INTERNATIONAL CONFERENCE **Dehli, India, 2026**
https://eijmr.org/conferences/

LINEAR FUNCTION AND ITS PROPERTIES

Mamaraimov Bekzod Kadirovich

Teacher of mathematics at Terdu Academic Lyceum

Makhmudov Azam Kudratovich

Teacher of mathematics at Terdu Academic Lyceum

Musurmonov Maruf Akrom ugli

Teacher of mathematics at Terdu Academic Lyceum

Mathematics plays an important role in forming the logical foundations of human thinking, modeling and analyzing phenomena occurring in the environment. In particular, the theory of functions is considered one of the pillars of mathematical knowledge, and it is widely used to express the relationships between real processes. One of the simplest, but most important types of this theory is a linear function, which is inextricably linked with mathematical analysis, algebra, geometry, and applied sciences. The study of a linear function and its properties creates a foundation for developing functional thinking in students, forming the skills of working with graphs, and mastering complex mathematical concepts. The concept of a linear function allows us to mathematically express many processes encountered in everyday life. For example, the relationship between time and distance, directly proportional quantities, changes in costs and income, and indicators such as speed and efficiency in technical processes are expressed precisely through linear relationships. Therefore, the study of this topic is not only theoretical, but also practical, and develops students' ability to mathematically model real-life problems.[5]

The main goal of studying the topic is to form the concept of a linear function, to gain a deep understanding of its general appearance, graphic representation and main properties. In this, it is important to analyze how a change in the argument of a function affects the resulting value, to distinguish between increasing and decreasing functions, and to develop skills in solving equations and inequalities using graphs. Also, the topic of linear functions serves as a necessary methodological basis for understanding quadratic, rational and other complex functions that will be studied at later stages.

Today, the relevance of studying linear functions and their properties is increasing. Many processes in digital technologies, economic analysis, engineering calculations and information systems are based on linear models. Linear functions are also a key tool in modern educational approaches focused on STEM education, algorithmic thinking, and problem-solving. Therefore, thorough mastery of this topic not only improves students' mathematical literacy, but also creates a solid foundation for their future professional activities.

The concept of functions plays an important role in mathematics. Through functions, many processes occurring in nature, technology and economics are expressed as mathematical models. In particular, a linear function is one of the simplest and most common functions, which is one of the main topics in the school and academic education system. Linear functions describe directly

proportional relationships, linear motion, economic growth and production processes. Therefore, in-depth study of this topic is of great importance in developing students' mathematical thinking.

A linear function is a function of the following form:

$y = kx + b$,

where k and b are constants, k is a coefficient, and b is a free term. This function assigns a unique value of y to each value of x. The graph of a linear function is a straight line on the coordinate plane.[1]

If $k > 0$, the function is increasing, that is, as x increases, y also increases. If $k < 0$, the function is decreasing. When $k = 0$, the function is a continuous function, expressed in the form $y = b$.

There are several important properties of a linear function. First, its domain consists of all real numbers. Because y is defined for any real value of x. The domain also consists of all real numbers when $k \neq 0$.

The second important property is that its graph is a straight line. This line can be drawn exactly through two points. For example, when $x = 0$, $y = b$, and when $x = 1$, $y = k + b$. The graph of a function can be constructed using these two points.

Whether a linear function is increasing or decreasing depends on the coefficient k. If k is positive, the function is increasing, and if it is negative, it is decreasing. This property is important in the analysis of linear functions and is used in solving many practical problems.

Constructing a graph of a linear function is an important part of mathematical analysis. The properties of a function can be seen and analyzed visually through a graph. The point of intersection of the graph with the ordinate axis is (0; b), and the point of intersection with the abscissa axis is determined by the value of x when $y = 0$: $x = -b/k$.

The graph of a linear function is used in economics to express the relationship between income and expenses, and in physics to express linear motion. For example, the formula $s = vt$ is also a form of a linear function.[1]

Linear functions are widely used in everyday life. For example, the relationship between electricity bills, water consumption, production volume and profit is expressed through a linear model. In the educational process, a linear function develops students' logical thinking.

In conclusion, a linear function is one of the most important and fundamental concepts in mathematics. Its simple structure, clear properties and wide application make it necessary to study it. Through a linear function, students master the basics of mathematical modeling and acquire skills in analyzing real-life processes.

References.

1. Alimuhamedov B., Xudoyberganov S. Algebra va analiz asoslari. Umumiy o‘rta ta’lim maktablarining 8-sinflari uchun darslik. — Toshkent: O‘qituvchi, 2020. — 45–62-betlar.

2. Yo‘ldoshev J., Karimov A. Algebra. Akademik litsey va kasb-hunar maktablari uchun darslik. — Toshkent: Sharq, 2019. — 33–58-betlar.

3. Ismoilov R., To‘xtayeva M. Elementar matematika va funksiyalar nazariyasi. — Toshkent: Fan, 2018. — 71–89-betlar.

4. Abdullayev A. Matematika o‘qitish metodikasi. — Toshkent: Innovatsiya-Ziyo, 2021. — 112–128-betlar.

5. Kolmogorov A.N., Fomin S.V. Funksiyalar va grafiklar asoslari. — Moskva: Nauka, 2016. — 25–47-betlar.