Exercise 3(B)

Solution 1:

Let principal (P) = x
R = 8%
T = 2 years

$$SI = \frac{x \times 8 \times 2}{100} = \frac{4x}{25}$$

$$CI = A - P = x\left(1 + \frac{8}{100}\right)^2 - x$$

$$= x\left[\left(1 + \frac{2}{25}\right)^2 - 1\right]$$

$$= x\left[\left(\frac{27}{25}\right)^2 - 1\right]$$

$$= \frac{104}{625}x$$

Given, CI = SI = 54.40

$$\frac{104x}{625} - \frac{4x}{25} = Rs.54.40$$

$$x\left(\frac{104}{625} - \frac{4}{25} \times \frac{25}{25}\right) = 54.40$$

$$x\left(\frac{4}{625}\right) = 54.40$$

$$x = \frac{54.40 \times 625}{4}$$

$$x = Rs.8500$$

Thus, principalsum = Rs. 8500

Solution 2:

(for 2 years) A = Rs. 19360
T = 2 years
Let P = X

$$x\left(1+\frac{R}{100}\right)^2 = 19360 \quad ...(1)$$

A (for 4 years) = Rs. 23425.60

$$x\left(1+\frac{R}{100}\right)^4 = 23425.60 \quad ...(2)$$

(2) ÷ (1)

$$\left(1+\frac{R}{100}\right)^2 = \frac{23425.60}{19360}$$

$$\left(1+\frac{R}{100}\right)^2 = \frac{2342560}{1936000}$$

$$\left(1+\frac{R}{100}\right)^2 = \frac{14641}{12100}$$

$$\left(1+\frac{R}{100}\right)^2 = \left(\frac{121}{110}\right)^2$$

$$1+\frac{R}{100} = \frac{121}{110}$$

$$\frac{R}{100} = \frac{121}{110} - 1$$

$$R = 10\%$$

Form (1) $x\left(1+\frac{10}{100}\right)^2 = 19360$

$$x = \frac{19360 \times 10 \times 10}{11 \times 11}$$

$$x = \text{Rs. } 16000$$

Thus, sum = Rs. 16000

Solution 3:

Let principal = x, A = 3x, T = 8 years, R = ?
Case I,

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

$$3x = x\left(1+\frac{R}{100}\right)^{8}$$

$$3^{y/8} = 1+\frac{R}{100} \qquad \ldots(1)$$

Case II,
P = x,A = 27x,T = ?

$$27x = x\left(1+\frac{R}{100}\right)^{T}$$

$$27^{1/T} = 1+\frac{R}{100} \qquad \ldots(2)$$

From (1) and (2) $3^{1/8} = 27^{1/T}$

$$3^{1/8} = 3^{\frac{1}{8}} = 3^{1/T}$$

$$T = 24$$

Time = 24 years.

Solution 4:

P = Rs. 9430
R = 5%
R = 10 years

$$SI = \frac{9430 \times 5 \times 10}{100} = Rs.4715$$

Let sum = x
CI = 4715, T = 2 years, Rs= 5%
CI = AP

$$4715 = x\left(1+\frac{R}{100}\right)^{T} - x$$

$$4715 = x\left(1+\frac{5}{100}\right)^{2} - x$$

$$4715 = x\left[\left(\frac{21}{20}\right)^{2} - 1\right]$$

$$4715 = x\left(\frac{441-400}{400}\right)$$

$$x = \frac{4715 \times 400}{41} = Rs.46,000$$

Thus principal from = Rs. 46,000

Solution 5:

Let principal = Rs. 100, R = 5% T = 2 years

For Kamal, SI = $\frac{100 \times 5 \times 2}{100} = Rs.10$

For Anand, $A = P\left(1+\frac{R}{100}\right)^T$

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

$= 100 \times \frac{21}{20} \times \frac{21}{20}$

$= \frac{441}{4}$

CI = $\frac{441}{4} - 100 = \frac{41}{4}$

Difference of CI and SI = $\frac{41}{4} - 10$

$= \frac{41-40}{4}$

$= Rs.\frac{1}{4}$

When difference is Rs. $\frac{1}{4}$, then principal = Rs. 100

If difference is 1, principal = 100 $\times$ 4

If difference is Rs, 15, principal = 100 $\times$ 4 $\times$ 15 = Rs. 6000

Solution 6:

SI = Rs. 450
R = 4%
R = 2 years
P = ?

$$P = \frac{SI \times 100}{R \times T} = \frac{450 \times 100}{4 \times 2} = Rs.5625$$

Now, P = 5625, R = 4%, T = 2 years

$$A = 5625\left(1+\frac{4}{100}\right)^2 = 5625\left(\frac{26}{25}\right)^2$$

$$= \frac{3802500}{625} = Rs.6084$$

Solution 7:

Let principal (P), R = 4%, T = 4 years

$$SI = \frac{P \times 4 \times 4}{100} = \frac{4P}{25}$$

$$CI = P\left(1+\frac{5}{100}\right) - P = P\left[\left(\frac{21}{20}\right)^3 - 1\right] = P\left(\frac{9261}{8000} - 1\right)$$

$$= \frac{1261}{8000}P$$

Given SI -; CI = Rs. 228

$$\frac{4P}{25} - \frac{1261}{8000}P = 228$$

$$\frac{4 \times 320P - 1261P}{8000} = 228$$

$$19P = 228 \times 8000$$

$$P = \frac{228 \times 8000}{19} = Rs.96000$$

Thus, Principal = Rs. 96000

Solution 8:

CI = Rs. 246, R = 5%, T = 2 years
CI = A - P

$$246 = P\left(1+\frac{5}{100}\right)^2 - P$$

$$246 = P\left[\left(\frac{21}{20}\right)^2 - 1\right]$$

$$246 = P\frac{61}{400}$$

$$P = \frac{246 \times 400}{41}$$

$$= Rs.\,2400$$

Now, P = Rs. 2400 ,R = 6%, T = 3 years

$$SI = \frac{2400 \times 6 \times 3}{100}$$

$$= Rs.\,432$$

Solution 9:

Let the sum (principle) = x
Given Amount = 23400, R = 10% and T = 3 years

$$\Rightarrow \text{interest I} = \frac{x \times 10 \times 3}{100} = \frac{3x}{10}$$

Amount = Principle + Interest

$$23400 = x + \frac{3x}{10}$$

$x = 18000$

Principle = 18000

Now,

Principle = `18000, r = 10% and n = 2 years

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

$$A = 18000\left(1 + \frac{10}{100}\right)^2$$

$$A = 18000\left(\frac{11}{10}\right)^2$$

$$A = 18000\left(\frac{121}{100}\right)$$

$$A = 21780$$

The amount of the same sum in 2 years and at 10% p.a. compound interest is 21780.

Solution 2:

For the payment of Rs. 12,600 at the end of first year:

A = Rs. 12,600; n = 1 year and r = 5%

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

$\Rightarrow 12,600 = P\left(1+\frac{5}{100}\right)^1$

$\Rightarrow 12,600 = P\left(\frac{21}{20}\right)$

$\Rightarrow P = \frac{20}{21} \times 12,600 = \text{Rs. } 12,000$

For the payment of Rs. 17,640 at the end of second year:

A = Rs. 17,640; n = 2 years and r = 5%

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

$\Rightarrow 17,640 = P\left(1+\frac{5}{100}\right)^2$

$\Rightarrow 17,640 = P\left(\frac{21}{20}\right)^2$

$\Rightarrow P = \frac{20}{21} \times \frac{20}{21} \times 17,640 = \text{Rs. } 16,000$

$\therefore$ Sum borrowed = Rs. (12,000 + 16,000) = Rs. 28,000