Arithmetic Progressions Ex 9.5 Q30

Answer :

In the given problem, we have the first and the last term of an A.P. along with the sum of all the terms of A.P. Here, we need to find the number of terms and the common difference of the A.P.

Here,

The first term of the A.P (a) = 5

The last term of the A.P (l) = 45

Sum of all the terms $S_n = 400$

Let the common difference of the A.P. be d.

So, let us first find the number of the terms (n) using the formula,

$$400 = \left(\frac{n}{2}\right)(5+45)$$

$$400 = \left(\frac{n}{2}\right)(50)$$

$$400 = (n)(25)$$

$$n = \frac{400}{25}$$

$$n = 16$$

Now, to find the common difference of the A.P. we use the following formula,

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

We get,

$$45 = 5 + (16-1)d$$

$$45 = 5 + (15)d$$

$$45 = 5 + 15d$$

$$\frac{45-5}{15} = d$$

Further, solving for d,

$$d = \frac{40}{15}$$

$$d = \frac{8}{3}$$

Therefore, the number of terms is $\boxed{n = 16}$ and the common difference of the A.P is $\boxed{d = \frac{8}{3}}$.

Arithmetic Progressions Ex 9.5 Q31

Answer :

Here, the sum of first n terms is given by the expression,

$$S_n = \frac{3n^2}{2} + \frac{13}{2}n$$

We need to find the 25th term of the A.P.

So we know that the n^{th}term of an A.P. is given by,

$$a_n = S_n - S_{n-1}$$

So $a_{25} = S_{25} - S_{24}$ ..... (1)

So, using the expression given for the sum of n terms, we find the sum of 25 terms (S_{25}) and the sum of 24 terms (S_{24}). We get,

$$S_{25} = \frac{3(25)^2}{2} + \frac{13}{2}(25)$$

$$= \frac{3(625)}{2} + \frac{13(25)}{2}$$

$$= \frac{1875}{2} + \frac{325}{2}$$

$$= \frac{2200}{2}$$

$$= 1100$$

Similarly,

$$\begin{aligned} S_{24} &= \frac{3(24)^2}{2} + \frac{13}{2}(24) \\ &= \frac{3(576)}{2} + \frac{13(24)}{2} \\ &= \frac{1728}{2} + \frac{312}{2} \\ &= \frac{2040}{2} \\ &= 1020 \end{aligned}$$

Now, using the above values in (1),

$$\begin{aligned} a_{25} &= S_{25} - S_{24} \\ &= 1100 - 1020 \\ &= 80 \end{aligned}$$

Therefore, $\boxed{a_{25} = 80}$.

********** END **********