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 ...

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,

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

$1000 = 25 + 25n - 25$

$1000 = 25n$

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

$n = 40$

Therefore, the total number of terms of the given A.P. is $\boxed{n = 40}$.

(ii) -1, -3, -5, -7 ...

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,

$-2n = -152$

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

$n = 76$

Therefore, the total number of terms of the given A.P. is $\boxed{n = 76}$.

(iii) $5\dfrac{1}{2},11,16\dfrac{1}{2},22,\dots$

We are given,

$a_n = 550$

Let us take the total number of terms as n.

So,

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

Last term $(a_n) = 550$

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

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

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

$= \dfrac{11}{2}$

Now, as we know,

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

So, for the last term,

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

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

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

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

On further simplifying, we get,

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

$$n = 100$$

Therefore, the total number of terms of the given A.P. is $\boxed{n = 100}$

(iv) $1, \frac{21}{11}, \frac{31}{11}, \frac{41}{11}, \ldots$

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 $\boxed{n = 17}$.

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