Grade 8

Chapter 11 : Linear Equations and Quadratic Equations

Linear equations in one variable

An equation containing one variable where the highest exponent of that variable is 1 is known as a linear equation in one variable.

example

$5 + 6y = 3y$ is a linear equation in one variable y.

$2(x-4) + 3(7x-1) = 9$ is a linear equation in variable x.

$ax + b = c$ is the general form of a linear equation in one variable x, where a, b, c are constants and $a \neq 0$.

Solution of an equation

The value of the variable that makes the equation true is called the solution or root of the equation.

example

In equation $x + 7 = 12$, $x=5$ is the solution of the equation because $x=5$ makes the equation true or $x=5$ satisfies the equation.

Simultaneous linear equations in two variables:

Two different linear equations containing two same variables are called simultaneous linear equations in two variables.

Example:

$2x+3y-7=0$ & $x+y=5$ are two simultaneous linear equations in two variables x and y.

Solution of Simultaneous linear equations:

The pair values of unknowns say x and y satisfying each one of the given equations is called a solution of the system of equations.

Example:

x + y =5 and x-y =1 are satisfied by x= 3 and y= 2, therefore x= 3, y=2 is the solution of the given system of equations.

Solving simultaneous linear equations:

We shall discuss two methods of solving simultaneous equations in two variables.

i) Substitution method
ii) Elimination method or addition-subtraction method

i) Substitution method

In this method ,value of one variable is found from any one equation in terms of other variable and is substituted in other equation to obtain a linear equation in one variable. This equation on solution gives the value of one variable. Value of this variable when substituted in any one of the given equations gives the value of the other variable.

Example

Solve: $7x - 5y = 2$............(1)
and $x + 2y = 3$.............(2)

Solution

From equation (2), $x = 3 - 2y$.

Putting the value of x in equation (1)

$7(3 - 2y) - 5y = 2$

$\Rightarrow 21 - 14y - 5y = 2$

$\Rightarrow 21 - 19y = 2$

$\Rightarrow y = 1$

Putting y=1 in equation (2), we get, x=1

∴ x= 1, y=1 is the required solutions.

ii) Elimination method or addition-subtraction method

In this method, we eliminated one of the variables by making the coefficient of that variable same and then adding or subtracting the two equations. Stepwise approach is as follows-

i) Multiply the given equations by suitable constants so as to make the coefficients of one of the unknown, numerically equal.
ii) Add the new equations, if the numerically equal coefficients are opposite in sign otherwise subtract them.
iii) Solve the equation so obtained to get one of them unknown.
iv) Substitute the value of unknown in any of the given equations and solve

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it to the value of the other unknown.

Example

Solve: $7x - 5y = 2$…………(1)
and $x + 2y = 3$…………..(2)

Solution

We multiply equation (2) by 7, we get
$7x + 14y = 21$…………..(3)

Subtracting equation (1) from equations (3) we get
$19y = 19$
$\Rightarrow y = 1$
Putting $y = 1$ in (2), we get $x = 1$.

Hence $x= 1$, $y= 1$ is the required solution.

Quadratic Equations
Any equation which can be put in the form of $ax^2 + bx + c=0$, where $a\neq0$, b, c are real numbers is a quadratic equation.

Example
$2x^2 - 3x + 5 = 0$ & $x^2 + 2 = 0$ are quadratic equations.

Solution of a Quadratic Equation:

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