



Exercise 11B

$$\text{Population} = P \times \left(1 + \frac{R}{100}\right)^n$$

$$= 120000 \times \left(1 + \frac{6}{100}\right)^1$$

$$= 120000 \times \left(\frac{100+6}{100}\right)$$

$$= 120000 \times \left(\frac{106}{100}\right)$$

$$= 120000 \times \left(\frac{53}{50}\right)$$

$$= 2400 \times 53$$

$$= 127200$$

Therefore, the population of the city in 2010 is 127200.

Again, population of the city in 2010,  $P = 127200$

Rate of decrease,  $R = 5\%$

Then the population of the city in the year 2011 is *given by*

$$\text{Population} = P \times \left(1 - \frac{R}{100}\right)^n$$

$$= 127200 \times \left(1 - \frac{5}{100}\right)^1$$

$$= 127200 \times \left(\frac{100-5}{100}\right)$$

$$= 127200 \times \left(\frac{95}{100}\right)$$

$$= 127200 \times \left(\frac{19}{20}\right)$$

$$= 6360 \times 19$$

$$= 120840$$

Therefore, the population of the city in 2011 is 120840.

Q25.

Answer :

Initial count of bacteria,  $P = 500000$

Rate of increase,  $R = 2\%$

Time,  $n = 2$  hours

Then the count of bacteria at the end of 2 hours is *given by*

$$\text{Count of bacteria} = P \times \left(1 + \frac{R}{100}\right)^n$$

$$= 500000 \times \left(1 + \frac{2}{100}\right)^2$$

$$= 500000 \times \left(\frac{100+2}{100}\right)^2$$

$$= 500000 \times \left(\frac{102}{100}\right)^2$$

$$= 500000 \times \left(\frac{51}{50}\right)^2$$

$$= 500000 \times \left(\frac{51}{50}\right) \times \left(\frac{51}{50}\right)$$

$$= (200 \times 51 \times 51)$$

$$= 520200$$

Therefore, the count of bacteria at the end of 2 hours is 520200.

Q26.

Answer :

Initial count of bacteria,  $P = 20000$

Rate of increase,  $R = 10\%$

Time,  $n = 3$  hours

Then the count of bacteria at the end of the first hour is given by

$$\text{Count of bacteria} = P \times \left(1 + \frac{10}{100}\right)^n$$

$$= 20000 \times \left(1 + \frac{10}{100}\right)^1$$

$$= 20000 \times \left(\frac{100+10}{100}\right)$$

$$= 20000 \times \left(\frac{110}{100}\right)$$

$$= 20000 \times \left(\frac{11}{10}\right)$$

$$= 2000 \times 11$$

$$= 22000$$

Therefore, the count of bacteria at the end of the first hour is 22000.

The count of bacteria at the end of the second hour is given by

$$\text{Count of bacteria} = P \times \left(1 - \frac{10}{100}\right)^n$$

$$= 22000 \times \left(1 - \frac{10}{100}\right)^1$$

$$= 22000 \times \left(\frac{100-10}{100}\right)$$

$$= 22000 \times \left(\frac{90}{100}\right)$$

$$= 22000 \times \left(\frac{9}{10}\right)$$

$$= 2200 \times 9$$

$$= 19800$$

Therefore, the count of bacteria at the end of the second hour is 19800.

Then the count of bacteria at the end of the third hour is given by

$$\text{Count of bacteria} = P \times \left(1 + \frac{10}{100}\right)^n$$

$$= 19800 \times \left(1 + \frac{10}{100}\right)^1$$

$$= 19800 \times \left(\frac{100+10}{100}\right)$$

$$= 19800 \times \left(\frac{110}{100}\right)$$

$$= 19800 \times \left(\frac{11}{10}\right)$$

$$= 1980 \times 11$$

$$= 21780$$

Therefore, the count of bacteria at the end of the first 3 hours is 21780.

Q27.

Answer :

Initial value of the machine,  $P = \text{Rs } 625000$

Rate of depreciation,  $R = 8\%$

Time,  $n = 2$  years

Then the value of the machine after two years is given by

$$\begin{aligned}\text{Value} &= P \times \left(1 - \frac{R}{100}\right)^n \\&= \text{Rs } 625000 \times \left(1 - \frac{8}{100}\right)^2 \\&= \text{Rs } 625000 \times \left(\frac{100-8}{100}\right)^2 \\&= \text{Rs } 625000 \times \left(\frac{92}{100}\right)^2 \\&= \text{Rs } 625000 \times \left(\frac{23}{25}\right)^2 \\&= \text{Rs } 625000 \times \left(\frac{23}{25}\right) \times \left(\frac{23}{25}\right) \\&= \text{Rs } (1000 \times 23 \times 23) \\&= \text{Rs } 529000\end{aligned}$$

Therefore, the value of the machine after two years will be Rs. 529000.

Q28.

Answer :

Initial value of the scooter,  $P = \text{Rs } 56000$

Rate of depreciation,  $R = 10\%$

Time,  $n = 3$  years

Then the value of the scooter after three years is given by

$$\begin{aligned}\text{Value} &= P \times \left(1 - \frac{R}{100}\right)^n \\&= \text{Rs. } 56000 \times \left(1 - \frac{10}{100}\right)^3 \\&= \text{Rs. } 56000 \times \left(\frac{100-10}{100}\right)^3 \\&= \text{Rs. } 56000 \times \left(\frac{90}{100}\right)^3 \\&= \text{Rs. } 56000 \times \left(\frac{9}{10}\right)^3 \\&= \text{Rs. } 56000 \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right) \times \left(\frac{9}{10}\right) \\&= \text{Rs. } (56 \times 9 \times 9 \times 9) \\&= \text{Rs. } 40824\end{aligned}$$

Therefore, the value of the scooter after three years will be Rs. 40824.

Q29.

Answer :

Initial value of the car,  $P = \text{Rs } 348000$

Rate of depreciation for the first year,  $p = 10\%$

Rate of depreciation for the second year,  $q = 20\%$

Time,  $n = 2$  years.

Then the value of the car after two years is given by

$$\begin{aligned}\text{Value} &= \left\{ P \times \left( 1 - \frac{p}{100} \right) \times \left( 1 - \frac{q}{100} \right) \right\} \\&= \text{Rs. } \left\{ 348000 \times \left( 1 - \frac{10}{100} \right) \times \left( 1 - \frac{20}{100} \right) \right\} \\&= \text{Rs. } \left\{ 348000 \times \left( \frac{100-10}{100} \right) \times \left( \frac{100-20}{100} \right) \right\} \\&= \text{Rs. } \left\{ 348000 \times \left( \frac{90}{100} \right) \times \left( \frac{80}{100} \right) \right\} \\&= \text{Rs. } \left\{ 348000 \times \left( \frac{9}{10} \right) \times \left( \frac{8}{10} \right) \right\} \\&= \text{Rs. } (3480 \times 9 \times 8) \\&= \text{Rs. } 250560\end{aligned}$$

$\therefore$  The value of the car after two years is Rs 250560.

Q30.

Answer :

Let the initial value of the machine,  $P$  be Rs  $x$ .

Rate of depreciation,  $R = 10\%$

Time,  $n = 3$  years

The present value of the machine is Rs 291600.

Then the initial value of the machine is given by

$$\begin{aligned}\text{Value} &= P \times \left( 1 - \frac{R}{100} \right)^n \\&= \text{Rs. } x \times \left( 1 - \frac{10}{100} \right)^3 \\&= \text{Rs. } x \times \left( \frac{100-10}{100} \right)^3 \\&= \text{Rs. } x \times \left( \frac{90}{100} \right)^3 \\&= \text{Rs. } x \times \left( \frac{9}{10} \right)^3\end{aligned}$$

$\therefore$  Present value of the machine = Rs 291600

Now, Rs 291600 = Rs  $x \times \left( \frac{9}{10} \right) \times \left( \frac{9}{10} \right) \times \left( \frac{9}{10} \right)$

$$\Rightarrow x = \text{Rs } \frac{291600 \times 10 \times 10 \times 10}{9 \times 9 \times 9}$$

$$\Rightarrow x = \text{Rs } \frac{291600000}{729}$$

$$\Rightarrow x = \text{Rs } 400000$$

$\therefore$  The initial value of the machine is Rs 400000.

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