

Scientific Revolution



Objectives

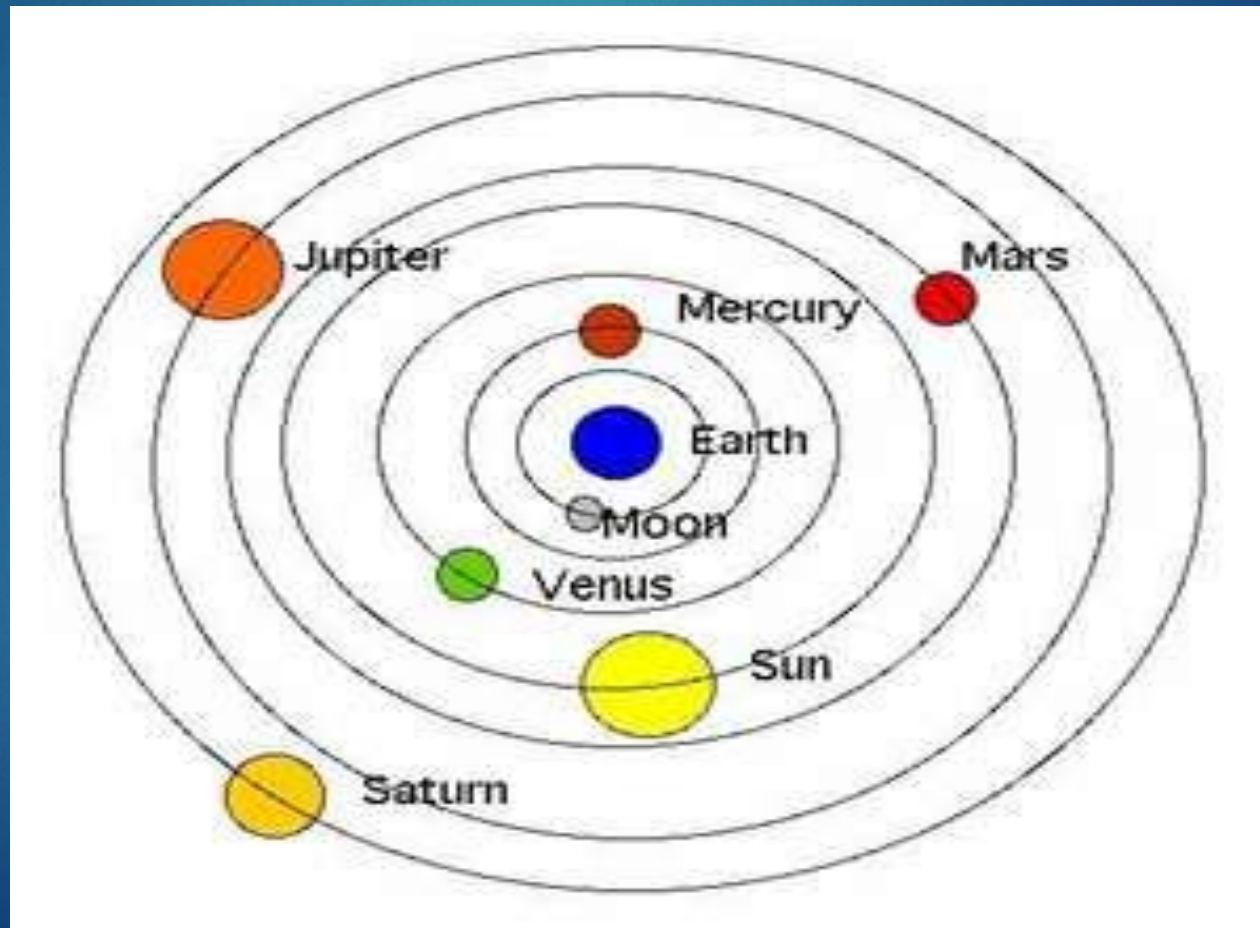
- ▶ Explain the scientific contributions of Copernicus, Galileo, Kepler, and Newton and how these ideas changed the European world view.

Scientific Revolution

- ▶ What is the Scientific Revolution?
- ▶ It was a new way of thinking about the natural world
- ▶ It challenged the ideas of the ancient thinkers and the church
- ▶ It was based upon careful observation and a willingness to question accepted beliefs

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- ▶ The Geocentric Theory



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- ▶ Copernicus
 - ▶ Polish cleric and astronomer
 - ▶ He didn't think the geocentric theory was true
 - ▶ Studied planetary movement for 25 years
 - ▶ Reasoned that the stars, the earth, and other planets revolved around the sun = Heliocentric theory
 - ▶ Caused little trouble at first
 - ▶ Instead, other scientists built on the foundations he laid

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- ▶ Kepler
 - ▶ Brilliant mathematician
 - ▶ Concluded certain mathematical laws govern planetary motion
 - ▶ One showed the planets revolve around the sun in elliptical orbits (instead of circles)
 - ▶ Showed Copernicus's basic ideas were true

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- ▶ Galileo
 - ▶ Italian scientist
 - ▶ Built on the new theories about astronomy
 - ▶ Built his own telescope to study the heavens
 - ▶ 1610, published *Starry Messenger*
 - ▶ Jupiter had four moons
 - ▶ Sun had dark spots
 - ▶ Earth's moon had rough, uneven surface
 - ▶ Disproved Aristotle's theory that the moon and stars were made of pure, perfect substance

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- ▶ Galileo's conflict with the Church
 - ▶ Catholic Church frightened by his findings
 - ▶ Went against Church's teaching and authority
 - ▶ Stood before the court in 1633 (Inquisition)
 - ▶ Under the threat of torture, he confessed that he agreed the ideas of Copernicus were false
 - ▶ Never again a free man; lived under house arrest until his death in 1642

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- ▶ Newton
 - ▶ Theory of Motion
 - ▶ All physical objects were affected equally by the same force (in earth and space)
 - ▶ Law of Universal Gravitation
 - ▶ Every object in the universe attracts every other object
 - ▶ Published *The Mathematical Principles of Natural Philosophy*
 - ▶ Described the universe as a clock whose parts all worked together perfectly and God was the clockmaker

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- ▶ The Scientific Method
 - ▶ Advanced by Francis Bacon and Rene Descartes
 - ▶ It is a logical procedure for gathering and testing ideas
 - ▶ Problem or question, an hypothesis is formed, then tested in an experiment, then analyzed and interpreted to reach a new conclusion which either confirms or disproves the hypothesis

CFA

- ▶ 1. Who was the first to come up with the Heliocentric Theory?
- ▶ 2. Who proved mathematically that the Heliocentric Theory was correct?
- ▶ 3. Who built his own telescope to study the heavens?
- ▶ 4. Who was forced to go before the Inquisition and recant (deny) the Heliocentric Theory?
- ▶ 5. Who is responsible for the Theory of Motion and Law of Universal Gravitation?