Arithmetic Progressions Ex 9.3 Q26

Answer :

In the given problem, let us first find the 13th term of the given A.P.

A.P. is 3, 10, 17 ...

Here,

First term (a) = 3

Common difference of the A.P. (d) $=10-3=7$

Now, as we know,

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

So, for 13th term (n = 13),

$$\begin{aligned} a_{13} &= 3+(13-1)(7) \\ &= 3+12(7) \\ &= 3+84 \\ &= 87 \end{aligned}$$

Let us take the term which is 84 more than the 13th term as a_n. So,

$$\begin{aligned} a_n &= 84+a_{13} \\ &= 84+87 \\ &= 171 \end{aligned}$$

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

$$\begin{aligned} 171 &= 3+(n-1)7 \\ 171 &= 3+7n-7 \\ 171 &= -4+7n \end{aligned}$$

$$171+4 = 7n$$

Further simplifying, we get,

$$175 = 7n$$

$$n = \frac{175}{7}$$

$$n = 25$$

Therefore, the $\boxed{25^{\text{th}}\text{term}}$ of the given A.P. is 84 more than the 13th term.

Arithmetic Progressions Ex 9.3 Q27

Answer :

Here, we are given two A.P sequences which have the same common difference. Let us take the first term of one A.P. as a and of other A.P. as a'

Also, it is given that the difference between their 100th terms is 100.

We need to find the difference between their 100th terms

So, let us first find the 100th terms for both of them.

Now, as we know,

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

So, for 100th term of first A.P. (n = 100),

$$a_{100} = a + (100-1)d$$
$$= a + 99d$$

Now, for 100th term of second A.P. (n = 100),

$$a'_{100} = a' + (100-1)d$$
$$= a' + 99d$$

Now, we are given,

$$a_{100} - a'_{100} = 100$$

On substituting the values, we get,

$$a + 99d - a' - 99d = 100$$
$$a - a' = 100 \quad \ldots\ldots(1)$$

Now, we need the difference between the 1000th terms of both the A.P.s

So, for 1000th term of first A.P. (n = 1000),

$$a_{1000} = a + (1000-1)d$$
$$= a + 999d$$

Now, for 1000th term of second A.P. (n = 1000),

$$a'_{1000} = a' + (1000-1)d$$
$$= a' + 999d$$

So,

$$a_{1000} - a'_{1000} = (a + 999d) - (a' + 999d)$$
$$= a + 999d - a' - 999d$$
$$= a - a'$$
$$= 100 \quad (\text{Using } 1)$$

Therefore, the difference between the 1000th terms of both the arithmetic progressions will be $\boxed{100}$.

Arithmetic Progressions Ex 9.3 Q28

Answer :

Here, we are given two A.P. sequences. We need to find the value of n for which the n^{th} terms of both the sequences are equal. We need to find n

So let us first find the n^{th} term for both the A.P.

First A.P. is 63, 65, 67 ...

Here,

First term (a) = 63

Common difference of the A.P. (d) $= 65 - 63 = 2$

Now, as we know,

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

So, for n^{th} term,

$$a_n = 63 + (n-1)2$$
$$= 63 + 2n - 2$$
$$= 61 + 2n \quad \ldots\ldots(1)$$

Second A.P. is 3, 10, 17 ...

Here,

First term (a) = 3

Common difference of the A.P. (d) $= 10 - 3 = 7$

Now, as we know,

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

So, for n^{th} term,

$$a_n = 3 + (n-1)7$$
$$= 3 + 7n - 7$$
$$= -4 + 7n \quad \ldots\ldots(2)$$

Now, we are given that the n^{th} terms for both the A.P. sequences are equal, we equate (1) and (2),

$$61 + 2n = -4 + 7n$$
$$2n - 7n = -4 - 61$$
$$-5n = -65$$
$$n = \frac{-65}{-5}$$
$$n = 13$$

Therefore, $\boxed{n = 13}$

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