

18PDM301L - ANALYTICAL AND LOGICAL
THINKING SKILLS

Unit - I

Arithmetic Progression

A sequence whose terms increase or decrease by a fixed number is called Arithmetic progression (AP). The fixed number is called common difference (d).

e.g. 2, 6, 10, 14, 18, 22

$$a=2 \quad d=6$$

n^{th} term of an AP

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

Sum of n terms of an AP

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

Average or Arithmetic Mean.

$$AM = \frac{S_n}{n}$$

In an AP AM is middle term of that AP (or) average of middle two terms (or) Average of n^{th} first and last terms (or) Average of second and second from the last term and so on.

Geometric Progression

A sequence whose terms increase or decrease by a constant factor is called Geometric Progression (GP). The constant factor is called common ratio (r).

eg

2, 8, 32, 128, 512

$$a = 2 \quad r = 4 \quad r > 1$$

512, 128, 32, 8, 2

$$a = 512 \quad r = \frac{1}{4} \quad r < 1$$

n^{th} term of a GP

$$t_n = ar^{n-1}$$

Sum of n terms of a GP

$$S_n = a \left(\frac{r^n - 1}{r - 1} \right) \quad r > 1$$

$$S_n = a \left(\frac{1 - r^n}{1 - r} \right) \quad r < 1$$

$$S_{\infty} = \frac{a}{1 - r} \quad r < 1$$

Geometric mean GM

$$GM = \sqrt[n]{\text{Product of } n \text{ terms}}$$

In a GP, GM is middle term or

$\sqrt{\text{Product of middle two terms}}$ or $\sqrt{\text{Product of first and last terms}}$

or $\sqrt{\text{Product of second and second from the last terms}}$
and so on.

Harmonic Progression

If the quantities a, b, c, d are in AP, then $\frac{1}{a}, \frac{1}{b}, \frac{1}{c}, \frac{1}{d}$ are in Harmonic Progression (HP)

n th term of a HP

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

If a and b are in HP and h is their harmonic mean then $\frac{1}{a}, \frac{1}{h}, \frac{1}{b}$ in AP

$$\frac{1}{h} = \frac{\frac{1}{a} + \frac{1}{b}}{2}$$

$$= \frac{a+b}{2ab}$$

$$h = \frac{2ab}{a+b}$$

For any two numbers

$$AM > GM > HM$$

$$GM^2 = AM \times HM$$