

CHAPTER 05**Arithmetic Progressions****Example:**

How many terms of the A.P. 24, 21, 18... must be taken so that their sum is 78?

Sol.

Here, $a = 24$,

$$d = 21 - 24 = -3 \text{ and}$$

$$S_n = 78$$

Let number of terms of A.P is 'n', then we need to find 'n'.

We know that,

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

$$78 = \frac{n}{2} [48 + (n-1)(-3)]$$

$$156 = n[51 - 3n]$$

$$\Rightarrow 3n^2 - 51n + 156 = 0$$

$$\Rightarrow n^2 - 17n + 52 = 0$$

$$\Rightarrow (n - 4) (n - 13) = 0$$

$$\therefore n = 4 \text{ or } 13$$

Both values of 'n' are admissible.

So, the number of terms is either 4 or 13.

Note:

- In this case,

Sum of the first 4 terms = Sum of the first 13 terms = 78

- Two answers are possible because the sum of the terms from 5th to 13th will be zero. This is because 'a' is positive and 'd' is negative. So, that some terms are positive and some are negative, will cancel out each other.

