

The Scientific Method

Beginning in the 1500's, a new way of thinking, based on **observation and experimentation**, changed the way Europeans looked at the world. This period of change was called **The Scientific Revolution**.

Since ancient times, people believed that the Earth was the center of the universe. However, in the 1500's and 1600's, scientists such as Copernicus and Galileo showed that the planets revolved around the Sun.

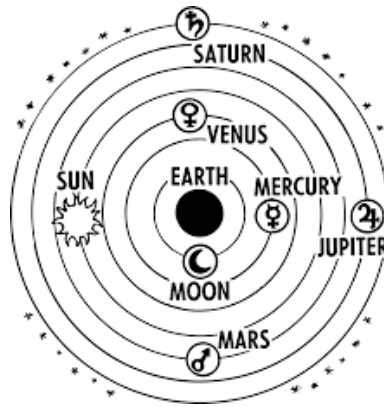
Geocentric Theory: The Earth is the center of the universe.

Heliocentric Theory: The Sun is the center of the universe.

In the second century C.E., **Claudius Ptolemy**, an astronomer who lived in Egypt, proposed his Geocentric Theory. He used observation and experimentation to prove his theory. As evidence he stated that due to gravity, all objects were attracted to the Earth, suggesting that Earth was the center of the universe. Secondly, he thought that the Earth did not move. He showed how an object is thrown in the air and falls in practically the same place. If the Earth moved, he theorized, the object should fall in a difference place. As a result, Ptolemy's views remained undisputed for centuries.

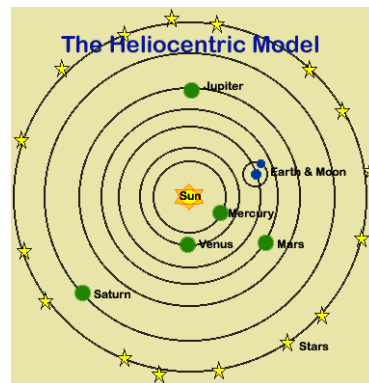
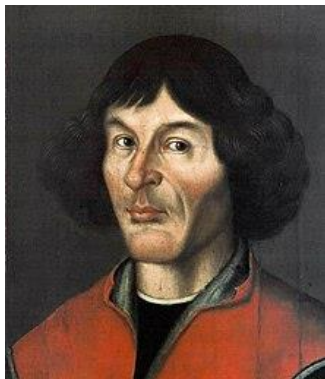


Ptolemy



Geocentric Theory

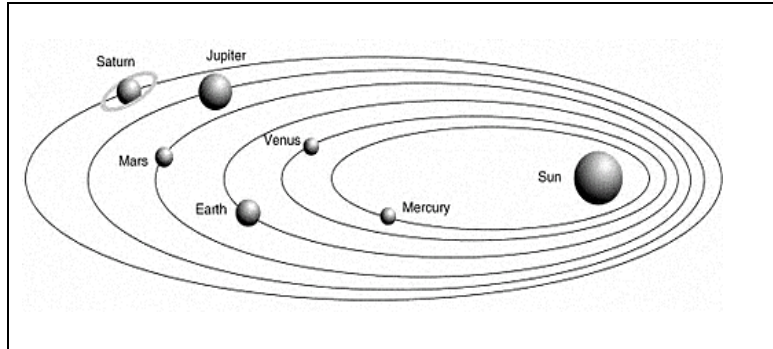
During the 1500's, **Nicolaus Copernicus**, a Polish astronomer, did not accept the Ptolemaic view. He became convinced that a different explanation of the solar system existed. After 25 years of observation, he concluded and proved the **Heliocentric Theory**; the Sun is the center of the universe and that the planets, including the earth, revolved around the sun in "perfect divine circles."



At first, Copernicus’s conclusion went practically unnoticed. However, in the 1600’s, a German astronomer, **Johannes Kepler**, supported Copernicus’s belief using mathematical calculations. Kepler also proved that planets travel in ellipses (ovals), and not perfect circles, around the sun.



Johannes Kepler



Copernicus’s and Kepler’s breakthroughs laid the foundation of modern knowledge of the solar system.

THE SCIENTIFIC METHOD	
STEP	METHOD
1	State the Problem
2	Collect information about the problem
3	Form a hypothesis, or educated guess
4	Experiment to test the hypothesis
5	Record and analyze the data
6	State a conclusion
7	Repeat Steps 1 to 6

FAMOUS SCIENTISTS AND THEIR INVENTIONS USING THE SCIENTIFIC METHOD	
Isaac Newton	Gravity – a force that keeps the planets in orbits around the sun
Robert Boyle	Gases – relative to temperatures, pressures and volumes
Ambroise Paré	Medicine – surgical techniques, ointments and stitches on wounds
Francis Bacon	Learning – through observation and experimentation
René Descartes	Learning – human reasoning was best way to gain understanding
Galileo Galilei	Astronomy – telescope, moon’s surface, four moons of Jupiter

