Arithmetic Progressions Ex 9.5 Q23

Answer :

In the given problem, we need to find the sum of terms for different arithmetic progressions. 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

(i) $2+4+6+...+200$

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

$= 6-4$

$= 2$

So here,

First term (*a*) = 2

Last term (*l*) = 200

Common difference (*d*) = 2

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,

$$200 = 2 + (n-1)2$$

$$200 = 2 + 2n - 2$$

$200 = 2n$

Further simplifying,

$$n = \frac{200}{2}$$

$$n = 100$$

Now, using the formula for the sum of *n* terms, we get

$$S_n = \frac{100}{2}\left[2(2) + (100-1)2\right]$$

$$= 50\left[4 + (99)2\right]$$

$$= 50(4 + 198)$$

On further simplification, we get,

$$S_n = 50(202)$$

$$= 10100$$

Therefore, the sum of the A.P is $\boxed{S_n = 10100}$

(ii) $3 + 11 + 19 + ... + 803$

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

$= 19 - 11$

$= 8$

So here,

First term (*a*) = 3

Last term (*l*) = 803

Common difference (*d*) = 8

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,

Further simplifying,

$$803 = 3 + (n-1)8$$

$$803 = 3 + 8n - 8$$

$$803 + 5 = 8n$$

$$808 = 8n$$

$$n = \frac{808}{8}$$

$$n = 101$$

Now, using the formula for the sum of *n* terms, we get

$$S_n = \frac{101}{2}\left[2(3) + (101-1)8\right]$$

$$= \frac{101}{2}\left[6 + (100)8\right]$$

$$= \frac{101}{2}(806)$$

$$= 101(403)$$

$$= 40703$$

Therefore, the sum of the A.P is $\boxed{S_n = 40703}$

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