Arithmetic Progressions Ex 9.5 Q40

Answer :

In the given problem, we have the first and the *n*th term of an A.P. along with the sum of the *n* 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) = 8

The *n*th term of the A.P (l) = 33

Sum of all the terms $S_n = 123$

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

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

$$123 = \left(\frac{n}{2}\right)(8+33)$$

$$123 = \left(\frac{n}{2}\right)(41)$$

$$\frac{(123)(2)}{41} = n$$

$$n = \frac{246}{41}$$

$$n = 6$$

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

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

We get,

$$33 = 8 + (6-1)d$$

$$33 = 8 + (5)d$$

$$\frac{33-8}{5} = d$$

Further, solving for *d*,

$$d = \frac{25}{5}$$

$$d = 5$$

Therefore, the number of terms is $\boxed{n=6}$ and the common difference of the A.P. $\boxed{d=5}$.

Arithmetic Progressions Ex 9.5 Q41

Answer :

In the given problem, we have the first and the *n*th term of an A.P. along with the sum of the *n* 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) = 22

The *n*th term of the A.P (l) = −11

Sum of all the terms $S_n = 66$

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

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

$$66 = \left(\frac{n}{2}\right)[22 + (-11)]$$

$$66 = \left(\frac{n}{2}\right)(22-11)$$

$$(66)(2) = (n)(11)$$

Further, solving for *n*

$$n = \frac{(66)(2)}{11}$$

$$n = (6)(2)$$

$$n = 12$$

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

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

We get,

$$-11 = 22 + (12-1)d$$
$$-11 = 22 + (11)d$$
$$\frac{-11-22}{11} = d$$

Further, solving for d,

$$d = \frac{-33}{11}$$
$$d = -3$$

Therefore, the number of terms is $\boxed{n=12}$ and the common difference of the A.P. $\boxed{d=-3}$.

Arithmetic Progressions Ex 9.5 Q42

Answer :

In the given problem, the sum of n terms of an A.P. is given by the expression,

$S_n = 4n - n^2$

So here, we can find the first term by substituting $n = 1$,

$$S_n = 4n - n^2$$
$$S_1 = 4(1) - (1)^2$$
$$= 4 - 1$$
$$= 3$$

Similarly, the sum of first two terms can be given by,

$$S_2 = 4(2) - (2)^2$$
$$= 8 - 4$$
$$= 4$$

Now, as we know,

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

So,

$$a_2 = S_2 - S_1$$
$$= 4 - 3$$
$$= 1$$

Now, using the same method we have to find the third, tenth and n^{th} term of the A.P.

So, for the third term,

$$a_3 = S_3 - S_2$$
$$= \left[4(3) - (3)^2\right] - \left[4(2) - (2)^2\right]$$
$$= (12 - 9) - (8 - 4)$$
$$= 3 - 4$$
$$= -1$$

Also, for the tenth term,

$$a_{10} = S_{10} - S_9$$
$$= \left[4(10) - (10)^2\right] - \left[4(9) - (9)^2\right]$$
$$= (40 - 100) - (36 - 81)$$
$$= -60 + 45$$
$$= -15$$

So, for the n^{th} term,

$$a_n = S_n - S_{n-1}$$
$$= \left[4(n) - (n)^2\right] - \left[4(n-1) - (n-1)^2\right]$$
$$= \left(4n - n^2\right) - \left(4n - 4 - n^2 - 1 + 2n\right)$$
$$= 4n - n^2 - 4n + 4 + n^2 + 1 - 2n$$
$$= 5 - 2n$$

Therefore, $\boxed{a = 3, S_2 = 4, a_2 = 1, a_3 = -1, a_{10} = -15}$.

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