

- Analyzing Visuals: p. 589
- What do you think inspired the artist Raphael to paint this picture? Who do you think Raphael saw as the most important Greek philosophers? How can you tell?

# LESSON OBJECTIVE

- I can explain the origin of the Scientific Revolution.
- I can describe the roots of the Scientific Revolution based upon Christian and Muslim influences.

# Roots of the Scientific Revolution



*Answer the following questions.*

1. What does the picture show?
2. The word root can mean many things. One of the meanings of root is "the source, beginning, or origin of a thing." What are some roots in your life? Explain how those things have helped to make you the person you are today.



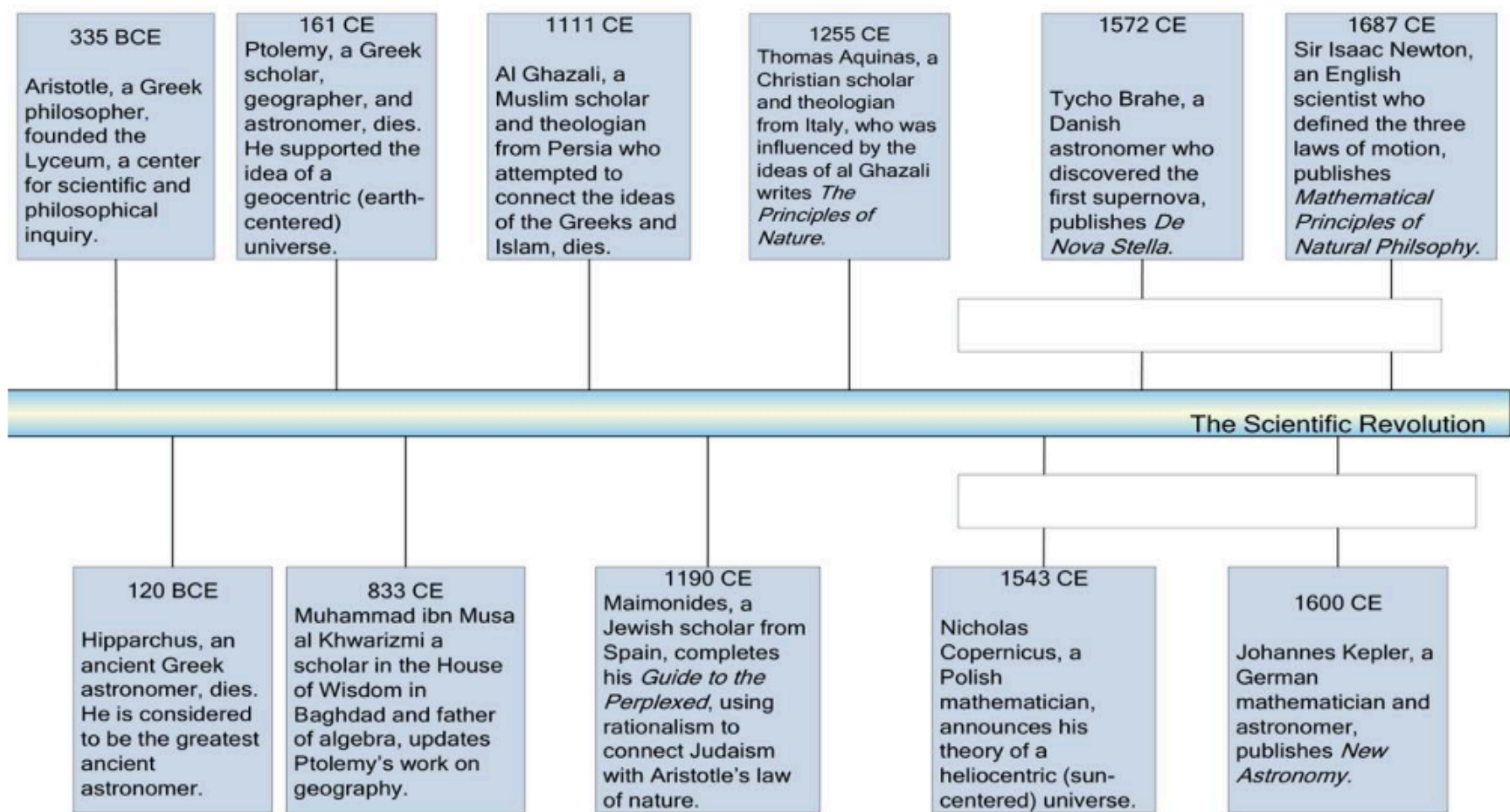
# Scientific Revolution

- The series of events that led to the birth of **modern science**
- It occurred in Europe from **1540-1700**
- People **gained knowledge by studying the** world around them and using logic to explain what they saw!
- It was a period of **general instability** with a population more concerned with **survival** than intellectual pursuits.
- The dominant Church established laws and norms which were influenced by religious mysticism and discouraged scientific inquiry, as it was often inconsistent with biblical teaching.
- <https://www.youtube.com/watch?v=9hodYUDDfsY>



# Science

- The word science comes from a Latin word meaning knowledge or understanding.
- Science starts with understanding.
- They observe and look at the world.
- They use logic to explain what they have observed.
- The explanations scientist develop to explain observed facts are called theories.



- What is the purpose of this timeline?
- How many years does this timeline cover?
- What is the background of each person listed on the timeline (country, religion)?
- Based on the information in the timeline, what do you think the term Scientific Revolution means?

# Roots of the Revolution

- **Greeks:** Greek thinkers, such as Ptolemy, wrote about astronomy, geography, and logic.
- While Europe remained stagnant, the nearby Islamic Empire scientifically flourished.
  - Muslims translated the Greek thoughts into Arabic and added their own ideas on how things worked.
  - Islamic scientists took great efforts to preserve and translate Ancient Greek texts, which included much work in science and natural philosophy that had effectively been “lost” to Europeans.
  - Arabic writings were later translated into Latin so Europeans could understand. Latin translations of these Arabic and Greek writings made their way to Europe through contact with the Islamic Empire through the Crusades and trade.

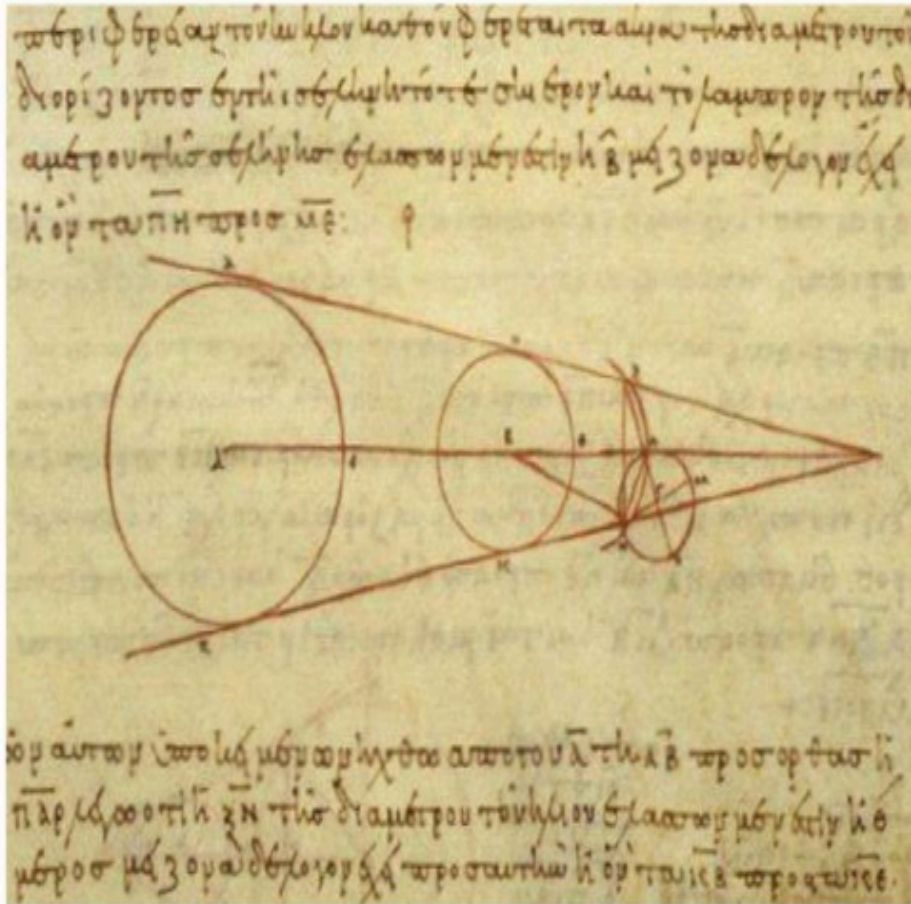
# Group Time!!!

- Read the Placard given for each group. Some groups will have the same placard.
- Answer the questions with your group members, and be prepared to share with class.



# Placard 1

## Ancient Greek Scientists



A copy of Aristarchus Samos' calculations of the sizes of the sun, moon and earth

The ancient Greek scientists were known as rationalists. This means that they used observation, reason, and logic to gain knowledge. The Greeks tried to avoid using superstition to explain why things happened in nature. Instead, scientists like Aristotle and Aristarchus believed that by asking questions, and investigating and observing the natural world, people could come to a better understanding. The ancient Greeks were not always correct in their observations. For example, a scholar named Ptolemy thought the sun and the planets revolved around the earth, and Aristotle thought heavier objects fall faster than lighter objects. Nevertheless the Ancient Greeks and their scientific efforts provided the foundations for modern scientific knowledge especially in the fields of mathematics and astronomy.

Answer the following questions on Student Handout 3

1. How might this image relate to the Scientific Revolution?
2. How did the Ancient Greeks contribute to the Scientific Revolution?
3. The contributions of the Ancient Greeks were important because...

# Placard 2

## Muslim Scholars



Muslim scholars from Persia, Spain, and other places built upon the knowledge of the Greeks. By preserving ancient Greek books and translating them to Arabic, Persian and Spanish Muslims were able to gain a deeper understanding of science. During the Golden Age of Islam from the 8<sup>th</sup> thru 13<sup>th</sup> centuries CE, Muslim scholars made significant discoveries of their own in mathematics, medicine, and astronomy. Al-Khwarizimi made advances on Ptolemy's work and laid the foundations for algebra. Ibn Sina (known as Avicenna in Europe) wrote a medical book that became the basis of medical study in Europe for hundreds of years. Persian astronomers created advanced observatories for calculating planetary motion, and developed advanced astrolabes to help with navigation and in finding the direction to Mecca. Muslim scholars preserved and advanced the work of the Greeks.

Answer the following questions on Student Handout 3

1. How might this image relate to the Scientific Revolution?
2. How did Muslim scholars contribute to the Scientific Revolution?
3. The contributions of Muslim scholars were important because...

An image representing [Qutb al-Din al-Shirazi](#), a Persian Muslim astronomer and mathematician.



## Placard 3

## Jewish and Christian Scholars

Jewish and Christian scholars also made investigations into the natural world. Maimonides, a Jewish scholar from Spain who eventually moved to Egypt, connected the ideas of Greeks like Aristotle with Jewish teachings. Thomas Aquinas, an Italian Catholic priest who was influenced by the ideas of the Muslim scholar al-Ghazali tried to connect scientific understandings with Christian teachings. Scholars like Maimonides and Aquinas caused some people to believe that there was not a conflict between religion and science. Eventually religious leaders of the Reformation such as Martin Luther further opened people to questioning traditional explanations of the natural world as they challenged the Catholic Church and its teachings.



Thomas Aquinas

Depiction of St. Thomas Aquinas from *The Demidoff Altarpiece* by Carlo Crivelli.

Answer the following questions on Student Handout 3

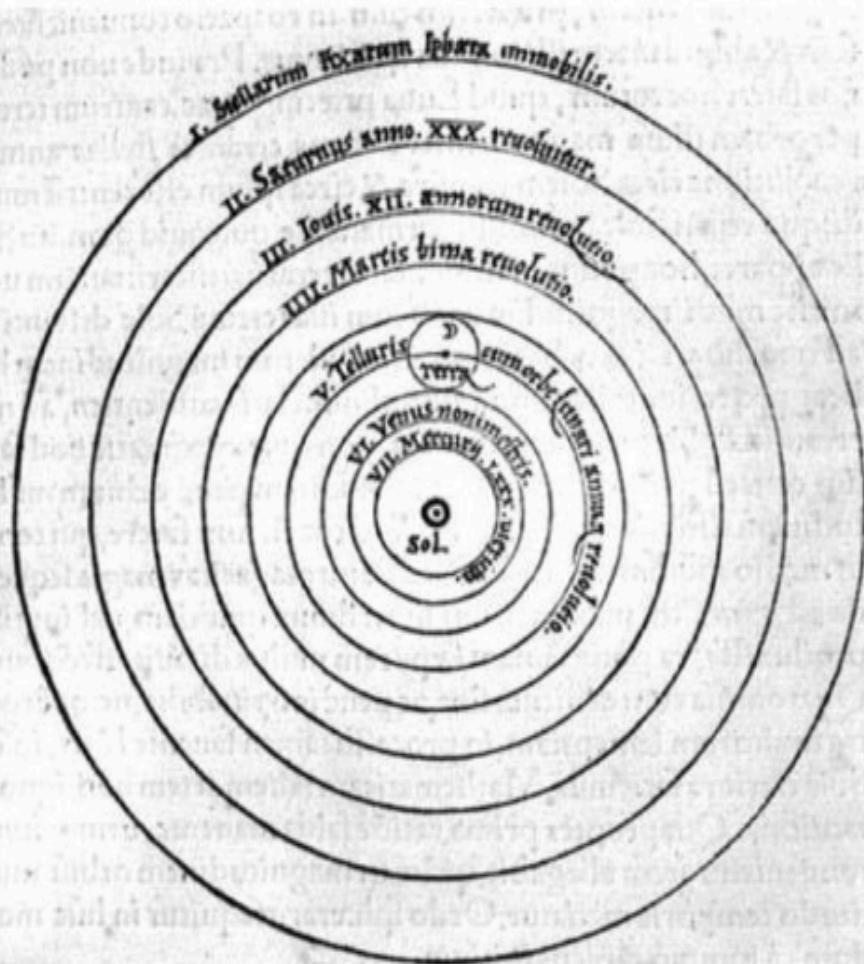
1. How might this image relate to the Scientific Revolution?
2. How did Christian and Jewish scholars contribute to the Scientific Revolution?
3. The contributions of Christian and Jewish scholars were important because...



Maimonides

Commonly used image indicating one artist's conception of Maimonides.

## The Renaissance



Nicolaus Copernicus (1473-1543) was the first astronomer to formulate a scientifically based theory of a heliocentric universe.

During the Renaissance of the 14<sup>th</sup> to 16<sup>th</sup> centuries, further advances were made. Humanist scholars studied the works of the ancient Greeks and Romans, and investigated the natural world in new ways. They also read the works of Muslim scholars like Ibn Sina (Avicenna). In addition, people like Leonardo da Vinci and Vesalius studied the human body (anatomy), while Copernicus made a major breakthrough in astronomy, concluding that the sun was the center of the universe (the heliocentric theory). Eventually a scientist in the 16<sup>th</sup> century named Kepler confirmed Copernicus's ideas through observation and study. Through scientific observation, experimentation, and the collection of data, the traditional ideas of Ptolemy and others were challenged and proven to be incorrect. A scientific revolution had begun.

Answer the following questions on Student Handout 3

1. How might this image relate to the Scientific Revolution?
2. How did Renaissance scholars contribute to the Scientific Revolution?
3. The contributions of Renaissance scholars were important because...

# Recap: What is the Scientific Revolution?

- Development in Europe also led to the Scientific Revolution. For, example the growth of humanism.
- Humanist artist and writers encouraged study of the natural world
- Also the development of alchemy, a forerunner of chemistry, involved experiments whose aim was to turn common metals into gold.



# Exit Ticket

- In your opinion, what were the three most important events or people that led to the Scientific Revolution? List the item and one reason why that was an important root of the Scientific Revolution.