ISSN 2181-

LINEAR EQUATIONS

Kholikov Tolqin Boltaevich - Mathematics teacher of the Kashkadarya Academic Lyceum of the Ministry of Internal Affairs of the Republic of Uzbekistan

Annotation: in this article, the concept of linear equations is introduced using the abstract-deductive method, a definition is given for the equation, then the general form of the equation and methods of its solution are studied, mathematical imagination and logical thinking are discussed through solving the equation

Keywords: linear equation, infinitely many solutions, one solution

Definition. If the left and right sides of the equation consist of linear functions with respect to the unknown variable, then such an equation is called a linear equation.

A linear equation is generally expressed in the form $ax + b = cx + d$. Here a,b,c,d are given known numbers, and x is an unknown number. Solving equations of this form is carried out as follows:

$$\mathbf{ax + b = cx + d.}$$

$$\mathbf{ax - cx = d - b,}$$

$$\mathbf{x(a - c) = d - b,}$$

$$\mathbf{x = \frac{d - b}{a - c}}$$

1. If $a \neq c$, the equation has one solution of the form.

2. If $a - c = 0. d - b \neq 0$, the equation takes the form $0 \cdot x = d - b$, such an equation is not valid for any value of x.

Therefore, in this case, the equation has no solution.

3. If $a - c = 0$ *and* $d - b = 0$, the equation takes the form $0 \cdot x = 0$, this equality is valid for all values of x, therefore, the equation has infinitely many solutions. In other words, any number can be its solution.

Example 1. Solve the equation $a + x = a^2x - 1$ with respect to x.

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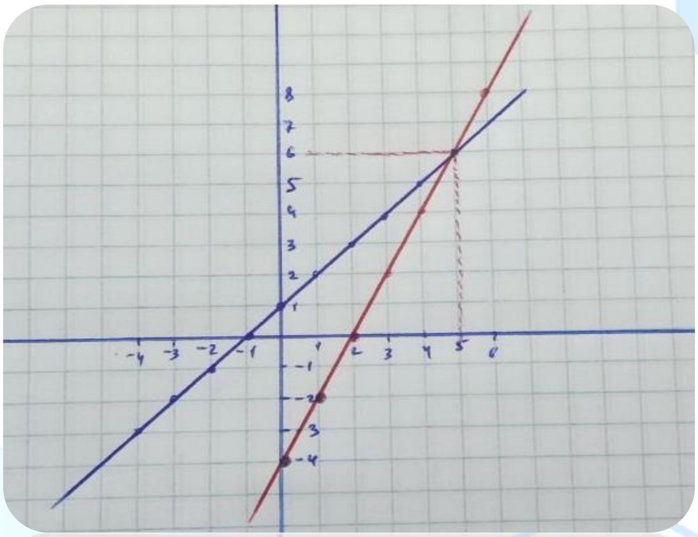

Yechish. $a+1=a^2x-x$, $a+1=x(a^2-1)$; $a+1=x(a-1)(a+1)$.

1. If $a \neq +1$, the equation has a solution $x=\frac{1}{a-1}$.

2. If $a=$ 1the equation takes the form $0 \cdot x=1$, in which case it has no solution.

3. If $a=-1$ the equation takes the form $-2x=1$, $x=-\frac{1}{2}$, in which case it has a solution.

When solving linear equations graphically, we consider each of the equations $ax+b=cx+d$ as a separate linear function, and in the process of constructing a graph, we can see that the common point of intersection is the general solution, as we will see in the example below.

Example: We can solve the equation $\mathbf{2x-1=x+2}$ graphically.

We consider the linear functions

$\boldsymbol{y_1=2x-1}$ and $\boldsymbol{y_2=x+2}$ and . We use the tabular method to construct the function and create the following table

x	**0**	**1**	**2**	**3**
$\boldsymbol{y_1}$	**- 1**	**1**	**3**	**5**

x	**0**	**1**	**2**	**3**
$\boldsymbol{y_2}$	**2**	**3**	**4**	**5**

We construct the function graphs using the table. From the point of intersection of the function with the axes Ox and Oy, we draw a straight line

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parallel to the axis. The function graphs have a common point at the point x=5 and the solution to the equation is equal to x=5.

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