Arithmetic Progressions Ex 9.5 Q8

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 common difference of the A.P.

Here,

The first term of the A.P (a) = 2

The last term of the A.P (l) = 50

Sum of all the terms $S_n = 442$

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

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

$$442 = \left(\frac{n}{2}\right)(2+50)$$

$$442 = \left(\frac{n}{2}\right)(52)$$

$$442 = (n)(26)$$

$$n = \frac{442}{26}$$

$$n = 17$$

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

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

We get,

$$50 = 2 + (17-1)d$$

$$50 = 2 + 17d - d$$

$$50 = 2 + 16d$$

$$\frac{50-2}{16} = d$$

Further, solving for d,

$$d = \frac{48}{16}$$

$$d = 3$$

Therefore the common difference of the A.P $\boxed{d = 3}$.

Arithmetic Progressions Ex 9.5 Q9

Answer :

In the given problem, we need to find the sum of first 10 terms of an A.P. Let us take the first term *a* and the common difference as *d*

Here, we are given that,

$a_{12} = -13$

$S_4 = 24$

Also, we know,

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

For the 12th term (n = 12),

$$a_{12} = a + (12-1)d$$
$$-13 = a + 11d$$
$$a = -13 - 11d \quad \ldots\ldots(1)$$

So, as we know the formula for the sum of *n* terms of an A.P. is given by,

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

Where; *a* = first term for the given A.P.

d = common difference of the given A.P.

n = number of terms

So, using the formula for n = 4, we get,

$$S_4 = \frac{4}{2}\left[2(a) + (4-1)(d)\right]$$

$$24 = (2)\left[2a + (3)(d)\right]$$

$$24 = 4a + 6d$$

$$4a = 24 - 6d$$

$$a = 6 - \frac{6}{4}d \qquad \text{.....(2)}$$

Subtracting (1) from (2), we get,

$$a - a = \left(6 - \frac{6}{4}d\right) - (-13 - 11d)$$

$$0 = 6 - \frac{6}{4}d + 13 + 11d$$

$$0 = 19 + 11d - \frac{6}{4}d$$

$$0 = 19 + \frac{44d - 6d}{4}$$

On further simplifying for d, we get,

$$0 = 19 + \frac{38d}{4}$$

$$-19 = \frac{19}{2}d$$

$$d = \frac{-19(2)}{19}$$

$$d = -2$$

Now, to find a, we substitute the value of d in (1),

$$a = -13 - 11(-2)$$

$$a = -13 + 22$$

$$a = 9$$

Now, using the formula for the sum of n terms of an A.P. for $n = 10$, we get,

$$\begin{aligned} S_{10} &= \frac{10}{2}\left[2(9) + (10-1)(-2)\right] \\ &= (5)\left[18 + (9)(-2)\right] \\ &= (5)(18-18) \\ &= (5)(0) \\ &= 0 \end{aligned}$$

Therefore, the sum of first 10 terms for the given A.P. is $\boxed{S_{10} = 0}$.

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