Name: Block:

**How the Scientific Method Works**

**SCIENTIFIC METHOD:** a method of procedure that has characterized natural science since the 17th century, consisting in systematic observation, measurement, and experiment, and the formulation, testing, and modification of hypotheses.

What is the connection between the scientific method and humanism?

Adapted from William Harris, http://science.howstuffworks.com/innovation/scientific-experiments/scientific-method3.htm

The **Dark Ages** (c. 500 to 1100) were characterized by a general erosion of civilization. Knowledge from the ancient Romans survived in only a few monasteries and cathedral and palace schools, while knowledge from ancient Greece almost disappeared completely. From right before the Dark Ages until about a century after, there were almost no important scientific advances. The Catholic Church became very powerful in Europe, and religious dogma [teaching] governed much of what people thought and believed. Those whose beliefs or practices strayed from the church were "rehabilitated" and brought back into the fold. Resistance often led to persecution.

Define *persecution*:

What could the Catholic Church do to persecute scientists?

The Renaissance (1300-1600): As European scholars became exposed to knowledge and cultures cultivated in the Islamic world and others, they became reacquainted with the works of ancient scholars like Aristotle, Ptolemy and Euclid. This provided a common vocabulary on which to build an extended scientific community.

What helped the growth of science during the Renaissance?

**Francis Bacon** (1561-1626) was the first to formalize the concept of a true scientific method, but he didn't do so in a vacuum. The work of **Nicolaus Copernicus** (1473-1543) and **Galileo Galilei** (1564-1642) influenced Bacon tremendously. Copernicus proposed from his observations that the planets of the solar system revolved around the sun, not Earth (heliocentricism). Galileo was able to confirm this sun-centered structure when he used a telescope that he designed to collect data on, among other things, the moons of Jupiter and the phases of Venus. Galileo's biggest contribution, however, may have been his systematic study of motion, which was based on simple mathematical descriptions.

How did other scientists help Francis Bacon develop the scientific method?

**Isaac Newton** (1642-1727) did much to drive this revolution forward. Newton's work in mathematics resulted in integral and differential calculus. His work in astronomy helped to define the laws of motion and universal gravitation. And his studies in optics led to the first reflecting telescope. He was able to develop a few relatively simple concepts and equations that held enormous predictive power. His unified systems of laws have withstood centuries of testing and continue to enable scientists to explore physics and astronomy.

It's safe to say that the span of Newton's career marks the beginning of modern science. As the 19th century dawned, science was established as an independent and respected field of study, and the scientific method -- based on observation and testing -- was being embraced all over the world. A classic example of how science had evolved into a collaborative endeavor leading to incremental knowledge can be found in the development of what we know today as the **cell theory**.

How did Isaac Newton’s inventions help modern science and knowledge?

Research one of the scientists from our reading above.

One interesting fact:

Did they experience success during life or after? Were they ever persecuted by the church?