Arithmetic Progressions Ex 9.5 Q33

Answer :

Here, we are given that the total saving of a man is Rs 16500 and every year he saved Rs 100 more than the previous year.

So, let us take the first installment as a.

Second installment = $a+100$

Third installment = $a+100+100$

So, these installments will form an A.P. with the common difference $(d) = 100$

The sum of his savings every year $S_n = 16500$

Number of years $(n) = 10$

So, to find the first installment, we use the following formula for the sum of n terms of an A.P.,

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

Where; a = first term for the given A.P.

d = common difference of the given A.P.

n = number of terms

So, using the formula for $n = 10$, we get,

$$S_{10} = \frac{10}{2}\left[2(a)+(10-1)(100)\right]$$

$$16500 = 5\left[2a+(9)(100)\right]$$

$$16500 = 10a+4500$$

$$16500-4500 = 10a$$

Further solving for a,

$$10a = 12000$$

$$a = \boxed{Rs\ 1200}$$

Therefore, man saved $\boxed{Rs\ 1200}$ in the first year.

Arithmetic Progressions Ex 9.5 Q34

Answer :

Here, we are given that the total saving of a man is Rs 200. In the first year he saved Rs 32 and every year he saved Rs 4 more than the previous year.

So, the first installment = 32.

Second installment = 36

Third installment = $36+4$

So, these installments will form an A.P. with the common difference $(d) = 4$

The sum of his savings every year $S_n = 200$

We need to find the number of years. Let us take the number of years as n.

So, to find the number of years, we use the following formula for the sum of n terms of an A.P.,

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

Where; a = first term for the given A.P.

d = common difference of the given A.P.

n = number of terms

So, using the formula for $n = 10$, we get,

$$S_n = \frac{n}{2}\left[2(32)+(n-1)(4)\right]$$

$$200 = \frac{n}{2}\left[64+4n-4\right]$$

$$400 = n(60+4n)$$

$$400 = 60n+4n^2$$

We get a quadratic equation,

$$4n^2 + 60n - 400 = 0$$

$$n^2 + 15n - 100 = 0$$

Further solving for n by splitting the middle term, we get,

$$n^2 + 15n - 100 = 0$$

$$n^2 - 5n + 20n - 100 = 0$$

$$n(n-5) + 20(n-5) = 0$$

$$(n-5)(n+20) = 0$$

So,

$$n - 5 = 0$$

$$n = 5$$

Or

$$n + 20 = 0$$

$$n = -20$$

Since number of years cannot be negative. So, in $\boxed{5 \text{ years}}$, his savings will be Rs 200.

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