Arithmetic Progressions Ex 9.3 Q36

Answer :

In the given problem, let us first find the 21st term of the given A.P.

A.P. is 3, 15, 27, 39 ...

Here,

First term (a) = 3

Common difference of the A.P. (d) $= 15 - 3 = 12$

Now, as we know,

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

So, for 21st term (n = 21),

$$\begin{aligned} a_{21} &= 3 + (21-1)(12) \\ &= 3 + 20(12) \\ &= 3 + 240 \\ &= 243 \end{aligned}$$

Let us take the term which is 120 more than the 21st term as a_n. So,

$$\begin{aligned} a_n &= 120 + a_{21} \\ &= 120 + 243 \\ &= 363 \end{aligned}$$

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

$$363 = 3 + (n-1)12$$

$$363 = 3 + 12n - 12$$

$$363 = -9 + 12n$$

$$363 + 9 = 12n$$

Further simplifying, we get,

$$372 = 12n$$

$$n = \frac{370}{12}$$

$$n = 31$$

Therefore, the $\boxed{31^{st}\ \text{term}}$ of the given A.P. is 120 more than the 21st term.

Arithmetic Progressions Ex 9.3 Q37

Answer :

Let a be the first term and d be the common difference.

We know that, n^{th} term $= a_n = a + (n - 1)d$

According to the question,

$a_{17} = 5 + 2a_8$
$\Rightarrow a + (17 - 1)d = 5 + 2(a + (8 - 1)d)$
$\Rightarrow a + 16d = 5 + 2a + 14d$
$\Rightarrow 16d - 14d = 5 + 2a - a$
$\Rightarrow 2d = 5 + a$
$\Rightarrow a = 2d - 5 \quad .... (1)$

Also, $a_{11} = 43$
$\Rightarrow a + (11 - 1)d = 43$
$\Rightarrow a + 10d = 43 \quad ....(2)$

On substituting the values of (1) in (2), we get
$2d - 5 + 10d = 43$
$\Rightarrow 12d = 5 + 43$
$\Rightarrow 12d = 48$
$\Rightarrow d = 4$
$\Rightarrow a = 2 \times 4 - 5 \quad$ [From (1)]
$\Rightarrow a = 3$

$$\begin{aligned} \therefore a_n &= a + (n - 1)d \\ &= 3 + (n - 1)4 \\ &= 3 + 4n - 4 \\ &= 4n - 1 \end{aligned}$$

Thus, the n^{th} term of the given A.P. is $4n - 1$.

Arithmetic Progressions Ex 9.3 Q38

Answer :

First three-digit number that is divisible by 9 is 108.

Next number is 108 + 9 = 117.

And the last three-digit number that is divisible by 9 is 999.

Thus, the progression will be 108, 117, ... , 999.

All are three digit numbers which are divisible by 9, and thus forms an A.P. having first term a 108 and the common difference as 9.

We know that, n^{th} term = $a_n = a + (n - 1)d$

According to the question,

$999 = 108 + (n - 1)9$
$\Rightarrow 108 + 9n - 9 = 999$
$\Rightarrow 99 + 9n = 999$
$\Rightarrow 9n = 999 - 99$
$\Rightarrow 9n = 900$
$\Rightarrow n = 100$

Thus, the number of all three digit natural numbers which are divisible by 9 is 100.

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