Arithmetic Progressions Ex 9.5 Q10

Answer :

In the given problem, we need to find the sum of first 22 terms of an A.P. Let us take the first term as a.

Here, we are given that,

$a_{22} = 149 \quad \ldots\ldots(1)$

$d = 22 \quad \ldots\ldots(2)$

Also, we know,

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

For the 22nd term ($n = 22$),

$a_{22} = a + (22-1)d$

$149 = a + 21(22) \quad (\text{Using 1 and 2})$

$a = 149 - 462$

$a = -313 \quad \ldots\ldots(3)$

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 $n = 22$, we get,

$$\begin{aligned} S_{22} &= \frac{22}{2}\left[2(-313) + (22-1)(22)\right] \\ &= (11)\left[-626 + (21)(22)\right] \quad (\text{Using 2 and 3}) \\ &= (11)\left[-626 + 462\right] \\ &= (11)\left[-164\right] \\ &= -1804 \end{aligned}$$

Therefore, the sum of first 22 terms for the given A.P. is $\boxed{S_{22} = -1804}$.

Arithmetic Progressions Ex 9.5 Q11

Answer :

In this problem, we need to find the sum of all the multiples of 3 lying between 1 and 100.

So, we know that the first multiple of 3 after 1 is 3 and the last multiple of 3 before 100 is 99.

Also, all these terms will form an A.P. with the common difference of 3.

So here,

First term (a) = 3

Last term (l) = 99

Common difference (d) = 3

So, here the first step is to find the total number of terms. Let us take the number of terms as n.

Now, as we know,

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

So, for the last term,

$99 = 3 + (n-1)3$

$99 = 3 + 3n - 3$

$99 = 3n$

Further simplifying,

$$n = \frac{99}{3}$$

$n = 33$

Now, using the formula for the sum of n terms,

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

We get,

$$S_n = \frac{33}{2}\left[2(3)+(33-1)3\right]$$
$$= \frac{33}{2}\left[6+(32)3\right]$$
$$= \frac{33}{2}(6+96)$$
$$= \frac{33(102)}{2}$$

On further simplification, we get,

$$S_n = 33(51)$$
$$= 1683$$

Therefore, the sum of all the multiples of 3 lying between 1 and 100 is $\boxed{S_n = 1683}$

Arithmetic Progressions Ex 9.5 Q12

Answer :

In this problem, we need to find the sum of first *n* odd natural numbers.

So, we know that the first odd natural number is 1. Also, all the odd terms will form an A.P. with the common difference of 2.

So here,

First term (*a*) = 1

Common difference (*d*) = 2

So, let us take the number of terms as *n*

Now, as we know,

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

So, for *n* terms,

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

Therefore, the sum of first *n* odd natural numbers is $\boxed{S_n = n^2}$.

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