STUDYING THE SCIENTIFIC HERITAGE OF GREAT SCIENTISTS IN MATHEMATICS AND ASTRONOMY

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Annotation
This article addresses the issue of studying the scientific heritage of great scientists in the process of studying mathematics and astronomy. Information is also provided on the use of historical, mathematical and astronomical materials in the process of teaching mathematics and astronomy in schools and universities.

Keywords: history, astronomy, mathematics, science, heritage, scientists.

Introduction

The study and analysis, preservation and multiplication of national traditions, the purposeful use of the scientific and spiritual heritage of ancestors are an integral part of modern pedagogical science. The use of historical and mathematical materials in the process of learning mathematics has not become commonplace, as in schools and universities. Historical material has great opportunities that affect the quality of the learning and education process. Mathematics and astronomy, as it is known, plays a special role in the formation of scientific and dialectical worldview in students, because its ideas and methods of research are based on the dialectical method of thinking.

It should be noted that the use of historical elements in the teaching of mathematics and astronomy was not sufficiently focused. They are usually given in classes sporadically, often to give the subject to the taught an interesting experience. In our opinion, in the conditions of modernization of education, the introduction of new forms and methods of education and education, inclusion in the educational process elements of historicism, more precisely, in the teaching of natural sciences, the use of didactic ideas of scientists, especially thinkers of the medieval East, should play a fundamentally important role. It is known that thanks to the research of scientists – encyclopedists of the Middle East of the 9th-13th century, i.e. during the Arab caliphate and later the 15th and later 17th century, the Samarkand School of Science Ulughbek, was the heyday of world-class science and culture, which had a noticeable impact on European science. Consequently, their study and use of didactic ideas by scientists at this period in order to improve the quality of learning in the learning process and in education will be very useful.

In 1417-1420 Ulughbek built a madrassah in Samarkand, which became the first building in the architectural ensemble of Registan. In this madrassa Ulughbek invited a large number of astronomers and mathematicians of the Islamic world. The other two madrassas were built in Gijuwan and Bukhara. The madrassas built by Ulughbek served as universities. On the portal of the madrassah Ulughbek in Bukhara, the inscription is preserved: «The pursuit of knowledge is the duty of every Muslim and Muslim woman». But Ulughbek's great passion was astronomy. The work of Ulughbek and his

associates are astronomers such as Kazi-zadeh-al-Rumi, Jemshid Ghiyas-ad-din-al Kashi, Ali Kushchi, etc. was the creation of an observatory.
Construction of the observatory, according to scientists-researchers, was completed in 1428-1429. The observatory was a unique structure for its time. To ensure the building's insensitivity to earth tremors, the site for the construction of the observatory was chosen rocky foot of The Hill Kuhak. The main instrument – sextant – was oriented along the meridian line from south to north. In addition to the main instrument, there were other astronomical instruments in the observatory.
Valuable contribution to the development of mathematical disciplines made the works of medieval scientists - naturalists in such fields of mathematics as arithmetic, algebra and geometry. In their era, treatises on arithmetic of such scholars as Muhammad al-Khorezmi, Abdulhamid Huttali, Siroj al-Din al-Sajovandi, Bahouddin Amuli, Jamshed al-Koshoni, Muhammad Amin Muminobodi and many others were very valuable.
In the Arabic-speaking countries of the East in the Middle Ages, practical arithmetic was called Hisab al-Amali, and the theoretical was called Hisab al-Nazari, or «Arismatics». The theoretical arithmetic of the scientists of the medieval East included the following parts:
1. The concept of «Separate quantities» («Amiya al-Mufrida»);
2. The concept of «Dependent Values» («Kumhia al-Mudafah»);
3. The notion of attitude to proportion;
Practical (computational) arithmetic was devoted to the development of computational methods and included the account, various operations with whole and fractional numbers, numerical solutions of equations of the 1st and 2nd degree, etc., for example, the outstanding scientist-encyclopedist Abu Ali Ibn Sina (Avicenna) issues of theoretical arithmetic devoted a separate part of his work «Danishna» («The Book»). Another scientist, encyclopedist Abu Nasr al-Farabi, classifying the sciences of that era, notes that mathematics consists of seven large sections: arithmetic, geometry, optics, astronomy, music, static, skillful techniques and determines the subject and content of each. One of the remarkable results of Jamshed al-Koshoni's work is the introduction of decimal fractions, which are first found in his «Treatise on The Circle», written in 1426.
On the issues of solving linear, square and cubic equations, the famous al-Khorezmi «Al-Kitab al-Muhtasar fi hisab al-jabriwa-l-mukabala» («A brief book on calculus, replenishment and opposition») is to be noted, which has become the most popular in the history of science.
The names «algebra» and «algorithm» without which modern mathematics cannot be imagined are associated with the name al-Khorezmi. For the first time in al-Khorezmi algebra's work, al-Khorezmi algebra was presented as a science on common methods of solving numerical linear and square equations. Studies on first- and second-degree equations were also proposed after al-Khorezmi's work. For example, another version of the geometric evidence of the solution of square equations and their somewhat more complete analysis is found in Ibn Turk al-Huttali, a native of Huttal district of present-day Dushanbe. The rules for solving square equations are found in Sabit ibn Korra, who wrote the treatise «The Discussion of Algebra with Geometric Evidence». Algebra developed in the Book of Al-Jabr and Al-Mukabalah by the Egyptian Mathematician H Abu Kamil al-Misri. The well-known Iranian mathematician Abu Bakr al-Karaji gave a three-member solution in the treatise al-Fakhri.
Many treatises were also paid to solving the square equations in the following centuries, so, for example, Muhammad Najmuddinhon wrote a treatise on square equations called «Risola dar jabr mucobala» («Treatise on algebra»). It is noteworthy that this treatise was written in a poetic form. By the 10th

century, a number of geometric, trigonometry, physical tasks were expressed by equations of higher degrees, especially cubic equations.

Significant progress in solving the cubic equations was achieved by the scientist – astronomer, the great poet Omar Khayyam in the work «The Treatise on the Evidence of Algebra Tasks», written in 1074, Hayam finds the roots of algebraic equations by crossing conical sections. With regard to the decision in radicals, he expressed hope that it would be done in the future. Indeed, it was done, about 500 years later by the Italian mathematician Girolamo Cardano.

In the studies of scientists of the medieval East, geometric issues occupy an important place. The main provisions of this science lay on the basis of astronomical studies of that period, and with the development of astronomy developed and geometry. For example, in Abu Rayhon Beruni's famous book Kitob-ut-Tafhim, which is set out in the form of questions and answers, a separate chapter reflects basic geometric concepts.

The well-known encyclopedist Abu Ali Ibn Sino (Avicenna), famous for his Canon of Medicine, in the scientific studies «Donishnam» and «Tatamatun-Najat» a separate section devotes to the theory of parallel lines. It is appropriate to mention the quadrangle, considered by Khayam and which played an important role in the history of non-Euclidean geometry.

Thus, the purposeful and systematic use of historical materials in the process of teaching mathematics has a positive effect on improving the level of knowledge of students and students, contributes to the specification and deepening of knowledge, broadening horizons, the formation of research skills, is one of the effective means of overcoming formalism in the learning process. The main condition for the use of historical material in the teaching of mathematics for educational purposes is the appropriate selection of mathematics, a well-designed and well-organized method of use. Historical materials, which are used for educational purposes in the teaching of mathematics and astronomy, should be clear and useful in content and accessible to students.

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