LINEAR EQUATIONS IN TWO VARIABLES

Mr. Gaikwad Atul Shesharao
Assi. Professor,
Shri Chhatripati Shivaji College, Omerga, (MS) India.

ABSTRACT :
A linear equation in two variables can be expressed in the form Ax + by means of + C = zero, wherein A, B, C are constants and x and y are the two variables, each with a degree of one. If we recall such linear equations, they're referred to as simultaneous linear equations. As an example, 6x + 2y + 9 = zero is a linear equation in variables.

KEYWORDS: linear equation , removal approach, mathematics.

INTRODUCTION:

There are numerous ways for fixing linear equations in two variables just like the Graphical approach, the Substitution technique, the cross Multiplication method, the removal approach, and the Determinant approach. After fixing these, we get the solutions for each of the variables..

PAIRS OF LINEAR EQUATIONS IN TWO VARIABLES:

A system of the linear equations consists of two or more equations that share a common solution. In a system of linear equations, each equation can be represented by a straight line and the solution is the point where the two or more lines intersect. The concept of the linear equation in mathematics has many implications in real life. Here, we have attempted to give you an idea of the linear equation and how to solve it through solved examples and explanations.

LINEAR EQUATION IN TWO VARIABLES DEFINITION:

If you are asked to define a linear equation in two variables, the answer will be - a pair of linear equations in two variables is a set in which all the equations are considered concurrent. To solve linear equations in two variables questions; for a unique solution, one has to find the values of the variable that is consistently true for all the equations. In some cases, linear systems may not have a solution while in other cases, some may have an infinite number of solutions. For finding a unique solution, the number of unknown variables should be equal to the number of equations. Linear equations in two variables have direct application in determining the geometry of lines. As a linear equation represents a straight line, plotting graphs and observing the point of intersection helps to solve for the variables.

_____
Journal for all Subjects : www.lbp.world

1

_____

LINEAR EQUATIONS IN VARIABLES:

Instead of locating the solution for a single linear equation in variables, we are able to take units of linear equations, each having variables in them, and find the answers. So, basically, the device of linear equations is defined while there may be more than one linear equation.

For instance, a+b = 15 and a-b = 5, are the machines of linear equations in variables. due to the fact, the point a = 10 and b = 5 is the solution for each equations, along with:

a+b=10 + 5 = 15
a-b=10-5 = 5

Subsequently, the proved factor (10,5) is the solution for each a+b=15 and a-b=5.

LINEAR EQUATION IN TWO VARIABLE FORMULA:

If a, b, and r are real numbers and both are not equal to 0, then ax + by = r. illustrates a linear equation in two variables. The two variables of the equation are denoted by x and y. The numbers a and b represent the coefficients.
* The standard form of linear equation in two variables: ax + by = r.
* The number 'r' is called the constant in the above equation.
* A linear equation in two variables has three entities as denoted in the following example:
* 10x - 3y = 5 and 2x - 4y = 7 are representative forms of linear equations in two variables.

SOLVING LINEAR EQUATIONS IN TWO VARIABLES:

* While solving a linear equation in two variables, one must always abide by the following rules.
* The solution of a linear equation is not altered when:
* The same number is added to (or subtracted from) L.H.S. and R.H.S. of the equation.
* Multiplication or dividing both L.H.S. and R.H.S. by the same non-zero number.
* Every linear equation in one variable has a unique solution. But a pair of linear equations have two solutions i.e. one for x and the other for y, satisfying both the equations.

* **Unique Solution:**

If a given set of linear equation intersects at a point, the solution will be unique for both the equations. In order to get a unique solution for a set of equations, the slopes of the lines should differ from each other. Suppose m_1 and m_2 are the two slopes of two lines having an equation in two variables. In that case, when $m_1 \neq m_2$, we can expect a unique solution.

* **No Solution:**

If a pair of two variable equations have equal slopes i.e. m1 = m2, the lines will be parallel to each other. Thus, due to the lack of intersection, they will have no solution.

* **Unique and Infinite Solutions:**

If a pair of linear equation is consistent then the lines will have unique solutions as well as infinite solutions i.e. they will be intersecting or coincident

For Example:

Find the value of variables which satisfies the following equations:
8x + 7y = 38 and 3x - 5y = - 1.

_____

_____

Solution:
Using the method of substitution to solve the pair of linear equation, we have:
$8x + 7y = 38$..........................(i)
$3x - 5y = -1$..........................(ii)

Multiplying equation (i) by 5 and (ii) by 7, we have:
$40x + 35y = 190$.........................(iii)
$21x - 35y = -7$ ....(iv)

Adding equation (iv) and (iii), we have:
$61x = 183$
$\Rightarrow x = 3$

Substituting the value of x in either equation (i) or (ii), we have
$3 \times 3 - 5y = -1$
$\Rightarrow y = 2$

        Therefore, $x = 3$ and $y = 2$ is the point where the given lines intersect.
        After knowing how to solve a pair of linear equations algebraically, let us represent an equation on a coordinate plane. These equations tend to have infinitely many solutions. The solutions of the linear equation: $3x + 2y = 6$ can be illustrated in the form of a table as follows by writing the values of y below the corresponding values of x :

Plotting Graph of Linear Equations in Two Variables

x	0	1	2
y	3	$\frac{3}{2}$	0

        On plotting the $(0,3),\ (1,\frac{3}{2})$ and $(2, 0)$ points a graph paper and joining them we will see that it forms a straight line. This is called the graph of the linear equation. The graph is obtained by joining two points corresponding to two solutions. Every point on the line satisfies the equation of the line and acts as the solution to the equation.

Do You Know
        In our everyday life, we come across several situations where we can use the linear equation method to solve a problem. In fact, any situation where one quantity is unknown can be represented by a linear equation! You want to figure out income over time or predict the profit of your startup or calculate mileage - you have to use a linear equation in two variables to find out the unknown quantity.

Problems and Solutions:
Question:
find the price of variables that satisfy the following equation:
$2x + 5y = 20$ and $3x+6y =12$.

Answer:
using the method of substitution to solve the pair of linear equations, we have:
$2x + 5y = 20$.........................(i)
$3x+6y =12$.........................(ii)

_____

_____

Multiplying equation (i) via 3 and (ii) through 2, we have:

$6x + 15y = 60$ ....(iii)

$6x+12y = 24$ ....(iv)

Subtracting equation (iv) from (iii)

$3y = 36$

$\Rightarrow y = 12$

Substituting the cost of y in any of the equations (i) or (ii), we've got

$2x + 5(12) = 20$

$\Rightarrow x = -20$

Consequently, x=-20 and y =12 is the factor wherein the given equations intersect.

REFERENCE:

1. https://ncert.nic.in/textbook (accessed on 12/05/2022)
2. https://www.cuemath.com (accessed on 12/05/2022)

_____