WH7.10.1 Discuss the roots of the Scientific Revolution (e.g., Greek rationalism; Jewish, Christian, and Muslim science; Renaissance humanism; new knowledge from global exploration).

The Scientific Revolution

Main Idea **The thinkers of the ancient world developed early forms of science and passed this knowledge to later civilizations.**

Reading Connection Have you ever taught a skill or passed on an idea to a younger brother or sister? Read in this chapter how the scientific ideas of early thinkers were passed on to later generations.

From earliest times, people have been curious about the world around them. Thousands of years ago, people began to use numbers, study the stars and planets, and watch the growth of plants and animals. These activities were the beginnings of science. Science is any organized study of the natural world and how it works.

Early Scientists Early civilizations developed different kinds of science to solve practical problems. Among the first sciences were mathematics, astronomy, and medicine. Mathematics was used for record keeping and building projects. Astronomy helped people keep time and figure out when to plant and harvest crops. Early civilizations also developed medical practices, such as surgery, acupuncture, and the use of herbs, for treating illnesses.

The ancient Greeks left behind a large amount of scientific knowledge. They believed that reason was the only way to understand nature. As they studied the world, they developed theories. A **theory** (THEE•uh•ree) is an explanation of how or why something happens. A theory is based on what you can observe about something. It may not be correct, but it seems to fit the facts.

In ancient Greece, the Greek philosopher Aristotle observed nature and compiled vast amounts of information about plants, animals, and the environment. He then took the facts he gathered and classified, or arranged them into groups, based on their similarities and differences.

The Greeks made many important scientific advances, but their approach to science had some problems. For example, they did not experiment, or test, new ideas to see if they were true. Many of their conclusions were false because they were based on "common sense" instead of experiments.

For example, in the A.D. 100s, the Egyptian-born astronomer **Ptolemy** (TAH•luh•mee) stated that the sun and the planets moved around the earth in circular paths. After all, it did seem like the earth was the center of the universe. Astronomers in Europe accepted Ptolemy's geocentric, or Earth-centered, theory for more than 1,400 years.

Science During the Middle Ages In Roman times, Europeans continued to accept the scientific knowledge of the Greeks. During the Middle Ages, most Europeans were more interested in theology, or the study of God, than in the study of nature. For scientific knowledge, they relied on Greek and Roman writings and saw no need to **investigate** the facts or to make their own observations. Many of these ancient works, however, were either lost or poorly preserved.

Meanwhile, Arabs and Jews in the Islamic Empire preserved much of the science of the Greeks and Romans. They carefully copied many Greek and Roman works into the Arabic language. They also came into contact with the science of the Persians and the Indian system of mathematics.

Arabic and Jewish scientists made advances of their own in areas such as mathematics, astronomy, and medicine. However, in spite of these achievements, scientists in the Islamic world did not experiment or develop the instruments

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necessary to advance their scientific knowledge.

During the 1100s, European thinkers became involved in science again as a result of their contacts with the Islamic world. Major Islamic scientific works were brought to Europe and translated into Latin. The Hindu-Arabic system of numbers also spread to Europe, where it eventually replaced Roman numerals.

Christian thinkers, such as Thomas Aquinas, tried to show that Christianity and reason could go together. During the 1100s, Europeans began building new universities. These universities would play an important role in the growth of science.

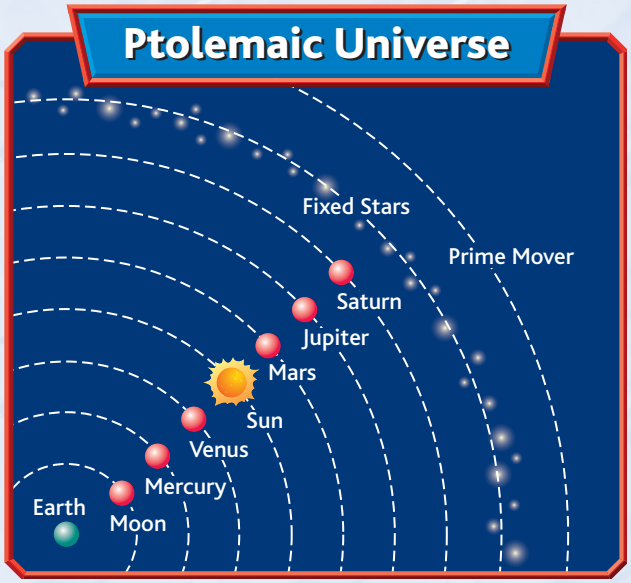
As you have read, in the 1300s the ideas of the Renaissance humanists developed into a new way of understanding the world. Humanists borrowed ideas from the ancient Greeks and Romans and combined them with ideas based on reason and ideas based on faith.

Humanist ideas then spread across Europe, aided by the invention of the printing press. This invention continued to play an important role in spreading ideas during the 1600s and 1700s.

In the meantime, the humanist **approach** to science and reason led to other inventions during the Renaissance. These helped bring about the Age of Exploration that you read about in Chapter 10. Better charts, maps, and navigational instruments helped explorers reach different parts of the world in the 1400s and 1500s.

A New View of the Universe

Louvre, Paris/Bridgeman Art Library



The astronomical theory of Ptolemy (left) placed Earth at the center of the universe (above). His theory was accepted for more than a thousand years. ***According to the diagram, how many planets besides Earth were known at the time of Ptolemy?***

WH7.10.1 Discuss the roots of the Scientific Revolution (e.g., Greek rationalism; Jewish, Christian, and Muslim science; Renaissance humanism; new knowledge from global exploration). **WH7.10.2** Understand the significance of the new scientific theories (e.g., those of Copernicus, Galileo, Kepler, Newton) and the significance of new inventions (e.g., the telescope, microscope, thermometer, barometer).

The voyages of exploration helped Europe become the world leader in commerce and trade. They also added to Europe's scientific knowledge. Explorers mapped the oceans and continents, and new kingdoms and countries were located. Scientists gathered and classified new knowledge about plants, animals, and diseases in different parts of the world.

By the 1500s, various developments in Europe had come together to increase European interest in science. As more and more people began to study science, many new discoveries were made. This era, when Europeans became interested in science again, is known as the Scientific Revolution.

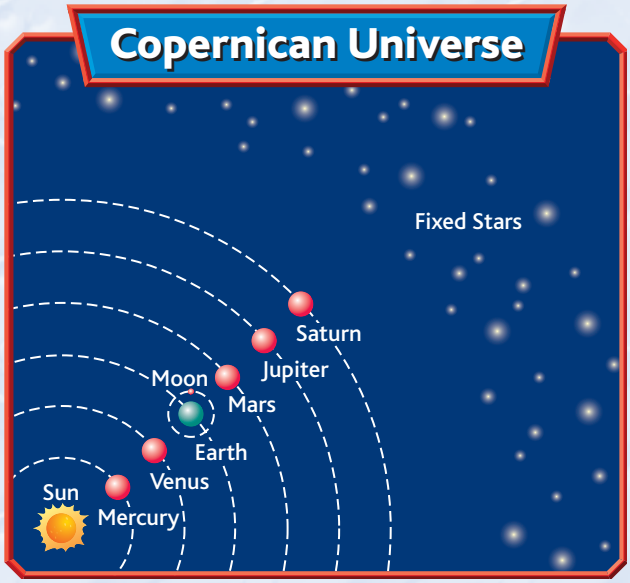
Reading Check **Describe** Describe scientific knowledge during the Middle Ages.

A Revolution in Astronomy

Main Idea **European interest in astronomy led to new discoveries and ideas about the universe and Earth's place in it.**

Reading Connection What would people on Earth think if life were discovered on other planets? Read to see how Europeans reacted to new discoveries about the universe.

During the 1500s, European thinkers began to abandon the old scientific ideas. They increasingly understood that advances in science could only come through mathematics and experimentation. This new way of thinking led to a revolution, or sweeping change, in the way Europeans understood science and the search for knowledge. Astronomy was the first science affected by



Nicolaus Copernicus (right), a Polish mathematician, believed that the sun was at the center of the universe. His model (above) placed Earth and the other planets in orbits around the sun. ***Why did Europeans again become interested in science in the 1100s?***

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