

SEQUENCE

A systematic arrangement of numbers according to a given rule is called a sequence. The numbers in a sequence are called its terms. We refer the first term of a sequence as T_1 , second term as T_2 and so on. The n^{th} term of a sequence is denoted by T_n , which may also be referred to as the general term of the sequence.

PROGRESSION

Sequences of numbers which follow specific patterns are called progressions

It is a special case of sequence in which it is possible to express its n^{th} term in terms of n , mathematically.

$a_1, a_2, a_3, \dots, a_n$ or

by $T_1, T_2, T_3, \dots, T_n$

T_n = Term at the n^{th} place of a

progression

= General term or n^{th} - term

SERIES

If the terms of sequence are connected by sign of addition or subtraction, then it is called as Series.

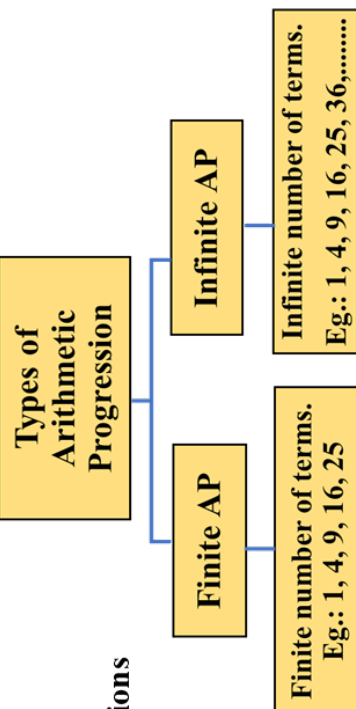
If $a_1, a_2, a_3, \dots, a_n$ is a sequence, then the expression $a_1 + a_2 + a_3 + \dots + a_n$ is a series.

MIND MAP

Arithmetic Progression

Arithmetic Progression (A.P.)

If difference between two consecutive terms is constant throughout the sequence, then it is known as Arithmetic Progression and this constant difference is known as its Common Difference (d).



- General Form of an A.P.

If 'a' is the first term and 'd' is the common difference, then the standard appearance of an A.P. is

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

- General Term of an A.P.

$T_n = l = n^{\text{th}}$ term or last term

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

Summation of n terms of an A.P.

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

$$S_n = \frac{n}{2} [a + l] \quad \text{where, } l \text{ (last term)} = a + (n - 1)d$$

Frequently used summations

(1) Sum of first 'n' natural numbers :

$$1 + 2 + 3 + \dots + n = \frac{n(n + 1)}{2}$$

(2) Sum of first 'n' odd natural numbers :

$$1 + 3 + 5 + \dots + (2n - 1)$$

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

(3) Sum of first 'n' even natural numbers :

$$2 + 4 + 6 + \dots + 2n = \frac{n(2 + 2n)}{2}$$

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

Arithmetic Mean

If a, b, c are in AP, then

$$\Rightarrow b - a = c - b$$

$$\Rightarrow 2b = a + c$$

$$\text{A.M.} \Rightarrow b = \frac{a + c}{2}$$