

Arithmetic Progressions Ex 9.3 Q22

Answer:

In the given problem, we need to find the number of terms in an A.P (i) $25, 50, 75, 100 \dots$

We are given,

$$a_n = 1000$$

Let us take the total number of terms as *n*.

So.

First term (a) = 25

Last term $(a_n) = 1000$

Common difference (d) = 50-25

$$= 25$$

Now, as we know,

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

So, for the last term,

$$1000 = 25 + (n-1)25$$

$$1000 = 25 + 25n - 25$$

$$1000 = 25n$$

$$n = \frac{1000}{25}$$

$$n = 40$$

Therefore, the total number of terms of the given A.P. is n = 40

We are given,

$$a_n = -151$$

Let us take the total number of terms as n.

So

First term (a) = -1

Last term $(a_n) = -151$

Common difference (d) = -3 - (-1)

$$= -3 + 1$$

$$= -2$$

Now, as we know,

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

So, for the last term,

$$-151 = -1 + (n-1)(-2)$$

$$-151 = -1 - 2n + 2$$

$$-151 = 1 - 2n$$

$$-2n = -151 - 1$$

On further simplifying, we get,

$$-2n = -152$$

$$n = \frac{-152}{-2}$$

$$n = 76$$

Therefore, the total number of terms of the given A.P. is n = 76.

(iii)
$$5\frac{1}{2}$$
, 11 , $16\frac{1}{2}$, 22 ,...

We are given,

$$a_n = 550$$

Let us take the total number of terms as n. So,

First term (a) =
$$5\frac{1}{2}$$

Last term $(a_n) = 550$

Common difference (d) = $11-5\frac{1}{2}$

$$= 11 - \frac{11}{2}$$

$$= \frac{22 - 11}{2}$$

$$= \frac{11}{2}$$

Now, as we know,

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

So, for the last term,

$$550 = 5\frac{1}{2} + (n-1)\left(\frac{11}{2}\right)$$

$$550 = \frac{11}{2} + \frac{11}{2}n - \frac{11}{2}$$

$$550 = \frac{11}{2}n$$

$$n = \frac{550(2)}{11}$$

On further simplifying, we get,

$$n = \frac{1100}{11}$$

$$n = 100$$

Therefore, the total number of terms of the given A.P. is n = 100

$$_{\text{(iv)}}1,\!\frac{21}{11},\!\frac{31}{11},\!\frac{41}{11},\!\dots$$

We are given,

$$a_n = \frac{171}{11}$$

Let us take the total number of terms as n.

So.

First term (a) = 1

Last term
$$(a_n) = \frac{171}{11}$$

Common difference (d) = $\frac{21}{11} - 1$

$$=\frac{21-11}{11}$$

$$=\frac{10}{11}$$

Now, as we know,

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

So, for the last term,

$$\frac{171}{11} = 1 + (n-1)\left(\frac{10}{11}\right)$$

$$\frac{171}{11} = 1 + \frac{10}{11}n - \frac{10}{11}$$

$$\frac{171}{11} = \frac{11 - 10}{11} + \frac{10}{11}n$$

$$\frac{171}{11} = \frac{1}{11} + \frac{10}{11}n$$

On further simplifying, we get,

$$\frac{10}{11}n = \frac{171}{11} - \frac{1}{11}$$
$$\frac{10}{11}n = \frac{170}{11}$$

$$n = \frac{(170)(11)}{(11)(10)}$$

$$n = 17$$

Therefore, the total number of terms of the given A.P. is n = 17.