

Class 10 Maths

Chapter 5: Arithmetic Progressions

1. Introduction to Arithmetic Progressions (AP)

An arithmetic progression is a list of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term.

- First Term (a): The starting number of the sequence.
- Common Difference (d): The fixed number added to get the next term. It can be positive, negative, or zero.

$$d = a_2 - a_1 = a_3 - a_2 = \dots = a_n - a_{n-1}$$

2. General Form of an AP

If "a" is the first term and "d" is the common difference, then the general form of an AP is:

$$a, a + d, a + 2d, a + 3d, \dots$$

3. The nth Term of an AP

The nth term (or the general term) of an AP with first term "a" and common difference "d" is given by the formula:

$$a_n = a + (n - 1)d$$

Note: If there are "m" terms in the AP, then a_m represents the last term, which is sometimes also denoted by "l".

4. Sum of First n Terms of an AP

The sum of the first n terms of an AP is given by the formula:

$$S_n = \frac{n}{2} \times [2a + (n - 1)d]$$

Alternatively, if the first term (a) and the last term (l or a_n) are given, the sum can be calculated as:

$$S_n = \frac{n}{2} \times [a + a_n]$$

5. Important Property

The nth term of an AP is the difference of the sum to first n terms and the sum to first (n - 1) terms of it, i.e.,

$$a_n = S_n - S_{n-1}$$