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USE OF HISTORICAL INFORMATION IN TEACHING THE SUBJECT OF COMPLEX NUMBERS AND OPERATIONS ON THEM

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ABSTRACT

This article provides information about numerical systems, natural, integer and rational numbers, complex numbers, geometric interpretation of complex numbers and the history of complex numbers.

Keywords: numerical systems, natural, integer and rational numbers, complex numbers, geometric interpretation of complex numbers

KOMPLEKS SONLAR VA ULAR USTIDA AMALLAR MAVZUSINI O‘QITISHDA TARIXIY MA’LUMOTLARDAN FOYDALANISH

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Annotatsiya

Ushbu maqolada kompleks sonlar va ular ustida amallar mavzusini o‘qitishda tarixiy ma’lumotlardan foydalanish uchun zarur bo‘lgan bilimlar, qoida, dalil, qonun, teorema, ta‘rif, gipotezalar tahlil qilingan. Matematikani rivojlanish bosqichlaridagi burilishlardan namunalar keltirilgan. O‘qitish jarayonida o‘quvchi talabalarga tarixiy bilimlarni muntazam o‘rgatib borish ularni mustaqil, erkin fikrlashga, izlanishga, har bir masalaga ijodiy yondashish, ma‘suliyatni sezish, ilmiy tadqiqot ishlarini olib borish, tahlil qilish, ilmiy adabiyotlardan unumli foydalanishga bo‘lgan qiziqishlarini kuchaytirishi asoslangan.

Kalit so‘zlar: sonli sistemalar, natural, butun, haqiqiy va kompleks sonlar sistemalari va ularning kiritulishi

ИСПОЛЬЗОВАНИЕ ИСТОРИЧЕСКИХ ДАННЫХ ПРИ ОБУЧЕНИИ КОМПЛЕКСНЫХ ЧИСЕЛ И ДЕЙСТВИЯ НАД НИМИ

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АННОТАЦИЯ

В данной статье анализируются знания, правила, доказательства, закон, теорема, определение, гипотеза, необходимые для использования исторической информации при

обучении комплексных чисел и операции над ними. Приведены примеры поворотов на этапах развития математики. В процессе обучения регулярное преподавание студентам исторических знаний дает им возможность мыслить самостоятельно, свободно, исследовать, творчески подходить к каждому вопросу, чувствовать ответственность, проводить научные исследования, анализировать, эффективно использовать научную литературу , основанный на повышении своих интересов.

Ключевые слова: числовые системы, натуральные, целые, действительные и комплексные системы чисел и их введение.

INTRODUCTION

Reform of the education system in our republic, consistent development of the education system based on the formation of a competitive environment in the field of state and non-state educational institutions and education and personnel training, the renewal of the education and personnel training system in society, a developed democratic legal state adaptation to construction processes, improvement of personnel training system and content based on prospects of social and economic development of the country, needs of society, modern achievements of science, culture, technique and technology were carried out. At the same time, tasks such as creative-intellectual and spiritual-ethical education of students, development of their creative abilities, development of effective forms and methods of this and creation of a normative, material-technical and informational base ensuring their implementation were defined.

Today, attention is paid to educating young people as worthy successors of prospects, creative people, and the future of our country is related to the development of the potential and talent of creatively thinking young people, modified educational content, and the search for new technologies and innovations.

In particular, in the decision of the President of the Republic of Uzbekistan dated 05.07.2020 No. PQ-4708 "On measures to increase the quality of education in the field of mathematics and to develop scientific research", a number of issues that have not been resolved in the field of the quality of education in the field of mathematics and the need to implement measures aimed at increasing the efficiency of scientific research is indicated.

In order to further improve the system of teaching mathematics at all stages of education, to support the effective work of pedagogues, to expand the scope and increase the practical importance of scientific and research work, a number of priority directions have been defined. In the teaching of mathematics, it is important to study numbers, their place in the development of science, technology, and in human life in general. That is why it is very important to study the construction of numbers and their properties on a theoretical basis.

It can be said that numerical systems are the basis of general secondary education mathematics. Because some operations on intuitively formed natural numbers, their comparison is studied in elementary school, and then the system of natural numbers is expanded with negative numbers.

First, natural, whole and rational numbers, operations between them, properties of these operations are studied. Then, the concepts of the approximate value of the number and the

square root, which are the basis for introducing the concept of irrational number, are studied. In the upper class, complex numbers are partially studied.

Studying complex numbers, conducting research on the specific aspects of teaching complex numbers in the educational system is one of the urgent issues. Familiarity with its history will increase interest in the student.

Ancient Greek mathematicians considered only natural numbers to be "real," but Ancient Egypt and Ancient Babylon began using fractions in practical calculations two thousand years before the new era. The next important stage in the development of the concept of number was negative numbers. They were introduced by Chinese mathematicians two centuries before the new era.

A new era III Ancient Greek mathematician Diophantus used negative numbers. He also knew the rules of actions on these numbers. Hing scholars VIII In the 1st century, they studied negative numbers in detail, they interpreted these numbers as "debt". Using negative numbers, it was possible to describe the change of quantities in a unique way. of our era VIII century, that the square root of a positive number has two values - positive and negative, and it is impossible to derive a square root from negative numbers, for example.x^2=-9 bdied x found that the number could not be found.

XVI In connection with the study of cubic equations in the 19th century, there was a need to extract square roots from negative numbers as well. Cube and square roots are involved in the formula for solving a cubic equation. This formula is used when the equation has one real root (for example, $x^3+3x-4=0$ for the equation) works smoothly, while the equation has three real roots (e.g. $x^3-7x+4=0$) a negative number will be formed under the square root. As a result, the way to find these three roots of the equation was through the forbidden operation - the operation of extracting the square root from a negative number. In order to explain the resulting paradox, the Italian algebraist J. Cardano proposed introducing new natural numbers in 1545. It did not have a solution in the set of real numbers $x+y=10$, $xy=40$ system of equations $x = 5 \pm \sqrt{-15}$, $y = 5 \pm \sqrt{-15}$ showed that it has solutions of the form, only according to the rules of ordinary algebra with such expressions $\sqrt{-a} \cdot \sqrt{-a} = -a$ it is necessary to agree (negotiate) to work. Cardano called such quantities "pure negative" and even "irrational negative", considered them useless and tried not to apply them.

However, as early as 1572, Italian algebraist R. Bombelli published a book containing the basic rules of arithmetic operations on such numbers. The book also contained a rule for extracting cube roots from such numbers. The name "abstract numbers" was introduced by the French mathematician and philosopher R. Descartes in 1637, and in 1777 XVIII a. L. Euler, one of the great mathematicians of this symbol became widespread thanks to K. Gauss (1831).XVII During the century, the discussion of the arithmetical nature of abstraction and the possibility of giving them a geometric interpretation continued.

Mathematicians have learned to express solutions of differential equations with constant coefficients using complex numbers. Such equations are found, for example, in the theory of vibration of a material point in a resistive medium. Earlier, the Swiss mathematician Ya. Bernoulli applied complex numbers to the calculation of integrals.

XVIII Although many problems, including cartography and hydrodynamics, were solved with the help of complex numbers during the century, the theory of these numbers was still not strictly logically based. That's why the French mathematician P. Laplace believed that the results obtained with the help of abstract numbers are only a guide, and only after they are directly confirmed by rigorous proofs, they take on the character of real truth.

The geometric interpretation of complex numbers allows defining many concepts related to the functions of a complex variable, expanding their field of application.

It became clear that complex numbers can be used in many problems dealing with magnitudes described by vectors in the plane: in the study of fluid flow, in problems of the theory of elasticity.

In the development of the theory of complex variable functions, N. I. Muskhelishvili was engaged in their application to the theory of elasticity, M. V. Keldish, M. A. Lavrentyev to aero- and hydrodynamics, N. N. Bogolyubov and V. S. Vladimirov to the problems of quantum field theory. Uzbek mathematician I. S. Arjanikh applied complex numbers to field theory.

In the course of teaching, regularly teaching pupils and students historical information on the subject helps them to think independently, freely, to research, to approach each issue creatively, to feel responsibility, to conduct scientific research, to analyze, from scientific literature. to productive use, and most importantly, to increase their interest in study, science, pedagogue and their chosen profession.

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