Arithmetic Progressions Ex 9.3 Q14

Answer :

In the given problem, let us take the first term as *a* and the common difference as *d*

Here, we are given that,

$a_4 = 3a$ .....(1)

$a_7 = 2a_3 + 1$ .....(2)

We need to find *a* and *d*

So, as we know,

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

For the 4th term ($n = 4$),

$$a_4 = a + (4-1)d$$
$$3a = a + 3d$$
$$3a - a = 3d$$
$$2a = 3d$$
$$a = \frac{3}{2}d$$

Similarly, for the 3rd term ($n = 3$),

$$a_3 = a + (3-1)d$$
$$= a + 2d$$

Also, for the 7th term ($n = 7$),

$$a_7 = a + (7-1)d$$
$$= a + 6d \quad .....(3)$$

Now, using the value of a_3 in equation (2), we get,

$$a_7 = 2(a+2d)+1$$

$$= 2a+4d+1 \qquad \ldots\ldots(4)$$

Equating (3) and (4), we get,

$$a+6d = 2a+4d+1$$

$$6d-4d-2a+a = +1$$

$$2d-a = +1$$

$$2d-\frac{3}{2}d = 1 \qquad \left(a = \frac{3}{2}d\right)$$

On further simplification, we get,

$$\frac{4d-3d}{2} = 1$$

$$d = (1)(2)$$

$$d = 2$$

Now, to find a,

$$a = \frac{3}{2}d$$

$$a = \frac{3}{2}(2)$$

$$a = 3$$

Therefore, for the given A.P $\boxed{d = 2, a = 3}$

Arithmetic Progressions Ex 9.3 Q15

Answer :

In the given problem, we are given 6^{th} and 8^{th} term of an A.P.

We need to find the 2^{nd} and n^{th} term

Here, let us take the first term as a and the common difference as d

We are given,

$a_6 = 12$

$a_8 = 22$

Now, we will find a_6 and a_8 using the formula $a_n = a + (n-1)d$

So,

$$a_6 = a + (6-1)d$$

$$12 = a + 5d \quad \text{.....(1)}$$

Also,

$$a_8 = a + (8-1)d$$

$$22 = a + 7d \quad \text{.....(2)}$$

So, to solve for a and d

On subtracting (1) from (2), we get

$$22 - 12 = (a + 7d) - (a + 5d)$$

$$10 = a + 7d - a - 5d$$

$$10 = 2d$$

$$d = \frac{10}{2}$$

$$d = 5 \quad \text{.....(3)}$$

Substituting (3) in (1), we get

$$12 = a + 5(5)$$

$$a = 12 - 25$$

$$a = -13$$

Thus,

$$a = -13$$

$$d = 5$$

So, for the 2nd term ($n = 2$),

$$a_2 = -13 + (2-1)5$$

$$= -13 + (1)5$$

$$= -13 + 5$$

$$= -8$$

For the n^{th} term,

$$a_n = -13 + (n-1)5$$

$$= -13 + 5n - 5$$

$$= -18 + 5n$$

Therefore, $\boxed{a_2 = -8, a_n = 5n - 18}$

Arithmetic Progressions Ex 9.3 Q16

Answer :

In this problem, we need to find out how many numbers of two digits are divisible by 3.
So, we know that the first two digit number that is divisible by 3 is 12 and the last two digit number divisible by 3 is 99. Also, all the terms which are divisible by 3 will form an A.P. with the common difference of 3.
So here,
First term (a) = 12
Last term (a_n) = 99
Common difference (d) = 3
So, let us take the number of terms as n
Now, as we know,

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

So, for the last term,

$$99 = 12 + (n-1)3$$
$$99 = 12 + 3n - 3$$
$$99 = 9 + 3n$$
$$99 - 9 = 3n$$

Further simplifying,

$$90 = 3n$$
$$n = \frac{90}{3}$$
$$n = 30$$

Therefore, the number of two digit terms divisible by 3 is $\boxed{30}$.

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