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, $S_n = \left(\dfrac{n}{2}\right)(a+l)$

Where, a = the first term

l = the last term

So, for the given A.P,

$$S_{10} = \left(\frac{10}{2}\right)(a + a + 9d)$$
$$-150 = 5(2a + 9d)$$
$$-150 = 10a + 45d$$
$$a = \frac{-150 - 45d}{10} \qquad \text{......(1)}$$

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,

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

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

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

$$a = \frac{-550 - 145d}{10} \qquad \text{...... (2)}$$

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, $S_{14} = 1505$

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

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

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

$$\Rightarrow 13d = -195$$

$$\Rightarrow d = -15$$

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 *********