LINEAR EQUATION IN ONE VARIABLE

INTRODUCTION OF LINEAR EQUATION IN ONE VARIABLE

INTRODUCTION TO LINEAR EQUATION

This chapter is very important because, while solving the problems, in most cases, we need to frame an equation first. In this chapter, we learn how to frame and solve equation. Framing an equation is more difficult than solving an equation. First, we shall have to understand the meaning of certain terms which are associated with equation like number, symbols, knowns, unknowns, constant variables, expressions, sentences, statements etc.

COMMON TERMS

1 Numbers and symbols

In lower classes, we worked with numbers like 1, 2, 3, 1.2, – 2.3 as well as letters like a, b, c, or x, y, z, which can be used instead of number, These letters can be used for some known or unknown numbers. Accordingly, they are called knowns or unknowns. We'll also come across situations in which the letters represent some particular numbers or a whole set of numbers. Accordingly, we call them constants or variables.

2 Numerical expressions

Expressions of the from 3×5, $(2 + 6)$ $5 \div (- 4)$, $3^2 + 4^{\frac{1}{2}}$, $\sqrt{2} + 5 \div 3$ are numerical expressions. Numerical expressions are made up of numbers, the basic arithmetical operations $(+, –, \times, \div)$, involution (raising to a power) and evolution (root extraction).

3 Algebraic Expressions

Expressions of the form $2x$, $(3x + 5)$, $(4x – 2y)$, $2x^2 + 3\sqrt{y}$, $\frac{3x^2}{2}\sqrt{y}$ are algebraic expressions.

3x and 5 are the terms of (3x + 5), and 4x and 2y are the terms of 4x – 2y. Algebraic expressions are made up of number, symbols and the basic arithmetical operations.

4   Equations

An open sentence containing the equality sign is an equation. In order words, an equation is a sentence in which there is an equality sign between two algebraic expressions.

For example, 2x + 5 = x + 3, 3y – 4 = 20, 5x + 6 = x + 1 are equation. Here x and y are unknown quantities and 5, 3, 20, etc are known equations.

LINEAR EQUATION

An equation in which the highest index of the unknowns present is one is a linear equation.

2 (x + 5) = 18, 3x – 2 = 5

x + y = 20 and 3x – 2y = 5 are same linear equations.

1   A linear equation in one variable

A linear equation which has only one unknown is called a linear equation in one variable. 3x + 4 = 16 and 2x – 5 = x + 3 are examples of linear equation in one variable. The part of an equation which is to the left side of the equality sign is known as the left hand side, abbreviated as LHS. The part of an equation which is to the right side of the equality sign is known as the right hand side, abbreviated as RHS. The process of finding the value of an unknown in an equation is called the solution (s) or the root (s) of the equation.

Before we learn how to solve an equation, let us review the basic properties of equality.

2   Properties of equation

(A)   REFLEXIVE PROPERTY

Every number is equal to itself.

Example : 5 = 5, 2 = 2 and so on.

(B)   SYMMETRIC PROPERTY

For any two numbers, if the first number is equal to the second, then the second number is equal to the first.

If x and y are two numbers and x = y, then y = x

Example :   3 + 4 = 5 + 2

5 + 2 = 3 + 4

(C)   TRANSITIVE PROPERTY

If x, y and z are three number such that x = y and y = z then x = z.

Example :   9 + 3 = 12, 12 = 3 × 4

9 + 3 = 3 × 4

(D)   ADDITION PROPERTY

If equal numbers are added to both side of an equality, the equality remains the same.

If x = y, then x + z = y + z.

(E)   SUBTRACTION PROPERTY

If equal number are subtacted from both side of an equality, the equality remains the same.

If x = y, then x – z = y – z.

(F)   MULTIPLICATION PROPERTY

If both sides of an equality are multiplied by the same number, the equality remains the same.

If x = y, then (x) (z) = (y) (z)

(G)   DIVISION PROPERTY

If both sides of an equality are divided by a non-zero number, the equality remains the same.

If x = y, then x/z = y/z, where z ^{1} 0.

If x, y and z are three numbers such that x = y and x = z, then y = z.

Example : $24 = 8 \times 3, 24 = 14 + 10$

$8 \times 3 = 14 + 10$

Ex.1 $3x + 7 = 12, \dfrac{5}{2}x - 9 = 1, x^2 + 1 = 5$ and $\dfrac{x}{3} + 5 = \dfrac{x}{2} - 3$ are equations in one variable x.

Ex.2 $2x + 3y = 15, 7x - \dfrac{y}{3} = 3$ are equations in two variables x and y.

Linear Equation :

 An equation involving only linear polynomials is called a linear equation.

Ex.3 $3x - 2 = 7, \dfrac{3}{2}x + 9 = \dfrac{1}{2}, \dfrac{y}{3} + \dfrac{y-2}{4} = 5$ are linear equations in one variable, because

the highest power of the variable in each equation is one whereas the equations

$3x^2 - 2x + 1 = 0, y^2 - 1 = 8$ are not linear equations, because the highest power of

the variable in each equation is not one.