Arithmetic Progressions Ex 9.5 Q35

Answer :

In the given problem,

Total amount of debt to be paid in 40 installments $=$ Rs 3600

After 30 installments one–third of his debt is left unpaid. This means that he paid two third of the debt in 30 installments. So,

Amount he paid in 30 installments $=\frac{2}{3}(3600)$

$=2(1200)$

$=2400$

Let us take the first installment as a and common difference as d.

So, using the formula for the sum of n terms of an A.P,

$$S_n=\frac{n}{2}\left[2a+(n-1)d\right]$$

Let us find a and d, for 30 installments.

$$S_{30}=\frac{30}{2}\left[2a+(30-1)d\right]$$

$$2400=15\left[2a+(29)d\right]$$

$$\frac{2400}{15}=2a+29d$$

$$160=2a+29d$$

$$a=\frac{160-29d}{2} \qquad \ldots(1)$$

Similarly, we find a and d for 40 installments.

$$S_{40} = \frac{40}{2}\left[2a + (40-1)d\right]$$

$$3600 = 20\left[2a + (39)d\right]$$

$$\frac{3600}{20} = 2a + 39d$$

$$180 = 2a + 39d$$

$$a = \frac{180 - 39d}{2} \qquad \ldots(2)$$

Subtracting (1) from (2), we get,

$$a - a = \left(\frac{180 - 39d}{2}\right) - \left(\frac{160 - 29d}{2}\right)$$

$$0 = \frac{180 - 39d - 160 + 29d}{2}$$

$$0 = 20 - 10d$$

Further solving for d,

$$10d = 20$$

$$d = \frac{20}{10}$$

$$d = 2$$

Substituting the value of d in (1), we get.

$$a = \frac{160 - 29(2)}{2}$$

$$= \frac{160 - 58}{2}$$

$$= \frac{102}{2}$$

$$= 51$$

Therefore, the first installment is $\boxed{\text{Rs } 51}$.

Arithmetic Progressions Ex 9.5 Q36

Answer :

In the given problem, there are 25 trees in a line with a well such that the distance between two trees is 5 meters and the distance between the well and the first tree is 10 meters.

So, the total distance covered to water first tree $= 10$ meters

Then he goes back to the well to get water.

So,

The total distance covered to water second tree $= 25$ meters

The total distance covered to water third tree $= 35$ meters

The total distance covered to water fourth tree $= 45$ meters

So, from second tree onwards, the distance covered by the gardener forms an A.P. with the first term as 25 and common difference as 10.

So, the total distance covered for 24 trees can be calculated by using the formula for the sum of *n* terms of an A.P,

$$S_n = \frac{n}{2}\left[2a + (n-1)d\right]$$

We get,

$$\begin{aligned} S_n &= \frac{24}{2}\left[2(25) + (24-1)(10)\right] \\ &= 12\left[50 + (23)(10)\right] \\ &= 12(50 + 230) \\ &= 12(280) \\ &= 3360 \end{aligned}$$

So, while watering the 24 trees he covered 3360 meters. Also, to water the first tree he covers 10 meters. So the distance covered while watering 25 trees is 3370 meters.

Now, the distance between the last tree and the well $= 10 + 24(5)$

$= 10 + 120$

$= 130$

So, to get back to the well he covers an additional 130 m. Therefore, the total distance covered by the gardener $= 3370 + 130$

$= 3500$

Therefore, the total distance covered by the gardener is $\boxed{3500 \text{ m}}$.

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