

Enrichment**LESSON 1**

Earth's Motion

Although you cannot feel it, Earth is moving. It moves around the Sun and its own axis. But for a long time, humans thought Earth was the center of the universe.

The Geocentric Model

For most of human history, the universe consisted of everything in the sky that could be seen with the unaided eye. The geocentric model of the universe holds that everything in the universe—the Sun, Moon, planets, and stars—orbital Earth. The geocentric model was the system that Aristotle (384–322 B.C.) and Ptolemy (165–~85 B.C.) taught.

Because observations were made by the unaided eye, the scientists of ancient Greece made two assumptions that supported the geocentric model. One assumption was that, because no one felt Earth move, it had to be stationary in space. Otherwise things that were not rooted to Earth, such as animals, would fly away. The second assumption was that other objects in space move around Earth each day. The Sun apparently rises on one side and sets on another side, and star formations apparently move across the sky.

The Heliocentric Model

The geocentric model was gradually replaced by the heliocentric model of

Copernicus, Galileo, and Kepler.

Heliocentrism is the theory that the Sun is the center of the solar system, and everything in the solar system revolves around the Sun. A distinction between the solar system and the universe became clear only after the advent of the telescope.

In the sixteenth century, the astronomer Nicolaus Copernicus (1473–1543) designed a mathematical model of a heliocentric system, which was later expanded and defended by Kepler and Galileo. Copernicus concluded that Earth is a planet that revolves around the Sun. To look at the sky, it seems that Earth stays in one place and everything else rises and sets or moves around. But Copernicus observed that, over time, the movements are more complicated. The Sun makes a slower circle over the course of a year, and the planets sometimes reverse direction for a time.

Galileo Galilei (1564–1642) was the first scientist to view the universe through a telescope, which allowed him to make discoveries such as sunspots, topography of the Moon, and some of the moons of Jupiter. He was able to confirm Copernicus's heliocentric model.

Applying Critical-Thinking Skills

Directions: *Respond to each statement.*

- 1. Compare** the motions of Earth, the Sun, and the Moon in geocentric and heliocentric models of the universe.
- 2. Explain** the two major motions of Earth in space that can be observed and justified by the geocentric model.
- 3. Interpret** this statement: “All fields of science are accumulations of knowledge.” Explain how this applies to modern sciences, including the science of astronomy.