INTERNATIONAL MULTIDISCIPLINARY JOURNAL FOR RESEARCH & DEVELOPMENT
SJIF 2019: 5.222 2020: 5.552 2021: 5.637 2022:5.479 2023:6.563 2024: 7,805
eISSN :2394-6334 https://www.ijmrd.in/index.php/imjrd Volume 11, issue 08 (2024)

CONCEPT OF LOGARIFM AND ITS PROPERTIES

Ro'ziyev Jamshid Xudoyberdiyevich

The senior teacher of Academic Lyceum No.1

Tashkent State University of Economics

Abstract: This article will give an overview of logarithms, in particular, the concept of logarithm and its mathematical properties, as well as the history of the origin of this mathematical concept.

Key words: logarithm, expressions, equations, complex fractions, mathematical property, etc.

In mathematics, in most cases, solutions to problems and examples are found using equations. For example, there are problems that can be solved using a system of equations, first, second and higher equations. In addition, we face many such problems in life, which are usually solved using logarithms from some branches of mathematics. That is, some problems, for example, a number of problems related to technology, appear in the form of a logarithmic equation. In addition, there are different forms of logarithmic equations and different methods of solving them. We come across similar examples and problems in the 10th grade "Mathematics" textbook. This textbook shows several examples of logarithms, but we can see that there is not enough information about them.

Calculating logarithms is called logarithmology. Values a, b are real in most cases, but there are also complex logarithms. Logarithms have special properties that are widely used to significantly simplify time-consuming calculations. Moving into the world of logarithms, multiplication is replaced by addition, subtraction is division, and exponentiation and root extraction become exponentiation and division, respectively. Laplace said about the invention of logarithms: "Logarithms have shortened the work of the mathematician and doubled his life." The definition of logarithms and a table of their values (for trigonometric functions) were first published in 1614 by the Scottish mathematician John Napier. Expanded and improved by other mathematicians.

$* \log_a a = 1$

$* \log_a 1 = 0$

$* a^{\log_a b} = b$

$* a^{\log_b c} = c^{\log_b a}$

$$* \log_a b = \frac{\log_c b}{\log_c a}$$

$$* \log_a b = \frac{1}{\log_b a}$$

$* \log_b(mn) = \log_b m + \log_b n$

$* \log_b(\frac{m}{n}) = \log_b m - \log_b n$

$* \log_b(m^p) = p\log_b m$

Logarithmic tables were created and logarithmic rulers were used. Logarithmic tables were widely used for scientific and engineering calculations for more than three centuries before the advent of electronic calculators and computers. Properties of logarithms: Various properties of logarithms are often used in substitution of expressions involving logarithms, calculations and solving equations.

Logarithms are indispensable in many other areas of human activity: solving differential equations, classifying the values of quantities (for example, sound frequency and intensity), estimating various relationships, information theory, probability theory, etc. This function represents an elementary number, which is the inverse of the exponential function. The most commonly used type of logarithms are real logarithms.

- 2 (binary),
- e (natural) and
- 10 (decimal logarithm)

Addition, multiplication, and exponentiation are the three most basic arithmetic operations. The opposite of addition is subtraction, and the opposite of multiplication is division. Similarly, a logarithm is the inverse of an exponent. Exponents - the base of the number b is raised to the power y of a certain degree, giving the value of x; it is determined. Using the properties of logarithms proved above, we can find the value of each logarithm in the expression:

$$\log_3 9 = \log_3 3^2 = 2\log_3 3 = 2 \cdot 1 = 2;$$

$$\log_{\sqrt{3}} 9 = \log_{3^{\frac{1}{2}}} 3^2 = \frac{2}{\frac{1}{2}} \cdot \log_3 3 = 2 \cdot 2 \cdot 1 = 4;$$

$$\log_{\frac{1}{3}} 9 = \frac{\log_3 9}{\log_3 \frac{1}{3}} = \frac{2}{-1} = -2;$$

$$\log_{\frac{\sqrt{3}}{2}} \left(\frac{64}{9}\right) = \frac{\log_3 \left(\frac{64}{9}\right)}{\log_3 \frac{\sqrt{3}}{2}} = \frac{\log_3 64 - \log_3 9}{\log_3 \sqrt{3} - \log_3 2} = \frac{6\log_3 2 - 2\cdot 1}{\frac{1}{2}\log_3 \sqrt{3} - \log_3 2} =$$

$$= \frac{4(3\log_3 2 - 1)}{1 - 2\log_3 2}.$$

References:

1. Murtozaqulov Z. M., Solayeva M. N. darslikdagi differensial tenglamalarni yechishdagi yetishmayotgan metodlar va ma‟lumotlar //Academic research in educational sciences. – 2021. – T. 2. – №. CSPI conference 3. – C. 462-467.
2. MURTOZAQULOV Z. M., ABDUJABBOROV S. H. F. Tenglamalar sistemasini yechishda qulay bo‟lgan metod va ko‟rsatmalar //ЭКОНОМИКА. – С. 898-904.
3. Zafar Madat o‟g‟li Murtozaqulov. KOMBINATORIKAGA DOIR MASALALARINI YECHISHDA FORMULALARNI TO‟G‟RI QO‟LLASH. Uzbek Scholar Journal. Volume- 09, Oct., 2022 (272-277).
4. Муртозақулов Зафар Мадат ўғли. УЧ ЎЛЧАМЛИ ЛЕЙБНИЦ АЛГЕБРАЛАРИДА L1, L2, L3 АЛГЕБРАЛАРДАГИ БУЗИЛИШЛАРИНИ ҲАМДА ЎТИШ МАТРИЦАЛАРИНИ

ҲИСОБЛАШ.// ОБРАЗОВАНИЕ НАУКА И ИННОВАЦИОННЫЕ ИДЕИ В МИРЕ. (119-127).
5. Муртозақулов Зафар Мадат ўғли. ТАБИИЙ УСУЛДА ГРАДИУРЛАНГАН КВАЗИ-ФИЛИФОРМ ЛЕЙБНИЦ АЛГЕБРАСИНИНГ ДИФФЕРЕНЦИАЛИ. Ustozlar uchun. (78-83).