Solution 10:
Exercise 3(D)

Solution 1:

Cost of machine in 2008 = Rs44,000
Depreciation rate=12%
(i) ∴ Cost of machine at the end of 2009

$$= P\left(1-\frac{r}{100}\right)^n$$

$$= 44,000\left(1-\frac{12}{100}\right)^2$$

$$= 44,000 \times \left(\frac{88}{100}\right)^2 = \text{Rs}34,073.60 \quad \text{Ans.}$$

(ii) Cost of machine at the beginning of 2007(P)

$$A = P\left(1-\frac{r}{100}\right)^n$$

$$\Rightarrow 44,000 = P\left(1-\frac{12}{100}\right)^1$$

$$\Rightarrow 44,000 = P\left(\frac{88}{100}\right)^1$$

$$\Rightarrow P = \frac{44,000 \times 100}{88} = \text{Rs}50,000 \quad \text{Ans}$$

Solution 2:

Let x be the value of the article.

The value of an article decreases for two years at the rate of 10% per year.

The value of the article at the end of the 1^{st} year is
X - 10% of x = 0.90x

The value of the article at the end of the 2^{nd} year is
0.90x - 10% of (0.90x) = 0.81x

The value of the article increases in the 3^{rd} year by 10%.

The value of the article at the end of 3^{rd} year is
0.81x + 10% of (0.81x) = 0.891x

The value of the article at the end of 3 years is ₹40,095.

$0.891x = 40,095$

$\Rightarrow x = 45,000$

The original value of the article is ₹45,000.

Solution 3:

Population in 2005(P) = 64,000
Let after n years its population be 74,088(A)
Growth rate= 5% per annum

$$\therefore \quad A = P\left(1 + \frac{r}{100}\right)^n$$

$$\Rightarrow 74,088 = 64,000\left(1 + \frac{5}{100}\right)^n$$

$$\Rightarrow \frac{74,088}{64,000} = \left(\frac{21}{20}\right)^n$$

$$\Rightarrow \frac{9,261}{8,000} = \left(\frac{21}{20}\right)^n$$

$$\Rightarrow \left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^n$$

On comparing, we get

$$n = 3 \text{ years}$$

Ans.

Solution 4:

Let the population in the beginning of 1998 = P
The population at the end of 1999 = 2,85,120(A)
r_1 = - 12% and r_2 = +8%

$$\therefore \quad A = P\left(1 - \frac{r_1}{100}\right)\left(1 + \frac{r_2}{100}\right)$$

$$\Rightarrow 2,85,120 = P\left(1 - \frac{12}{100}\right)\left(1 + \frac{8}{100}\right)$$

$$\Rightarrow 2,85,120 = P\left(\frac{22}{25}\right)\left(\frac{27}{25}\right)$$

$$\Rightarrow P = \frac{2,85,120 \times 25 \times 25}{22 \times 27} = 3,00,000 \text{ Ans.}$$

Solution 5:

Let sum of money be Rs P and rate of interest= r%
Money after 1year= Rs16,500
Money after 3years=Rs19,965
For 1year

$$\therefore\ A = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow 16,500 = P\left(1+\frac{r}{100}\right)^1 \text{ ----------(1)}$$

For 3years

$$\therefore\ A = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow 19,965 = P\left(1+\frac{r}{100}\right)^3 \text{ ----------(2)}$$

Divide eq^n (2) by eq^n (1)

$$\frac{19,965}{16,500} = \frac{P\left(1+\frac{r}{100}\right)^3}{P\left(1+\frac{r}{100}\right)^1}$$

$$\Rightarrow \frac{121}{100} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \left(\frac{11}{10}\right)^2 = \left(1+\frac{r}{100}\right)^2$$

On comparing, we get

$$\frac{11}{10} = 1+\frac{r}{100} \Rightarrow r = 10\%$$ Ans.

Put value of r in eq^n (1)

$$16,500 = P\left(1+\frac{10}{100}\right)$$

$$\Rightarrow P = \frac{16,500 \times 10}{11} = \text{Rs}\,15,000$$ Ans

Solution 6:

Given: P = Rs7,500 and Time(n)= 2years

Let rate of interest = y%

$$\therefore \text{ S.I. } = \frac{P \times R \times T}{100} = \frac{7,500 \times y \times 2}{100} = Rs150y$$

$$\therefore \text{ C.I. } = P\left(1+\frac{r}{100}\right)^n - P = Rs7,500\left(1+\frac{y}{100}\right)^2 - Rs7,500$$

Given: C.I. -; S.I. = Rs12

$$\Rightarrow 7,500\left(1+\frac{y}{100}\right)^2 - 7,500 - 150y = 12$$

$$\Rightarrow 7,500\left(1+\frac{y^2}{10000}+\frac{2y}{100}\right) - 7,500 - 150y = 12$$

$$\Rightarrow 7,500 + \frac{7,500y^2}{10000} + 150y - 7,500 - 150y = 12$$

$$\Rightarrow \frac{3y^2}{4} = 12$$

$$\Rightarrow y^2 = 16 \quad \Rightarrow y = 4\% \text{ Ans.}$$

Solution 7:

Let Principal be Rs y and rate= r%

According to 1st condition

Amount in 10 years = Rs 3y

$$\therefore A = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow 3y = y\left(1+\frac{r}{100}\right)^{10}$$

$$\Rightarrow 3 = \left(1+\frac{r}{100}\right)^{10} \text{ --------(1)}$$

According to 2nd condition

Let after n years amount will be Rs 27y

$$\therefore A = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow 27y = y\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow (3)^3 = \left(1+\frac{r}{100}\right)^n$$

Put value from first equation

$$\Rightarrow \left[\left(1+\frac{r}{100}\right)^{10}\right]^3 = \left(1+\frac{r}{100}\right)^n$$

On comparing, we get

n = 10 x 3= 30years Ans.

Solution 8:

At the end of the two years the amount is

$$A_1 = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow A_1 = P\left(1+\frac{10}{100}\right)^2$$

Mr. Sharma paid ₹19,360 at the end of the second year.
So for the third year the principal is A_1 - 19,360.
Also he cleared the debt by paying ₹31,944 at the end of the third year.

$$A_2 = P\left(1+\frac{r}{100}\right)^n$$

$$\Rightarrow 31,944 = \left(P\left(1+\frac{10}{100}\right)^2 - 19,360\right)\left(1+\frac{10}{100}\right)^1$$

$$\Rightarrow 29040 = \left(P\left(1+\frac{10}{100}\right)^2 - 19,360\right)$$

$$\Rightarrow P\left(1+\frac{10}{100}\right)^2 = 48,400$$

$$\Rightarrow P = 40,000$$

Mr. Sharma borrowed ₹40,000.

Solution 1:

Let sum of money be RS y

To calculate S.I.

$$S.I. = \frac{P \times R \times T}{100} = \frac{y \times 10 \times 1}{100} = Rs\,\frac{y}{10}$$

To calculate C.I.(compounded half-yearly)

$$\therefore \quad C.I. = P\left[\left(1+\frac{r}{2\times 100}\right)^{n\times 2} - 1\right] = y\left[\left(1+\frac{10}{2\times 100}\right)^{1\times 2} - 1\right]$$

$$= y\left[\left(\frac{21}{20}\right)^2 - 1\right] = \left(\frac{41}{400}\right)y$$

Given : C.I. - S.I = Rs15

$$\Rightarrow \left(\frac{41}{400}\right)y - \frac{y}{10} = 15$$

$$\Rightarrow \frac{y}{400} = 15 \Rightarrow y = Rs6{,}000 \qquad \text{Ans.}$$

Solution 10:

$$x\left(1+\frac{5}{100}\right)^9 = y\left(1+\frac{5}{100}\right)^7$$

$$\Rightarrow \frac{x}{y} = \frac{1}{\left(1+\frac{5}{100}\right)^2}$$

$$\Rightarrow \frac{x}{y} = \frac{400}{441}$$