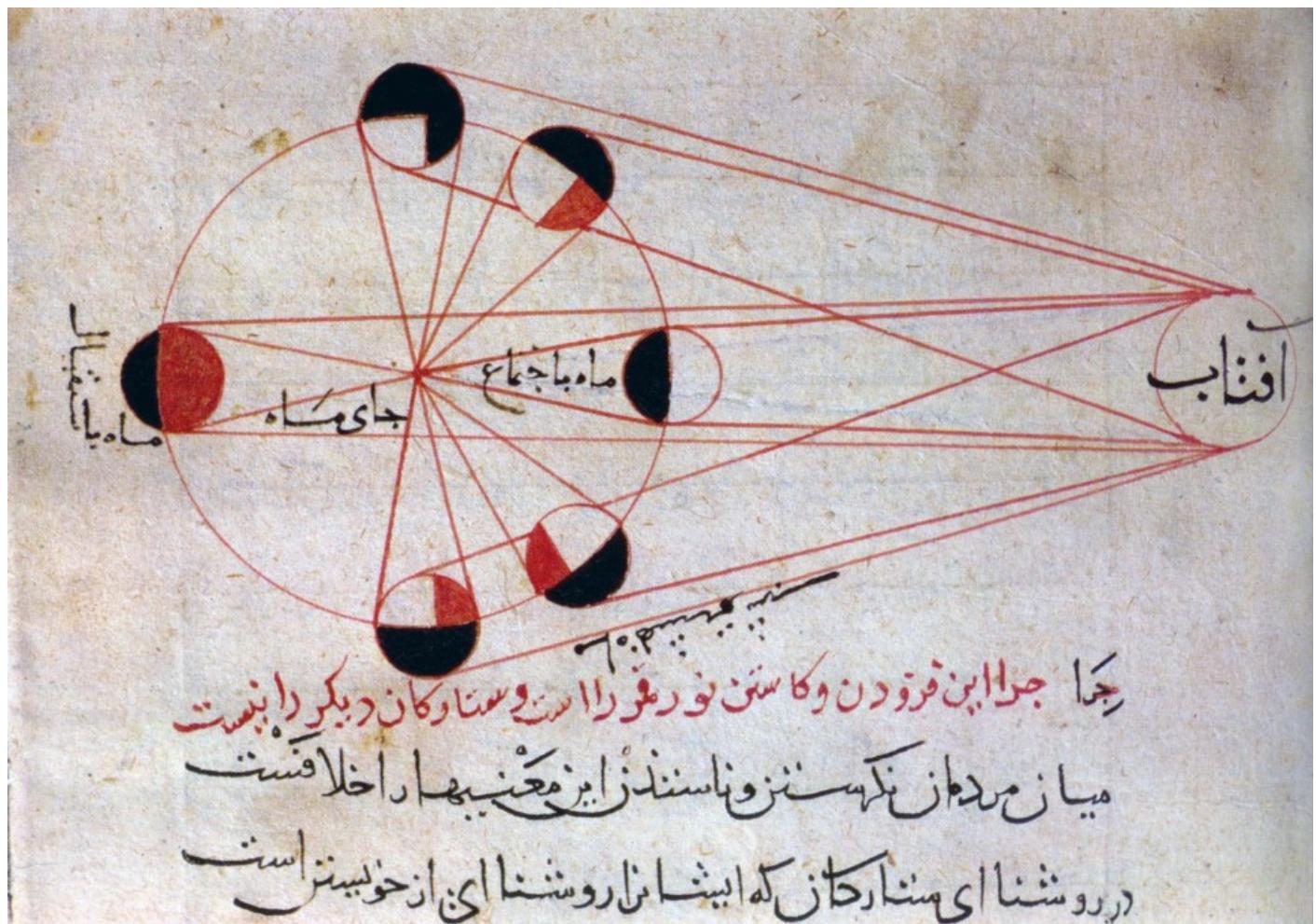


Trigonometry



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Al-Biruni was among those who laid the foundation for modern Trigonometry. He was a philosopher, geographer, astronomer, physicist and mathematician. Six hundred years before Galileo, Al-Biruni discussed the theory of the earth rotating about its own axis. Al-Biruni carried out geodetic measurements and determined the earth's circumference in a most ingenious way.

With the aid of mathematics, he enabled the direction of the Qibla to be determined from anywhere in the world. In the domain of trigonometry, the theory of the functions; sine, cosine, and tangent was developed by Muslim scholars of the 10th century. Muslim scholars worked diligently in the development of plane and spherical trigonometry.

The trigonometry of Muslims is based on Ptolemy's theorem but is superior in two important respects: it employs the sine where Ptolemy used the chord and is in algebraic instead of geometric form.

What is Taught:

The Greeks were the developers of trigonometry.

What Should be Taught:

Trigonometry remained largely a theoretical science among the Greeks. It was developed to a level of modern perfection by Muslim scholars, although the weight of the

al-Biruni (973-1048 AD)

- Discovered the mathematical formula for finding exactly when a season starts/ends and seven different methods to find north and south
- He proved that when the speed of sound is compared to the speed of light, the speed of light is very fast
- Famous books:
 - *Qanun-i-Masoodi* discusses several theories of astronomy, trigonometry, solar, lunar, and planetary movements, ect.
 - *Kitab-al-Saidana*- Indian medicine
 - *Kitab-al-Jamahir*- properties of precious stones
 - *al-Tafhim-li-Awail Sina'at al-Tanjim*- summary of mathematics and astronomy



credit must be given to al-Battani.

The words describing the basic functions of this science, sine, cosine and tangent, are all derived from Arabic terms. Thus, original contributions by the Greeks in trigonometry were minimal.

What is Taught:

During the 17th century Rene Descartes made the discovery that Algebra could be used to solve geometrical problems. By this, he greatly advanced the science of Geometry.

What Should be Taught:

Mathematicians of the Islamic Empire accomplished precisely this as early as the 9th century A.D. Thabit bin Qurrah was the first to do so, and he was followed by Abu'l Wafa, whose 10th century book utilized Algebra to advance Geometry into an exact and simplified science.

The renaissance of astronomy in Baghdad in the 9th and 10th centuries. Al-Bīrūnī — Different phases of the moon- al-Biruni

AL-BATTANI

(868-929 C.E.)



Abu Abdullah Al-Battani was a famous astronomer, mathematician and astrologer.

He has been held as one of the greatest astronomists of Islam.

He is responsible for a number of important discoveries in astronomy.

His well-known discovery is the remarkably accurate determination of the solar year as being 365 days, 5 hours, 46 minutes and 24 seconds, which is very close to the latest estimates.

He found that the longitude of the sun's apogee had increased by 16° , $47'$ since Ptolemy. This implied the important discovery of the motion of the solar apsides and of a slow variation in the equation of time.

He did not believe in the trapidation of the equinoxes, although Copernicus held it.