Arithmetic Progressions Ex 9.5 Q45

Answer :

Here, we are given $S_{10} = -150$ and sum of the next ten terms is −550.

Let us take the first term of the A.P. as *a* and the common difference as *d*.

So, let us first find S_{10}. For the sum of first 10 terms of this A.P,

First term = *a*

Last term = a_{10}

So, we know,

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

For the 10th term (n = 10),

$a_{10} = a + (10-1)d$

$= a + 9d$

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,

$S_{10} = \left(\frac{10}{2}\right)(a + a + 9d)$

$-150 = 5(2a + 9d)$

$-150 = 10a + 45d$

$a = \frac{-150 - 45d}{10}$ .....(1)

Similarly, for the sum of next 10 terms (S_{10}),

First term = a_{11}

Last term = a_{20}

For the 11th term (n = 11),

$a_{11} = a + (11-1)d$

$= a + 10d$

For the 20th term (n = 20),

$a_{20} = a + (20-1)d$

$= a + 19d$

So, for the given A.P,

$$S_{10} = \left(\frac{10}{2}\right)(a + 10d + a + 19d)$$

$$-550 = 5(2a + 29d)$$

$$-550 = 10a + 145d$$

$$a = \frac{-550 - 145d}{10} \quad \ldots\ldots (2)$$

Now, subtracting (1) from (2),

$$a-a=\left(\frac{-550-145d}{10}\right)-\left(\frac{-150-45d}{10}\right)$$

$$0=\frac{-550-145d+150+45d}{10}$$

$$0=-400-100d$$

$$100d=-400$$

$$d=-4$$

Substituting the value of d in (1)

$$a=\frac{-150-45(-4)}{10}$$

$$=\frac{-150+180}{10}$$

$$=\frac{30}{10}$$

$$=3$$

So, the A.P. is $3,-1,-5,-9,\ldots$ with $\boxed{a=3,d=-4}$.

Arithmetic Progressions Ex 9.5 Q46

Answer :

First term, $a = 10$

Sum of first 14 terms, $S_{14} = 1505$

$$\Rightarrow \frac{14}{2}\left[2\times 10+(14-1)d\right]=1505$$

$$\Rightarrow 7\times(20-13d)=1505$$

$$\Rightarrow 20-13d=\frac{1505}{7}=215$$

$$\Rightarrow 13d=-195$$

$$\Rightarrow d=-15$$

Now,

$$a_{25}=10+24(-15)=-350$$

Arithmetic Progressions Ex 9.5 Q47

Answer :

$S_n = 5n^2 + 3n$

We know

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

$\therefore a_n = 5n^2 + 3n - 5(n-1)^2 - 3(n-1)$

$a_n = 10n - 2$

Now,

$a_m = 168$

$\Rightarrow 10m - 2 = 168$

$\Rightarrow 10m = 170$

$\Rightarrow m = 17$

$a_{20} = 10(20) - 2 = 198$

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