Solution 1:
Exercise 3(E)

1st case

Given: S.I. = Rs 450; Time= 2 years and Rate = 4%

$$\therefore \quad \text{Principal} = \frac{I \times 100}{R \times T} = \frac{450 \times 100}{4 \times 2} = \text{Rs. } 5625$$

2nd case(compounded half-yearly)

P = ₹5,625; n= 1 year and r = 4%

$$\therefore \quad A = P\left(1 + \frac{r}{2 \times 100}\right)^{n \times 2} = 5{,}625\left(1 + \frac{4}{2 \times 100}\right)^{1 \times 2}$$

$$= 5{,}625\left(\frac{51}{50}\right)^2 = \text{Rs. } 5852.25$$

$$\therefore \quad \text{C.I.} = 5{,}852.25 - 5{,}625 = \text{Rs. } 227.25$$

Solution 2:

Given: P = Rs. 10,800; Time $= 2\frac{1}{2}$ years and Rate= 10%p.a

For 2years

$$A = P\left(1 + \frac{r}{100}\right)^n = 10{,}800\left(1 + \frac{10}{100}\right)^2 = \text{Rs}13{,}068$$

For ½ year

$$\therefore \quad A = P\left(1 + \frac{r}{2 \times 100}\right)^{n \times 2} = 13{,}068\left(1 + \frac{10}{2 \times 100}\right)^{\frac{1}{2} \times 2}$$

$$= 13{,}068 \times \frac{21}{20} = 13{,}721.40 = \text{Rs.}13721(\text{nearest rupee})$$

∴ ₹13,721 - ₹10,800 = ₹2,921

Solution 3:

(i) Present value of machine(P) = ₹97,200
Depreciation rate = 10%

$$\therefore \text{ Value of machine after 2 years } = P\left(1-\frac{r}{100}\right)^n$$

$$= 97{,}200\left(1-\frac{10}{100}\right)^2$$

$$= 97{,}200\left(\frac{9}{10}\right)^2$$

$$= ₹78732$$

(ii) Present value of machine(A) = ₹97,200
Depreciation rate = 10% and time = 2 years
To calculate the cost 2 years ago

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

$$\Rightarrow 97{,}200 = P\left(1-\frac{10}{100}\right)^2$$

$$\Rightarrow 97{,}200 = P\left(\frac{9}{10}\right)^2$$

$$\Rightarrow P = \text{Rs. } 97{,}200 \times \left(\frac{10}{9}\right)^2 = 1{,}20{,}000$$

Solution 4:

Let the sum of money lent by both ₹y
For Anuj
P = ₹y ;rate = 8% and time = 2 years

$$\therefore \text{ S.I. } = \frac{P \times R \times T}{100} = \frac{y \times 8 \times 2}{100} = \frac{4y}{25}$$

For Rajesh
P = ₹y ;rate = 8% and time = 2 years

$$\therefore \text{ C.I. } = P\left[\left(1+\frac{r}{100}\right)^n - 1\right] = y\left[\left(1+\frac{8}{100}\right)^2 - 1\right] = \frac{104y}{625}$$

Given : C.I. -₹64

$$\Rightarrow \frac{104y}{625} - \frac{4y}{25} = 64$$

$$\Rightarrow \frac{4y}{625} = 64 \Rightarrow y = \frac{64 \times 625}{4} = \text{Rs.}10{,}000 \text{ Interest received by Anuj } = \frac{4 \times 10{,}000}{25} = \text{Rs.}1600$$

$$\text{Interest received by Rajesh} = \frac{104 \times 10{,}000}{625} = \text{Rs. } 1664$$

Solution 5:

Given: Principal = ₹4,715;time = 5 years and rate= 5% p.a.

$$\therefore \quad \text{S.I.} = \frac{P \times R \times T}{100} = \frac{4715 \times 5 \times 5}{100} = 1,178.75$$

Then C.I. = ₹1,178.75 x 4 = ₹4,715

Time = 2 years and rate = 5%

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

$$\Rightarrow \quad 4,715 = P\left[\left(1 + \frac{5}{100}\right)^2 - 1\right]$$

$$\Rightarrow \quad 4,715 = P\left(\frac{41}{400}\right)$$

$$\Rightarrow \quad P = \text{Rs}\,\frac{4,715 \times 400}{41} = \text{Rs. } 46,000$$

Solution 6:

Given: C.I. for the 2nd year = ₹4,950 and rate = 15%

$$\text{Then, C.I.} = P\left[\left(1 + \frac{r}{100}\right)^n - 1\right]$$

$$\Rightarrow \quad 4,950 = P\left[\left(1 + \frac{15}{100}\right)^1 - 1\right]$$

$$\Rightarrow \quad 4,950 = P\left(\frac{3}{20}\right)$$

$$\Rightarrow \quad P = \frac{4,950 \times 20}{3}$$

$$\Rightarrow \quad P = \text{Rs. } 33,000$$

Then amount at the end of 2nd year= ₹33,000

For first 2years

A = ₹33,000; r_1 = 10%

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

$$\Rightarrow \quad 33,000 = P\left(1 + \frac{10}{100}\right)$$

$$\Rightarrow \quad 33,000 = P\left(\frac{11}{10}\right)$$

$$\Rightarrow \quad P = \frac{33,000 \times 10}{11} = 30,000$$

The sum invested is ₹30,000.

Solution 7:

Let the sum of money be ₹y
and rate = 10% p.a. compounded half yearly

For first 6months

$$\therefore \quad A = P\left(1+\frac{r}{2\times 100}\right)^{n\times 2} = y\left(1+\frac{10}{2\times 100}\right)^{\frac{1}{2}\times 2} = \left(\frac{21}{20}\right)y$$

For first 12 months

$$\therefore \quad A = P\left(1+\frac{r}{2\times 100}\right)^{n\times 2} = y\left(1+\frac{10}{2\times 100}\right)^{1\times 2} = \left(\frac{441}{400}\right)y$$

Given: The difference between the above amounts = ₹189

$$\Rightarrow \left(\frac{441}{400}\right)y - \left(\frac{21}{20}\right)y = 189$$

$$\Rightarrow \left(\frac{21}{400}\right)y = 189$$

$$\Rightarrow y = \frac{189\times 400}{21}$$

y = 3600

Solution 8:

P = ₹86,000;time = 2 years and rate = 5% p.a.

To calculate S.I.

$$\therefore \quad S.I. = \frac{P\times R\times T}{100} = \frac{86,000\times 5\times 2}{100} = Rs.\ 8,600$$

To calculate C.I.

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

$$= 86,000\left[\left(1+\frac{5}{100}\right)^{2} - 1\right]$$

$$= 86,000\left(\frac{41}{400}\right) = Rs.\ 8,815$$

Profit = C.I. - S.I. = ₹8,815 - ₹8,600 = ₹215

Solution 9:

Let ₹x be the sum of money.

Rate = 5 % p.a. Simple interest = ₹1,200, n = 3years.

$$1,200 = \frac{x \times 5 \times 3}{100}$$

$$\Rightarrow x = \frac{12,00,00}{15}$$

$$\Rightarrow x = 8,000$$

The amount due and the compound interest on this sum of money at the same rate and after 2 years.

P = ₹8,000;rate = 5% p.a., n = 3 years

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

$$\Rightarrow A = 8,000\left(1 + \frac{5}{100}\right)^2$$

$$\Rightarrow A = 8,000(1.1025)$$

$$\Rightarrow A = 8,820$$

$$C.I. = A - P$$

$$\Rightarrow C.I. = 8,820 - 8,000$$

$$\Rightarrow C.I. = 820$$

The amount due after 2 years is ₹8,820 and the compound interest is ₹820.

Solution 10:

Let x% be the rate of interest.

P = ₹6,000, n = 2 years, A = ₹6,720

i. For the first year

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

$$\Rightarrow 6,720 = 6,000\left(1+\frac{x}{100}\right)^1$$

$$\Rightarrow 6,720 - 6,000 = 60x$$

$$\Rightarrow x = 12$$

The rate of interest is x% = 12%.

ii. The amount at the end of the second year.

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

$$\Rightarrow A = 6,000\left(1+\frac{12}{100}\right)^2$$

$$\Rightarrow A = 6,000\left(\frac{112}{100}\right)^2$$

$$\Rightarrow A = 7,526.40$$

The amount at the end of the second year = ₹7,526.40