DIVISION RULES, PRIME AND COMPOSITE NUMBERS, AND THE SIEVE OF ERATOSTHENES

Rozikova Farizoda Ruyiddin qizi

Student of 023-99 course.

B.Berdiyev

Scientifc Teacher.

Karshi State University. Pedagogy and primaryeducation faculty.

Abstract. This article provides information on one of the fundamental topics of mathematics: numbers, their divisibility rules, prime numbers, and the Sieve of.

Eratosthenes. It also discusses the works and thoughts of various scholars on these topics, as well as recommendations for overcoming dificulties in studying the subject.

List of words: divisibility of numbers, Sieve of Eratosthenes, prime numbers, Golbax hypothesis.

ПРАВИЛА ДЕЛЕНИЯ, ПРОСТЫЕ И СОСТАВНЫЕ ЧИСЛА И РЕШЕТО ЭРАТОСФЕНА

Аннотация. В статье представлена информация по одной из фундаментальных тем математики: числа, правила их делимости, простые числа и решето.

Эратосфена. В ней также обсуждаются труды и мысли различных ученых по этим темам, а также рекомендации по преодолению трудностей в изучении предмета.

Список слов: делимость чисел, решето Эратосфена, простые числа, гипотеза Голбакса.

Introduction

Mathematics is often considered a challenging and abstract subject, requiring a unique ability to understand. While it is true that some areas of mathematics are complex, this is no diferent from any other feld of study. At the same time, mathematics is a discipline with widespread applications.

It has been employed for thousands of years to address problems in society, science, and technology.

We fnd mathematics dificult when we fail to master its principles and useful methods. Among the fundamental topics that lay the foundation for further exploration of mathematics are division rules, prime and composite numbers, and the Sieve of

Eratosthenes. These topics, although essential, can sometimes be challenging for learners. This article will explore these concepts and present ways to grasp them more efectively.

Rules of Division Division plays a vital role in mathematics by refecting order, distribution, and balance. To understand division in a practical sense, we use division rules—methods that determine whether a number is divisible by another without performing the division operation.

Common Division Rules:

1. Divisibility by 2: A number is divisible by 2 if its last digit is 0, 2, 4, 6, or 8.

2. Divisibility by 3: A number is divisible by 3 if the sum of its digits is divisible by

3. Divisibility by 4: A number is divisible by 4 if its last two digits form a number divisible by

4.Divisibility by 5: A number is divisible by 5 if its last digit is 0 or 5.

5. Divisibility by 9: A number is divisible by 9 if the sum of its digits is divisible by 9.

6. Divisibility by 10: A number is divisible by 10 if its last digit is 0.
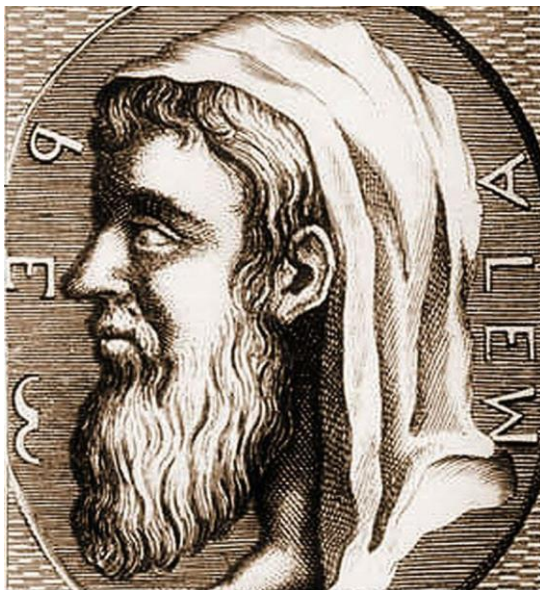
Эвклид

2 3 5 7 11 13 17
19 23 29 31 37 41
43 47 53 59 61 67
71 73 79 83 89 97

While some numbers are easy to classify using these rules, others require performing the division to verify divisibility.

Nonetheless, understanding these rules is a foundation for further exploration of mathematical patterns. Prime and Composite Numbers Prime numbers are positive integers greater than 1 that have exactly two divisors: and themselves. In contrast, composite numbers have more than two divisors.Key Points About Prime Numbers:Smallest Prime Number: The number 2 is the smallest prime and theonly even prime number.Why 1 is Not Prime: The number 1 is not considered a prime number because it has only one divisor.Every composite number can be expressed as the product of prime factors. For example:One famous hypothesis related to prime numbers is Goldbach's Conjecture, which suggests that every even integer greater than 2 can be expressed as the sum of two primes. While this conjecture remains unproven, it has been verifed for many numbers.Methods to Identify Prime Numbers.There are several methods to determine whether a number is prime.

1. Trial Division: Check divisibility by all numbers from 2 to the square root of the given number. For example, to check if 121 is prime, divide it by all integers up to .

2. Sieve of Eratosthenes: This ancient method eficiently fnds all primes up to a given number.The Sieve of Eratosthenes:

Developed by the Greek mathematician Eratosthenes in the 3rd century BCE, this method systematically eliminates composite numbers from a list of natural numbers to identify primes.

Steps:

1. Write all integers from 2 to.

2. Cross out all multiples of 2 except 2 itself.

3. Move to the next uncrossed number (3) and cross out its multiples.

4. Repeat this process for all numbers up to. This method allows for the simultaneous identifcation of multiple prime numbers and is particularly efective for smaller ranges.

Applications of Divisibility and Prime Numbers Understanding divisibility and prime numbers is not only foundational but also crucial for solving advanced mathematical problems.

For instance, Fermat's Last Theorem and Goldbach's Conjecture both rely on the concept of divisibility. These problems have intrigued mathematicians for centuries and continue to inspire research. Sieve of Eratosthenes –An Important Method for Identifying Prime Numbers The Sieve of Eratosthenes is an ancient and eficient algorithm used to fnd all prime numbers up to a given limit. This method was developed by the Greek mathematician and astronomer Eratosthenes in the 3rd century BC and ofers a simple and understandable approach. The algorithm works by sequentially eliminating composite numbers from the list of numbers, leaving only the prime numbers. Sieve of Eratosthenes: It allows you to identify multiple prime numbers at once. It is a very fast and simple method for small numbers.It helps to fnd large numbers of primes in a short time. Limitations: It may take a bit more time for larger numbers.

The need to manually remove many numbers can be time-consuming. The Sieve of Eratosthenes is one of the fundamental algorithms in mathematics and is widely used in prime number identifcation, cryptography, and scientifc research. Its simplicity and eficiency have kept it relevant for millennia.

Conclusion. Mastering fundamental mathematical concepts, such as division rules and prime numbers, requires patience, perseverance, and practice. By building a strong foundation in these areas, learners can confdently tackle more complex problems. As the renowned mathematician Carl Friedrich Gauss once said, "The ability to rejoice comes from knowledge.

"This quote beautifully encapsulates the joy derived from learning and exploring mathematical truths.

REFERENCES

1. Hamedova, N., Ibragimova, Z., Tasetov, T. Matematika. Toshkent: Turon-Iqbol, 2007.
2. Sirojiddinov, S., Mirzaahmedov, M. Matematik Kasbi Haqida Suhbatlar. Toshkent: O'qituvchi, 1993.
3. Uzoqov, S., Ochilov, A., Tirkashev, M. Matematikadan Ommabop Ko'makdosh. Qarshi, 2008.
4. Berdiyev, B. R. Matematika O'qitish Metodikasi. Qarshi: Fan va Ta'lim, 2022.