets revolved around the sun.

- Scholars and clergy rejected this idea because it contradicted their teachings.
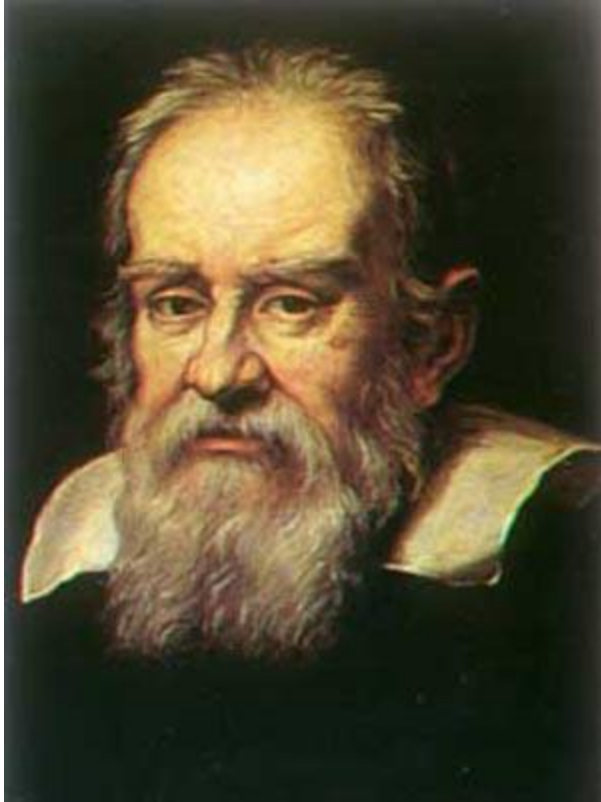
Copernicus

- Fearing ridicule, he did not publish his findings until 1543, the last year of his life.

- Future scientist would build on the foundations that he laid.

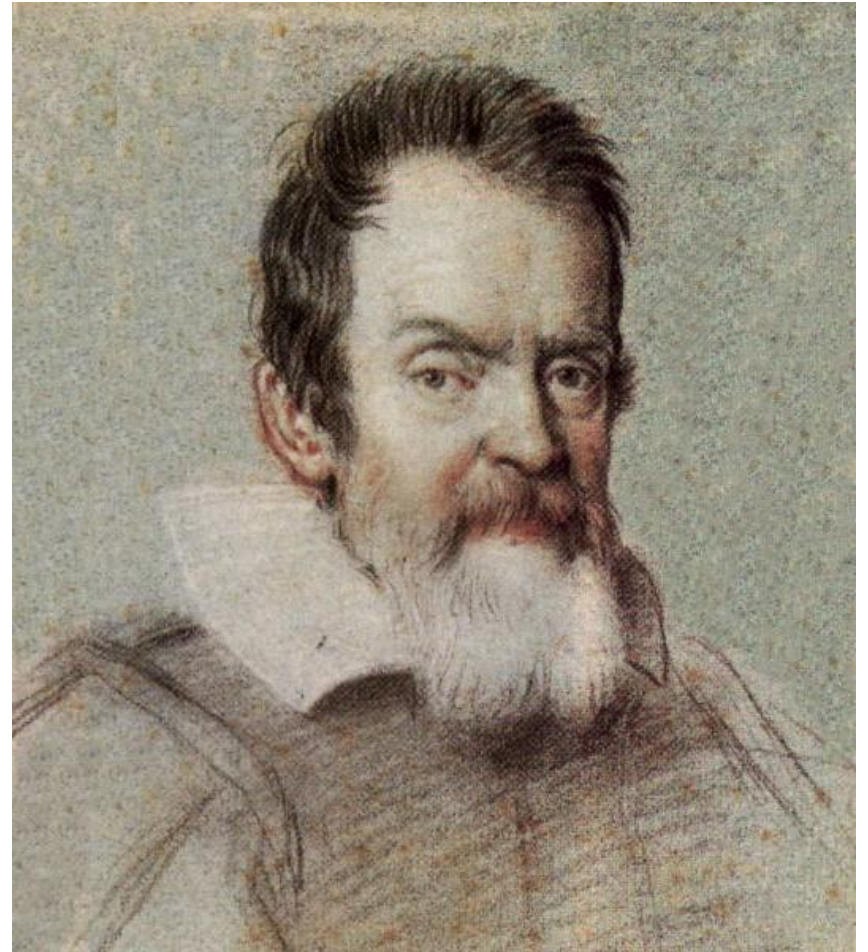- His book was entitled *On the Revolutions of the Heavenly Bodies*.

Galileo (1560s-1640s)

- Galileo was an Italian scientist who supported Copernicus' heliocentric ideas

- Discovered four moons around Jupiter and that the Earth's moon's surface was rough

- His ideas led to the development of the scientific method

Galileo Galilei

- Built his own telescope and used it to study the heavens.

- Published a small book called the *Starry Messenger.*

- Found that Jupiter had four moons and that the sun had dark spots.

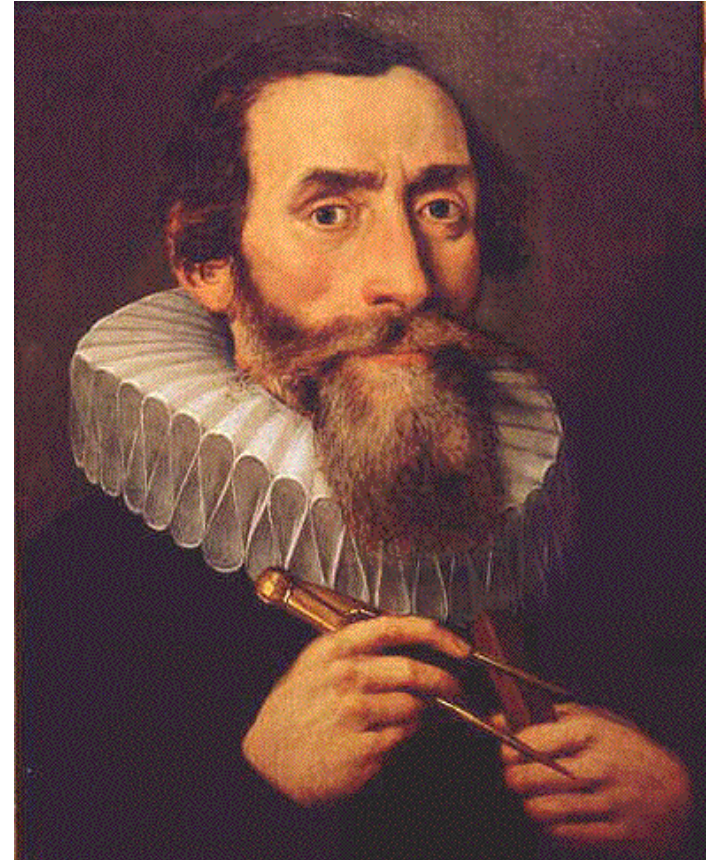- Said that the earth's moon had rough, uneven surface.

Galileo

- His teachings came into conflict with church teachings.

- He was summoned to appear before the Pope Urban VIII.

- Under threat of torture he agreed his findings were false.

- He lived the rest of his life under house arrest.

"The Universe is like a clock, with its parts all working together perfectly in ways that can be expressed mathematically. God is the creator of this orderly universe. He is the clockmaker that set everything in motion."

- Galileo

Kepler (1570s-1630s)

- Kepler, a mathematician, showed that the planets traveled in an elliptical path around the sun instead of the widely believed circular path

- Ideas led to the development of the scientific method

Johannes Kepler

- Concluded that mathematical laws govern planetary motion.
- The planets revolve around the sun in elliptical orbits instead of circles.
- Showed that Copernicus's basic ideas were true and could be proved by using math.
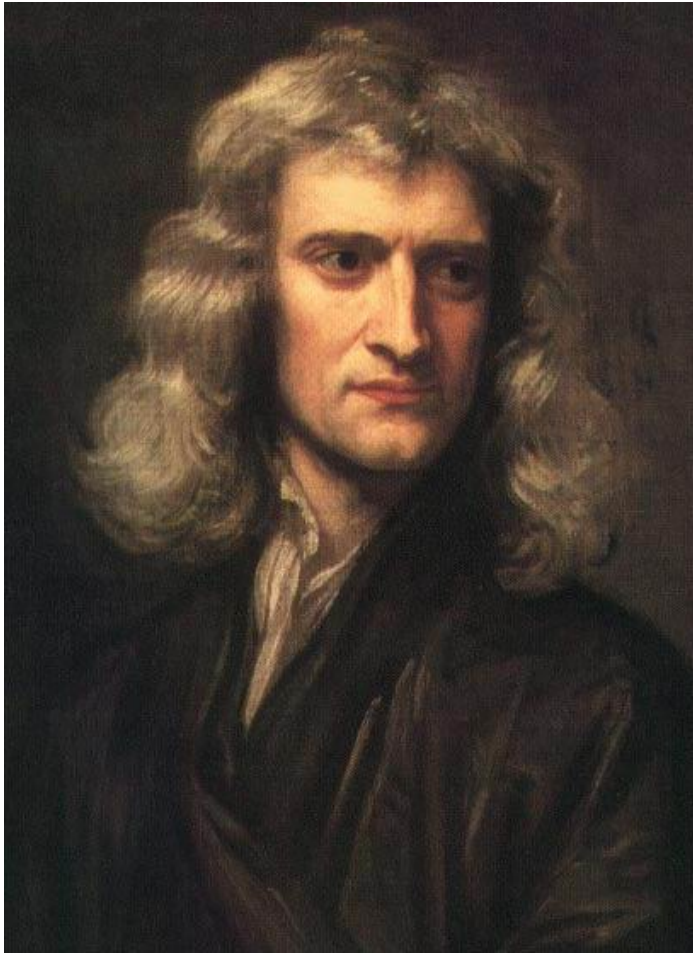
Newton (1640s-1720s)

- Newton, an English scientist, discovered the universal law of gravity
- His law stated that the same principles governed gravity on both the earth and in the solar system
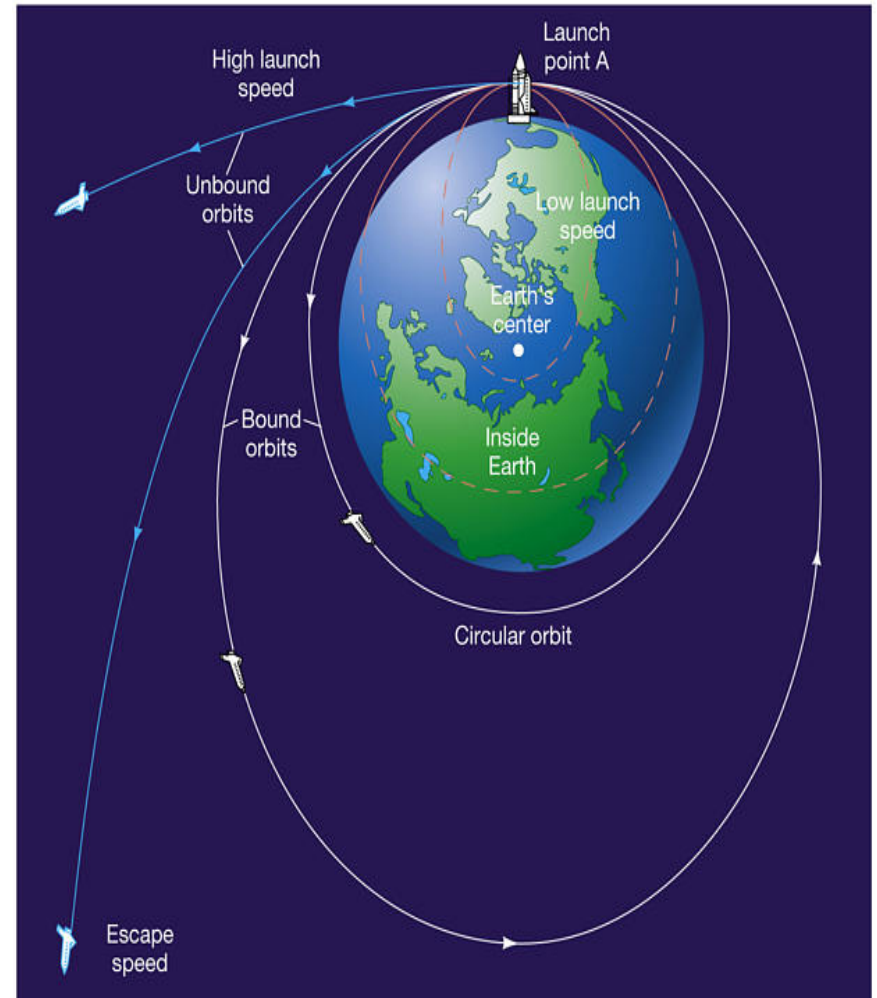
Sir Isaac Newton

- Tried to prove that all physical objects were equally affected by the same forces.

- He said the same force ruled the motion of the planets and all matter on earth and in space.

- He came up with the *Law of Universal Gravitation*.

Law of Universal Gravitation

- Every object in the universe attracts every other object.

- The degree of attraction depends on the mass of the object and the distance between them.

- Newton published his ideas in The *Mathematical Principles of Natural Philosophy*.

The Scientific Evolution

- All of these discoveries went against the teachings of the Catholic Church
- Many scientists of the time period were pressured by the Church not to print their theories
- These early scientists laid the groundwork for the scientific revolution where ideas were based on observation and fact and not on religious or ancient beliefs

b. Identify the major ideas of the Enlightenment from the writings of Locke, Voltaire, and Rousseau and their relationship to politics and society.
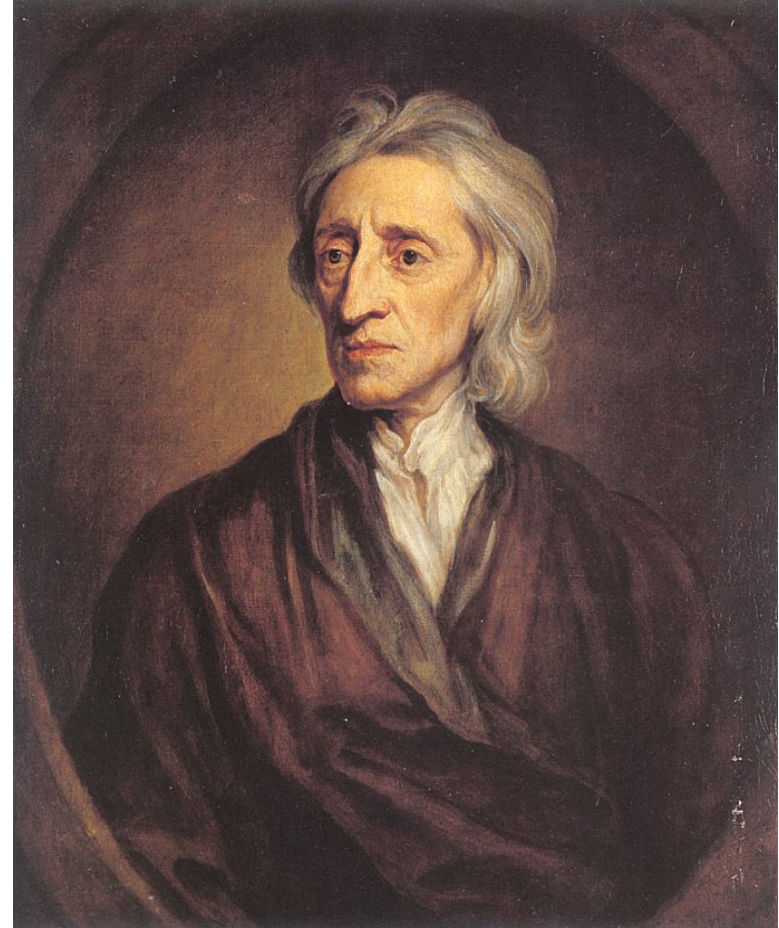
Enlightenment

- Ideas of Enlightenment Thought:

- The universe can be understood through reason
- Human experience is the basis for understanding the truth
- Religion has no place in the understanding of the physical universe
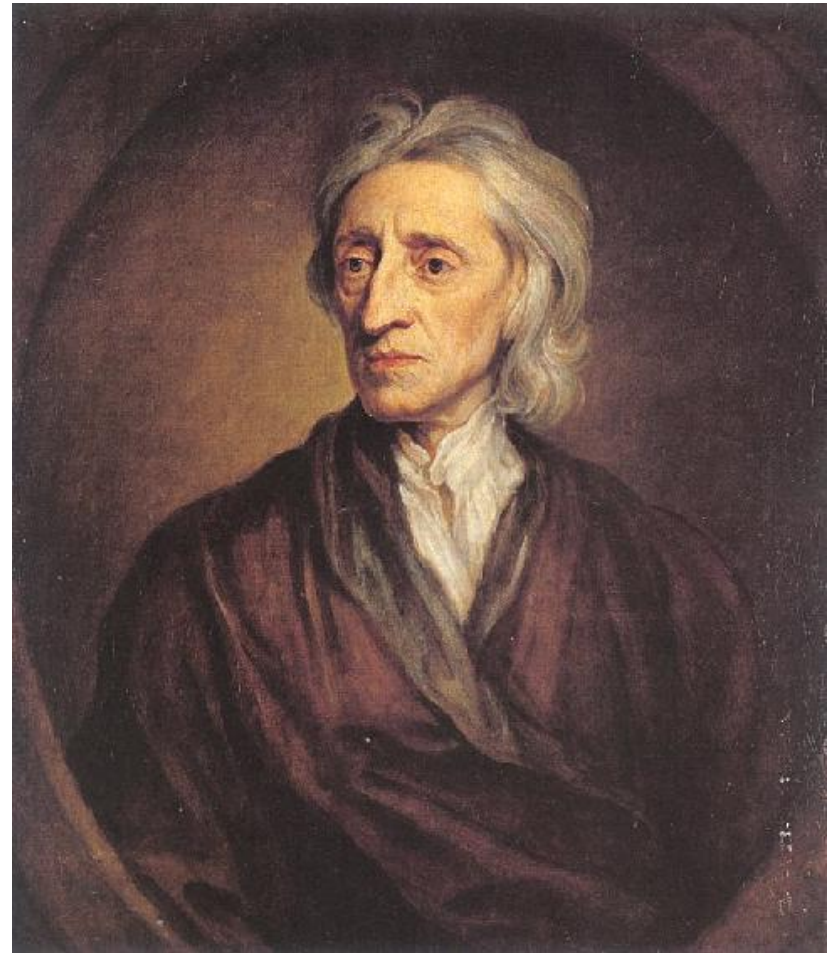
John Locke (1630s-1700s)

- Locke believed people could learn and improve themselves through their experiences
- Believed in the idea that all people are born with 3 basic <u>natural rights:</u> life, liberty, and property and that the purpose of government is to protect these rights
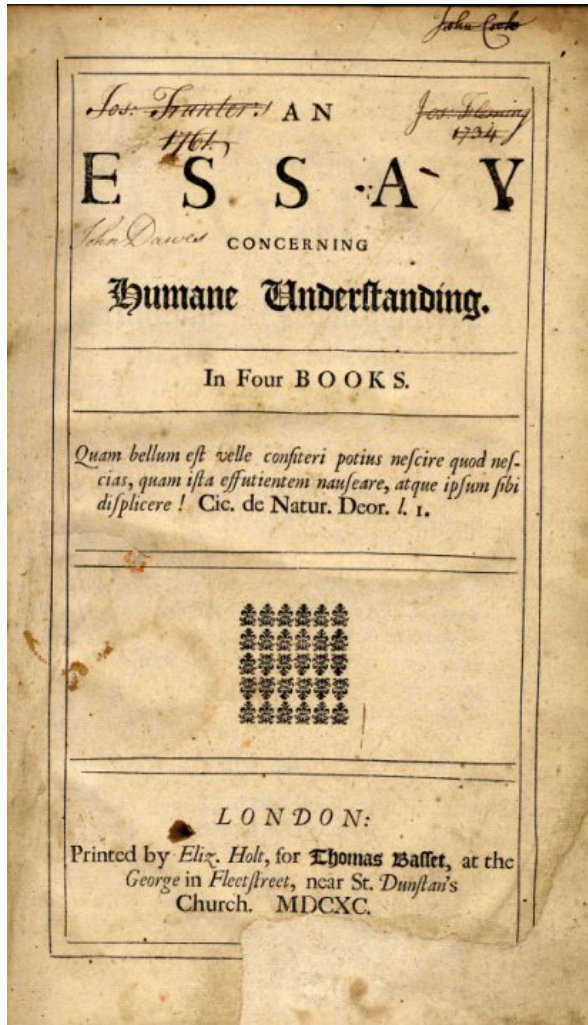- A government's power comes from the people

John Locke

- Believed that people could learn from experience and improve themselves.

- People have the natural ability to govern their own affairs and to look after the welfare of society.

- Locke criticized absolute monarchy and advocated self-government.
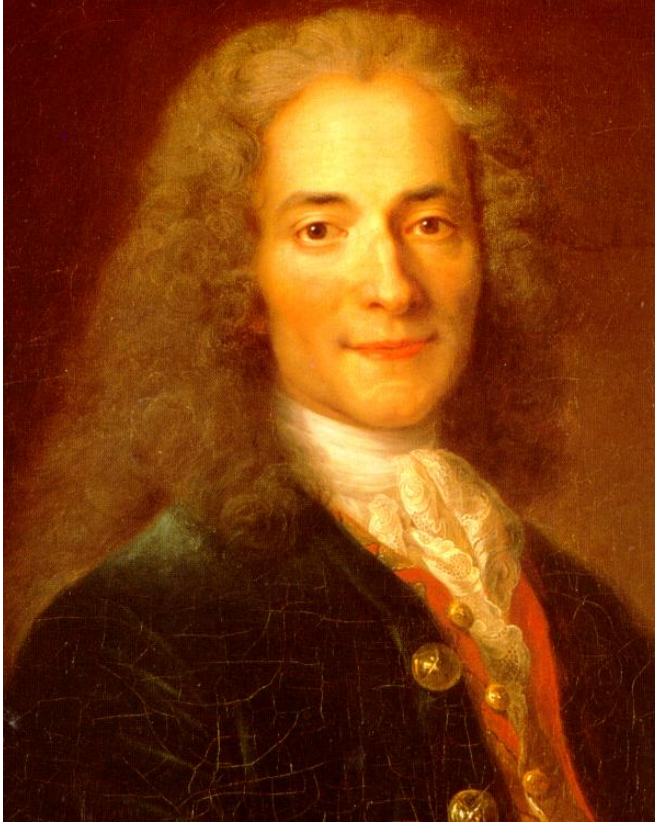
Locke

- According to Locke, all people are born free and equal, with three natural rights- life, liberty, and property.

- The purpose of government is to protect these three rights.

- If the government fails to do so, citizens have a right to overthrow it.

"Governments derive their power from the consent of the people"

-John Locke

Voltaire

"I do not agree with a word you say but will defend to the death your right to say it."
Voltaire

- Used satire to attack the French government and clergy
- Fought for tolerance, reason, and the freedoms of religion and speech
- Used his writings to defend his beliefs

Voltaire
(Francois Marie Arouet)

- Published more than 70 books of political essays, philosophy, and drama.

- His main targets were the clergy, the aristocracy, and the government.

- He was twice sent to prison, and was exiled to England for two years.
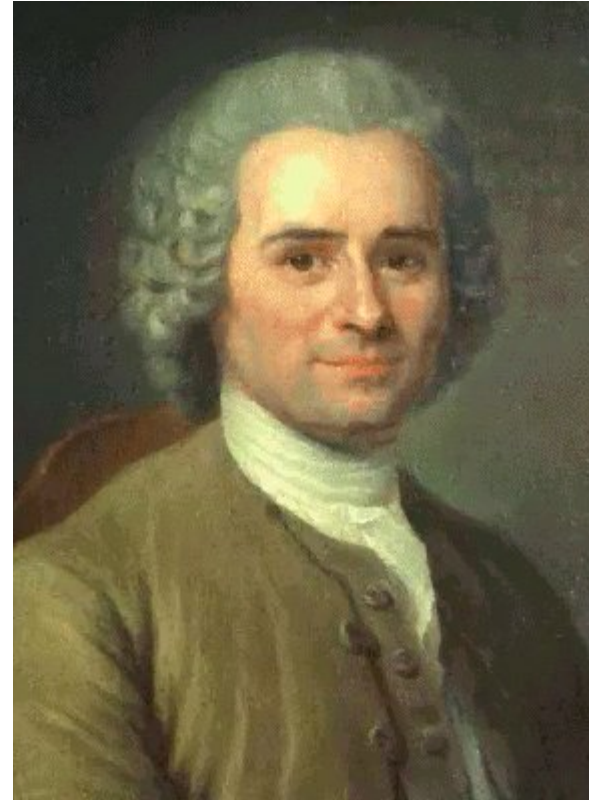
Voltaire

- Never stopped fighting for tolerance, reason, freedom of religious belief, and freedom of speech.

- He said humanities worst enemies were intolerance, prejudice, and superstition.

"I do not agree with a word you say but will defend to the death your right to say it"
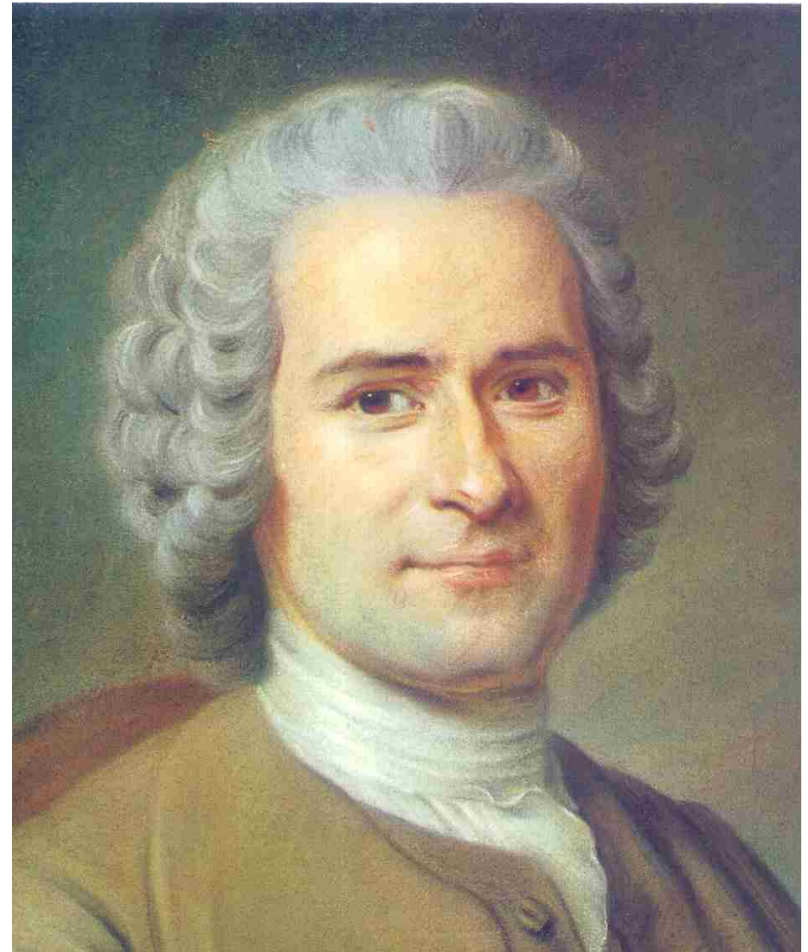
-Voltaire

Rousseau

- Wrote "*The Social Contract*" in which he discussed the role of the people and government, and that all people were equal
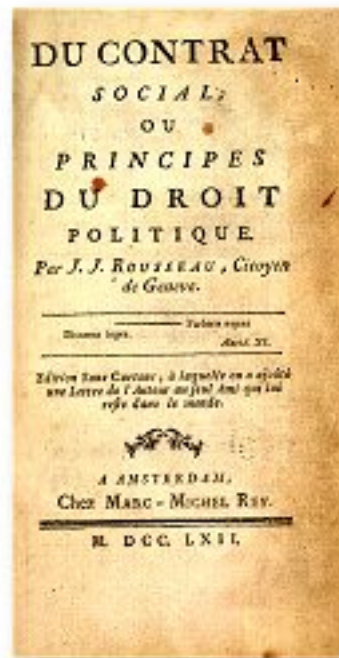- Called for the end of nobility which helped to spark the French Revolution
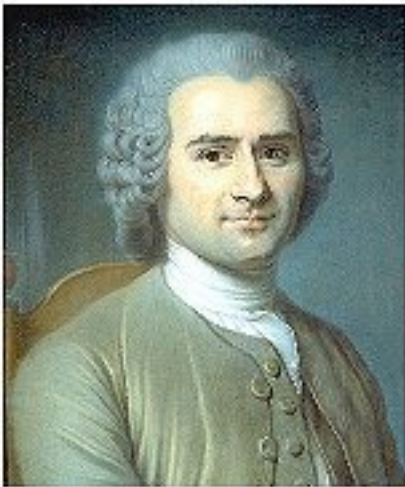
Jean Jacques Rousseau

- Passionately committed to individual freedom.
- Believed the only good government was one that was freely formed by the people and guided by the "general will" of society- a direct democracy.

Rousseau's direct democracy

- People agree to give up some of their freedom in favor of the common good.

- He explained this in his book *The Social Contract*.

"Man is born free, and everywhere he is in chains"

-Rousseau