Formula
Chapter: - 5
ARITHMETIC PROGRESSIONS

(i) ***Arithmetic Progression (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.

This **fixed number** is called the **common difference** of the AP and AP can be **positive, negative or zero**.

a, a + d, a + 2d, a + 3d, . . .

a = first term, d = common difference

Example: -

(a) **4, 10, 16, 22, . . .**

$a = 4$ **and** $d_1 = 10-4 = 6$

$d_2 = 16-10 = 6$

$d_3 = 22-16 = 6$

This given series is known as an A.P. because d has equal value.

(b) ***1, 3, 9, 27, . . .***

$a = 1$ ***and*** $d_1 = 3-1 = 2$

$d_2 = 9-3 = 6$

$d_1 \neq d_2$

(ii) nth Term of an AP: -

The n^{th} term an of the AP with **first term** "a" and **common difference** "d" is given by

$$a_n = a + (n - 1)\, d.$$

a_n also write as l ($a_n = l$) if you know the last term of A.P.

(iii) Sum of First "n" Terms of an AP: -

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

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

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

(a) If the series is finite means you know the last term of A.P. ($a_n = l$)

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

(b) The sum of first n positive integers is given by

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