Arab contributions to mathematics and the introduction of the Zero

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Arab contributions to human civilization are noteworthy. In arithmetic the style of writing digits from right to left is an evidence of its Arab origin. For instance, the numeral for five hundred in English should be written as 005, not as 500 according to English's left-to-right reading style.

Another invention that revolutionized mathematics was the introduction of the number zero by Muhammad Bin Ahmad in 967 AD. Zero was introduced in the West as late as the beginning of the thirteenth century. Modern society takes the invention of the zero for granted, yet the Zero is a non-trivial concept, that allowed major mathematical breakthroughs.

Arab civilizations also made a great contribution to fractions and to the principle of errors, which is employed to solve Algebra problems arithmetically.

Concerning Algebra, al-Khawarzmi is credited with the first treatise. He solved Algebra equations of the first and second degree (known as quadratic equations, and are are prevelant in science and engineering) and also introduced the geometrical method of solving these equations.

He also recognized that quadratic equations have two roots. His method was continued by Thabet Bin Qura, the translator of Ptolemy's works who developed Algebra and first realized application in geometry. By the 11th century the Arabs had founded, developed and perfected geometrical algebra and could solve equations of the third and fourth degree.

Another outstanding Arab mathematician is Abul Wafa who created and successfully

developed a branch of geometry which consists of problems leading to equations in Algebra of a higher degree than the second. He made a number of valuable contributions to polyhedral theory.

Al-Karaki, of the 11th century is considered to be one of the greatest Arab mathematicians. He composed one arithmetic book and another on Algebra. In the two books, he developed an approximate method of finding square roots, a theory of indices, a theory of mathematical induction and a theory of intermediate quadratic equations.

Arabs have excelled in geometry, starting with the transition of Euclid and conic section of Apolonios and they preserved the genuine works of these two Greek masters for the modern world, by the 9th century AD. and then started making new discoveries in this domain.

In his book translated by Roger Bacon, Ibn al-Haitham wrote a book on geometrical optics, dealing with problems that would be difficult to solve even now.

It is also at the hand of the Arabs that the geometry of conic sections was developed to a great extent.

However, Arab achievements in this field were crowned by the discovery made by Abu Jafar Muhammad Ibn Muhammad Ibn al-Hassan, known as Nassereddine al-Tusi. Al-Tusi separated trigonometry from astronomy. This contribution recognizes and explains weakness in Euclid's theory of parallels, and thereby may thus be credited as founder of non-Euclidian geometry.

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