

CHAPTER : 5 ARITHMETIC PROGRESSIONS

MIND MAPS LEARNING MADE SIMPLE

Sum of first n positive integers
Let $s_n = 1 + 2 + 3 + \dots n$
 $a = 1$, last term $l = n$
$$s_n = \frac{n(a+l)}{2} = \frac{n(1+n)}{2}$$

How many 2-digit numbers are divisible by 3?
2-digit numbers divisible by are 12, 15, 18, ... 99
 $a = 12$, $d = 3$, $a_n = 99$
 $a_n = a + (n-1)d$
 $99 = 12 + (n-1)3$
i.e., $n-1 = \frac{87}{3} = 29$
 $n = 30$

If a, b, c , are in AP,
$$b = \frac{a+c}{2}$$

 b is arithmetic mean

Examples

Arithmetic mean

Arithmetic Progressions

Sum (s)

When first term and common difference are given :
$$S_n = \frac{n}{2} (2a + (n-1)d)$$

 a - first term
 d - common difference
 n - total terms

When first & last terms are given :
$$S_n = \frac{n}{2} (a + a_n) \text{ or } S_n = \frac{n}{2} (a + l)$$

 a - first term
 n - total terms
 a_n - n^{th} term
 l - last term

Definition

List of numbers in which each term is obtained by adding a fixed number to the preceding term except the first term. Fixed number is called common difference.

General form

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

Common Difference

- Fixed number in arithmetic progression which provides the to and fro terms by adding/subtracting from the present number.
- Can be positive or negative.

n^{th} term

From beginning
 $a_n = a + (n-1)d$
Here
 a - first term
 d - common difference
 a_n - n^{th} term

From the end
 $a_n = l - (n-1)d$
Here
 l - last term
 d - common difference
 a_n - n^{th} term