

CHAPTER 06

Progressions

Sum of first 'n' terms of an A.P:

For an A.P,

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

The sum of first 'n' terms is denoted by S_n and is given by,

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

Where 'a' is the first term and 'd' is the common difference.

Also,

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

$$= \frac{n}{2} [a + a_n]$$

$$S_n = \frac{n}{2} (a + l), \text{ where } l = a + (n - 1)d \text{ is the last term of the}$$

given A.P.

Note:

- S_n is also denoted by 'S'.
- As S_n is sum of first 'n' terms of an A.P, then $a_n = S_n - S_{n-1}$

Example:

Find the sum of the first 20 terms of the A.P. 5, 8, 11, 14...

Sol.

First term of the A.P,

$$\Rightarrow a = 5$$

Common difference (d) = 3,

$$n = 20$$

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

$$S_{20} = \frac{20}{2} [2(5) + (20-1)3]$$

$$= 10 [10 + (19 \times 3)]$$

$$= 10 [10 + 57]$$

$$= 10 (67)$$

$$S_{20} = 670$$