Arithmetic Progressions Ex 9.5 Q21

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) $2, 6, 10, 14, \ldots$ To 11 terms.

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

$= 10 - 6$

$= 4$

Number of terms (*n*) = 11

First term for the given A.P. (*a*) = 2

So, using the formula we get,

$$S_n = \frac{11}{2}\left[2(2) + (11-1)(4)\right]$$

$$= \left(\frac{11}{2}\right)\left[4 + (10)(4)\right]$$

$$= \left(\frac{11}{2}\right)\left[4 + 40\right]$$

$$= \left(\frac{11}{2}\right)\left[44\right]$$

$$= 242$$

Therefore, the sum of first 11 terms for the given A.P. is $\boxed{242}$.

(ii) $-6, 0, 6, 12, \ldots$ To 13 terms.

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

$= 6 - 0$

$= 6$

Number of terms (*n*) = 13

First term for the given A.P. (*a*) = −6

So, using the formula we get,

$$S_n = \frac{13}{2}\left[2(-6) + (13-1)(6)\right]$$

$$= \left(\frac{13}{2}\right)\left[-12 + (12)(6)\right]$$

$$= \left(\frac{13}{2}\right)\left[-12 + 72\right]$$

$$= \left(\frac{13}{2}\right)\left[60\right]$$

$$= 390$$

Therefore, the sum of first 13 terms for the given A.P. is $\boxed{390}$.

(iii) 51 terms of an A.P whose $a_2 = 2$ and $a_4 = 8$

Now,

$$a_2 = a + d$$

$$2 = a + d \qquad \ldots(1)$$

Also,

$$a_4 = a + 3$$

$$8 = a + 3d \qquad \ldots(2)$$

Subtracting (1) from (2), we get

$$2d = 6$$

$$d = 3$$

Further substituting $d = 3$ in (1), we get

$$2 = a + 3$$

$$a = -1$$

Number of terms (n) = 51

First term for the given A.P. (a) = −1

So, using the formula we get,

$$S_n = \frac{51}{2}\left[2(-1) + (51-1)(3)\right]$$

$$= \left(\frac{51}{2}\right)\left[-2 + (50)(3)\right]$$

$$= \left(\frac{51}{2}\right)\left[-2 + 150\right]$$

$$= \left(\frac{51}{2}\right)[148]$$

$$= 3774$$

Therefore, the sum of first 51 terms for the given A.P. is $\boxed{3774}$.

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