Arithmetic Progressions Ex 9.5 Q2

Answer :

In the given problem, we need to find the sum of the n terms of the given A.P. "$5,2,-1,-4,-7,\ldots$".

So, here we use the following formula for the sum of n terms of an A.P.,

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

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

d = common difference of the given A.P.

n = number of terms

For the given A.P. $(5,2,-1,-4,-7,\ldots)$,

Common difference of the A.P. $(d) = a_2 - a_1$

$= 2-5$

$= -3$

Number of terms $(n) = n$

First term for the given A.P. $(a) = 5$

So, using the formula we get,

$$S_n = \frac{n}{2}\left[2(5)+(n-1)(-3)\right]$$

$$= \frac{n}{2}\left[10+(-3n+3)\right]$$

$$= \frac{n}{2}\left[10-3n+3\right]$$

$$= \frac{n}{2}\left[13-3n\right]$$

Therefore, the sum of first n terms for the given A.P. is $\boxed{\frac{n}{2}\left[13-3n\right]}$.

Arithmetic Progressions Ex 9.5 Q3

Answer :

Here, we are given an A.P., whose n^{th} term is given by the following expression, $a_n = 5-6n$

So, here we can find the sum of the n terms of the given A.P., using the formula, $S_n = \left(\frac{n}{2}\right)(a+l)$

Where, a = the first term

l = the last term

So, for the given A.P,

The first term (a) will be calculated using $n = 1$ in the given equation for n^{th} term of A.P.

$a = 5-6(1)$

$= 5-6$

$= -1$

Now, the last term (l) or the n^{th} term is given

$a_n = 5-6n$

So, on substituting the values in the formula for the sum of n terms of an A.P., we get,

$$S_n = \left(\frac{n}{2}\right)\left[(-1)+5-6n\right]$$

$$= \left(\frac{n}{2}\right)\left[4-6n\right]$$

$$= \left(\frac{n}{2}\right)(2)\left[2-3n\right]$$

$$= (n)(2-3n)$$

Therefore, the sum of the n terms of the given A.P. is $\boxed{(n)(2-3n)}$.

Arithmetic Progressions Ex 9.5 Q4

Answer :

In the given problem, we have the sum of the certain number of terms of an A.P. and we need to find the last term for that A.P.

So here, let us first find the number of terms whose sum is 116. For that, we will use the formula,

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

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

d = common difference of the given A.P.

n = number of terms

So for the given A.P $(25, 22, 19, \ldots)$

The first term (a) = 25

The sum of n terms $S_n = 116$

Common difference of the A.P. (d) = $a_2 - a_1$

$= 22 - 25$

$= -3$

So, on substituting the values in the formula for the sum of n terms of an A.P., we get,

$$116 = \frac{n}{2}\left[2(25) + (n-1)(-3)\right]$$

$$116 = \left(\frac{n}{2}\right)\left[50 + (-3n+3)\right]$$

$$116 = \left(\frac{n}{2}\right)\left[53 - 3n\right]$$

$$(116)(2) = 53n - 3n^2$$

So, we get the following quadratic equation,

$$3n^2 - 53n + 232 = 0$$

On solving by splitting the middle term, we get,

$$3n^2 - 24n - 29n + 232 = 0$$

$$3n(n - 8) - 29(n - 8) = 0$$

$$(3n - 29)(n - 8) = 0$$

Further,

$$3n - 29 = 0$$

$$n = \frac{29}{3}$$

Also,

$$n - 8 = 0$$

$$n = 8$$

Now, since n cannot be a fraction, so the number of terms is 8.

So, the term is a_8

$$a_8 = a_1 + 7d$$

$$= 25 + 7(-3)$$

$$= 25 - 21$$

$$= 4$$

Therefore, the last term of the given A.P. such that the sum of the terms is 116 is $\boxed{4}$.

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