

Advances in Mathematics and Astronomy

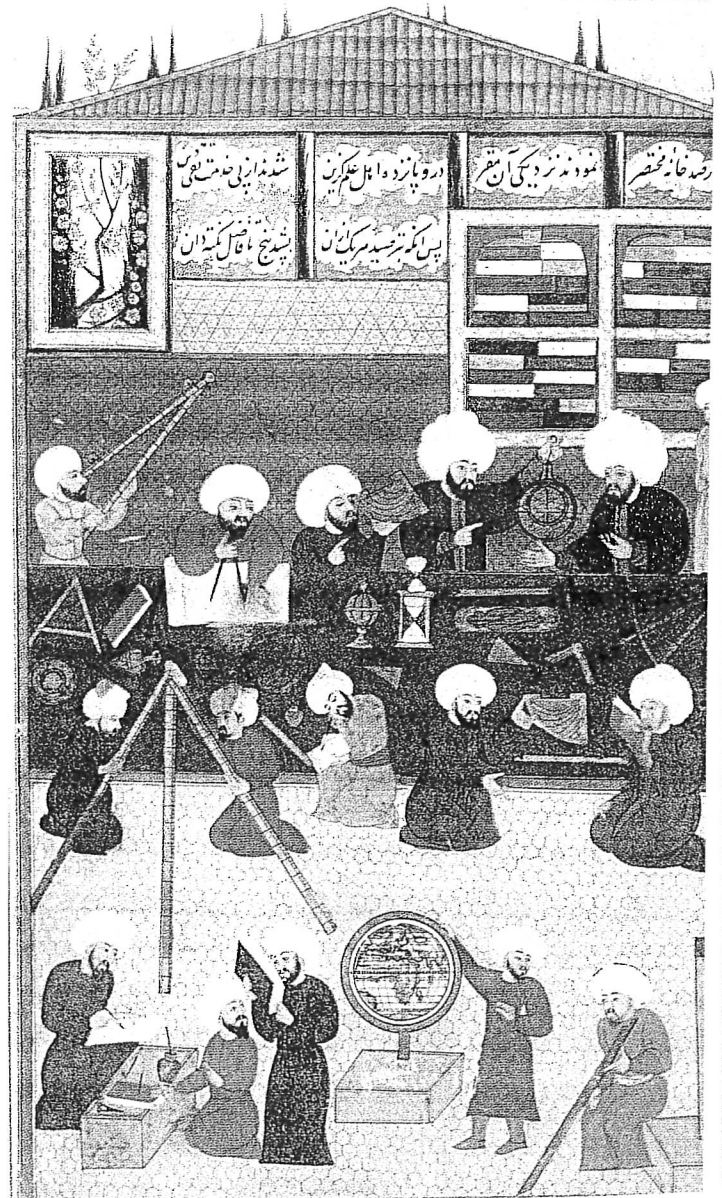
Muslim scholars made important advances in various fields of science. Some of their main contributions were in mathematics and astronomy.

Mathematics Arab mathematicians used a decimal system based on Indian numerals (sometimes called Hindu numerals). This system included the **concept** of zero.

A book by the Muslim mathematician al-Khwarizmi introduced that number system to Europe. We call the symbols that we use for numbers today (0, 1, 2, 3, . . . 9) **Arabic numerals** because it came to Europe from the Arab world. Previously, Europeans used Roman numerals, but Arabic numerals are easier to work with.

Al-Khwarizmi made groundbreaking advances in the field of algebra. Algebra is a kind of mathematics in which letters are used to stand in for unknown numbers, allowing people to solve complex problems. The word *algebra* comes from Arabic.

Astronomy Muslim astronomers built observatories, buildings for viewing and studying the stars. They created charts that showed the position of stars and planets. They also measured the size of Earth and developed precise calendars.



MATHEMATICS AND ASTRONOMY

Medieval times, which spanned from the 500s to the 1500s, saw the rise and fall of many Muslim empires. The vast extent of these empires and their religious tolerance allowed for a unique blending of cultures. Medieval Muslim leaders and scholars played a key role in preserving and building on the intellectual works of ancient Greece, Persia, and India. In this way, they helped build a foundation for modern civilization.

The field of mathematics provides an important example. Muslim scholars revived interest in the works of such Greek

mathematicians as Euclid and Archimedes and further developed their ideas in geometry, trigonometry, and algebra. To simplify mathematics, they used the decimal number system and encouraged its adoption as the world's standard number system.

Muslim scholars also built upon ancient learning to extend their understanding of the universe. They constructed observatories to plot the movement of the stars, which enabled them to calculate dates for religious ceremonies and contributed to advances in navigation.