Revision Notes

Class - 10 Maths

Chapter 5 - Arithmetic Progression

Definition of Arithmetic Progression

- An arithmetic progression is a sequence of numbers, obtained by **adding** a fixed number to the preceding term starting from the first term such that the difference between each consecutive term remains the same.
- Each of the numbers in the list is called a term and the fixed number is called the common difference of the AP which can be any integer.

  For example: $2,5,8,11....$ having common difference of 3.

General term of an AP

1. The general form of an AP is:

   $a\ ,a+d\ ,a+2d\ ,a+3d\ ,....,a+(n-1)d$

2. An AP with finite number of terms is called a **finite** AP having $a+(n-1)d$ as the last term. An AP which neither has a finite number of terms nor has a last term is called an **infinite** AP.

   For example:

   a) Finite AP: $1,3,5,7,....,25$

   b) Infinite AP: $2,4,6,8.....\infty$

3. The n^{th} term of the AP: $a_n = a + (n-1)d$, where a is the **first** term of the sequence and d is the common difference.

   The **Second** term: $a_2 = a + (2-1)d = a + d$

   Similarly, the **third** term $a_3 = a + (3-1)d = a + 2d$

   The **fourth** term $a_4 = a + (4-1)d = a + 3d$ and so on till the last term.

   Example 1:

   An AP has a first term 3, common difference 4. Find the third and fifth term of the AP.

   Solution:

   $a = 3,\ d = 4$

   $a_3 = 3 + (3-1)4$

   $a_3 = 11$

   Similarly,

   $a_5 = 3 + (5-1)4$

   $a_5 = 19$

4. n^{th} term of an AP from the end: $t_n = L - (n-1)d$, where L is the last term of the AP.

   Example 2:

   An AP has a common difference 2 and last term 24. Find the fourth term of the AP from the end.

Solution:

$d = 2,\ L = 24$

$t_4 = 24 - (4-1)2$

$t_4 = 18$

Sum of the terms of an AP

1. Sum of n terms of an AP if first term and common difference is given:

$$S = \frac{n}{2}(2a + (n-1)d)$$

2. Sum of n terms of an AP if first term and last term l is given:

$$S = \frac{n}{2}(a + l)$$

Example 3:

Find the sum of first 10 terms of the AP $1, 4, 7, 10.....34.$

Solution:

$$S = \frac{10}{2}(2 \times 1 + (10-1)3)$$

$$= 5(2 + 27)$$

$$= 5 \times 29$$

$$= 145$$