



Arithmetic Progressions Ex 9.5 Q37

Answer :

In the given problem, the total amount = Rs 10710.

For the first half and hour (30 minutes) he counts at a rate of Rs 180 per minute. So,

The amount counted in 30 minutes = $(180)(30) = 5400$

So, amount left after half an hour = $10710 - 5400 = 5310$

After 30 minutes he counts at a rate of Rs 3 less every minute. So,

At 31st minute the rate of counting per minute = 177.

At 32nd minute the rate of counting per minute = 174.

So, the rate of counting per minute for each minute will form an A.P. with the first term as 177 and common difference as -3.

So, the total time taken to count the amount left after half an hour can be calculated by using the formula for the sum of n terms of an A.P,

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

We get,

$$5310 = \frac{n}{2} [2(177) + (n-1)(-3)] \text{ -----(1)}$$

$$5310(2) = n[354 - 3n + 3]$$

$$10620 = n(357 - 3n)$$

$$10620 = 357n - 3n^2$$

So, we get the following quadratic equation,

$$3n^2 - 357n + 10620 = 0$$

$$n^2 - 119n + 3540 = 0$$

Solving the equation by splitting the middle term, we get,

$$n^2 - 60n - 59n + 3540 = 0$$

$$n(n - 60) - 59(n - 60) = 0$$

$$(n - 60)(n - 59) = 0$$

So,

$$n - 59 = 0$$

$$n = 59$$

Or

$$n - 60 = 0$$

$$n = 60$$

Now let $n = 60$ then finding the last term, we get

$$S_n = \frac{n}{2} [a + l]$$

$$5310 = \frac{60}{2} [177 + l]$$

$$177 = 177 + l$$

$$l = 0$$

It means the work will be finish in 59th minute only because 60th term is 0.

So, we will take $n = 59$

Therefore, the total time required for counting the entire amount = $30 + 59$ minutes = 89 minutes

So, the total time required for counting the entire amount is 89 minutes.

Arithmetic Progressions Ex 9.5 Q38

Answer :

In the given problem,

Cost of the equipment = Rs 600,000

It depreciates by 15% in the first year. So,

Depreciation in 1 year

$$= 600000 - 495000$$

$$= 105000$$

$$= 90000$$

It depreciates by 13.5% of the original cost in the 2 year. So,

$$\text{Depreciation in 2 year} = \frac{13.5}{100}(600000) = 81000$$

Further, it depreciates by 12% of the original cost in the 3 year. So,

$$\text{Depreciation in 3 year} = \frac{12}{100}(600000) = 72000$$

So, the depreciation in value of the equipment forms an A.P. with first term as 90000 and common difference as -9000.

So, the total depreciation in value in 10 years can be calculated by using the formula for the sum of n terms of an A.P.

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

We get,

$$S_n = \frac{10}{2}[2(90000) + (10-1)(-9000)]$$

$$= \frac{10}{2}[180000 + (9)(-9000)]$$

$$= 5(180000 - 81000)$$

$$= 5(99000)$$

$$= 495000$$

So, the total depreciation in the value after 10 years is Rs 495000.

Therefore, the value of equipment = $600000 - 495000 = 105000$

So, the value of the equipment after 10 years is **Rs 105,000**.

Arithmetic Progressions Ex 9.5 Q39

Answer :

In the given problem,

Total amount of money (S_n) = Rs 700

There are a total of 7 prizes and each prize is Rs 20 less than the previous prize. So let us take the first prize as Rs a .

So, the second prize will be Rs $a - 20$, third prize will be Rs $a - 20 - 20$.

Therefore, the prize money will form an A.P. with first term a and common difference -20 .

So, using the formula for the sum of n terms,

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

We get,

$$700 = \frac{7}{2}[2(a) + (7-1)(-20)]$$

$$700 = \frac{7}{2}[2a + (6)(-20)]$$

$$700 = \frac{7}{2}(2a - 120)$$

$$700 = 7(a - 60)$$

On further simplification, we get,

$$\frac{700}{7} = a - 60$$

$$100 + 60 = a$$

$$a = 160$$

Therefore, the value of first prize is Rs 160.

Second prize = Rs 140

Third prize = Rs 120

Fourth prize = Rs 100

Fifth prize = Rs 80

Sixth prize = Rs 60

Seventh prize = Rs 40

So the values of prizes are **Rs 160, Rs 140, Rs 120, Rs 100, Rs 80, Rs 60, Rs 40**

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