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DEVELOPMENT OF MATHEMATICS IN DIFFERENT PERIODS

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Abstract:

This article first discusses the meaning of the word "mathematics", its history and development, the research of scholars from different eras, and the great contributions of Muslim scholars to the science of mathematics.

Keywords: mathematics, thematike, mathema, science of arithmetic, series theory, algebraic topology, algebra.

Mathematics (Greek thematike, mathema - knowledge, science), Mathematics [1] - the science of knowledge based on clear logical observations. Because the first object was a number, it was often referred to as the "science of arithmetic" (in today's mathematics, calculations, even operations on formulas, play a very small role). Mathematics is one of the oldest sciences, with a long history of development, and at the same time, "What is mathematics?" The answer to this question has also changed and deepened. In Greece, mathematics was understood as geometry.

In the IX-XIII centuries, the concept of mathematics was expanded by algebra and trigonometry. After analytical geometry, differential and integral calculus became central to mathematics in the 17th and 18th centuries, it was described as a "science of quantitative relations and spatial forms" until the early twentieth century. In the late 19th and early 20th centuries, objects of various geometries (such as Lobachevsky geometry, projective geometry, Riemannian geometry), algebras (such as Bull's algebra, quaternion algebra, Kelly's algebra), and infinite-dimensional spaces were very diverse in content, often artificial objects. and the above definition of mathematics is too narrow. During this period, as a result of the formation of a unique style and language of observation based on mathematical logic and set theory, the idea that the most important feature in mathematics is strict logical observation (J. Peano, G. Frege, B. Russell, D. Hilbert).

In the mid-20th century, a group of French mathematicians who revised the definition of mathematics under the pseudonym Burbaki developed the idea, defining it as "Mathematics is the science of mathematical structures." Although this approach was broader and more precise than previous definitions, it was still limited - relationships between structures (eg, mathematics, series theory, algebraic topology), and applied and applied theories, especially mathematical models in physics, engineering, and social sciences, did not fit into this definition. In the last century, there has been a very deep relationship between the various mathematical objects, and the results based on this show that they will play a key role in the further development of mathematics. Along with the use of electronic computing, the expansion of the application of mathematics (biometrics, sociometry, econometrics, psychometry, etc.) and the rapid penetration of mathematical methods into various spheres of life have expanded the subject of mathematics beyond comprehension. Thus, mathematics is a science that studies axiomatic theories and mathematical models, the relationships between them, and draws conclusions based on rigorous logical observations.

Thematic knowledge, which originally began with simple numbers and the arithmetic operations on them, has expanded and deepened along with universal progress. Even in the earliest written sources (e.g., mathematical papyri) there are examples of operations on kayers and the solution of linear equations. Irrigated agriculture, the development of architecture, and the increasing importance of astronomical observations led to the accumulation of evidence for geometry. For example, in ancient Egypt, a triangle with sides of 3, 4, and 5 units was used to be a right angle. The greatest achievements of the mathematics of this period can be seen in the example of the rule for calculating the volume of a regular rectangular truncated pyramid (in the present notation V— (a2 + ab + b2) corresponds to the formula L / 3) and the approximate value of l = (16/9) 2.

In India, mathematics was developed in the works of Ariabhata (5th century), Brahmagupta (7th century), and Bhaskara (12th century). The great achievement of Indian mathematics was the invention of the decimal number system and the number 0. Indian scientists were also familiar with negative numbers and irrational expressions, and achieved important results in geometry.

Greek, Chinese, and Indian mathematics existed almost independently of each other. By the 3rd and 4th centuries, science in Greece was in crisis, and existing works began to be forgotten. The period of European civilization from then until the Renaissance was called the "Dark Ages" (A. Mets). With the spread of Islam and the establishment of the Arab Caliphate in the 7th century, new conditions were created for the development of science and culture. During the reign of Harun al-Rashid, Baghdad, the capital of the caliphate, became a major city, and scholars from various regions began to come here. They originally translated works from Greek, Assyrian, and Hindi into Arabic. Thanks to the knowledge of Ma'mun, the son of Harun al-Rashid, who was appointed governor of Khorasan and Movarounnahr, Central Asian scholars began to gather in Marv. In 813, Ma'mun took the caliphate to Baghdad and founded the famous Bayt ul-Hikma (Ma'mun Academy). It is said that this scientific institution was headed by Muhammad ibn Musa al-Khwarizmi. Bayt ul-Hikma also included many Central Asian scholars, such as Ahmad al-Farghani, Ibn Turk al-Khuttali, the son of the Abyssinian Hasib al-Marwazi, and Musa ibn Shakir. This shows that there is a favorable environment for talented scientists to come out.

Muslim Orientalists also developed geometry (Thabit ibn Qurra, Abul Wafa, Umar Khayyam) and established trigonometry as a science (Ibn al-Haytham, Beruni, Tusi), in particular, the proof of Ptolemy's theorem on stereographic projection by Ahmad al-Farghani in the Baghdad Academy of Geometry. showed that it had been studied. The mathematical solutions of the third and fourth degree equations by mathematicians who wrote in Arabic later led to the development of analytic geometry.

The Khorezm Mamun Academy (Ibn Iraq, Beruni) also played an important role in the development of mathematics. The peak of the development of Oriental Mathematics dates back to the Samarkand Scientific School. Ulugbek and his scientists (Qazizoda Rumi, Giyosiddin Kashi, Ali Kushchi, Miram Chalabi, Hussein Birjani, etc.) built a huge observatory, observed the coordinates of stars and the motion of planets with great accuracy, and interpreted the methods of calculating the spherical coordinates of lights. formulas, then develop a method called the Gorner scheme, as well as a method of serial approximations. Ulugbek's "Ziji jadidi Koragoniy" also contains tables of trigonometric functions with high accuracy.

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