# Chapter 3. Compound Interest (Using Formula)

## Exercise 3(A)

### Solution 1:

Given : P= Rs12,000; n=3years and r=5%

$$\text{Amount} = P\left(1+\frac{r}{100}\right)^n = 12000\left(1+\frac{5}{100}\right)^3$$

$$= 12000\left(\frac{21}{20}\right)^3$$

=Rs13,891.50 Ans.

∴ C.I. =RS13,891.50 - Rs12,000

= Rs1,891.50 Ans.

### Solution 2:

Given : P= Rs15,000; n=2years; $r_1$ =8% and $r_2$ =10%

$$\text{Amount} = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right) = 15,000\left(1+\frac{8}{100}\right)\left(1+\frac{10}{100}\right)$$

$$= 15,000\left(\frac{27}{25}\right)\left(\frac{11}{10}\right)$$

=Rs17,820 Ans.

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### Solution 3:

Given : P=Rs6,000; n= 3years; $r_1$= 5%; $r_2$= 8% and $r_3$ =10%

$$\text{Amount} = P\left(1+\frac{r_1}{100}\right)\left(1+\frac{r_2}{100}\right)\left(1+\frac{r_3}{100}\right)$$

$$= 6,000\left(1+\frac{5}{100}\right)\left(1+\frac{8}{100}\right)\left(1+\frac{10}{100}\right)$$

$$= 6000\left(\frac{21}{20}\right)\left(\frac{27}{25}\right)\left(\frac{11}{10}\right)$$

=Rs7,484.40

∴ C.I. = Rs7,484.40 - Rs6,000 = Rs1,484.40 Ans.

**Solution 4:**

Given : Amount= Rs5,445; n= 2years and r = 10%

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

$\Rightarrow 5{,}445 = P\left(1+\frac{10}{100}\right)^2$

$\Rightarrow 5{,}445 = P\left(\frac{11}{10}\right)^2$

$\Rightarrow P = 5{,}445\left(\frac{10}{11}\right)^2$ =Rs4,500 Ans.

**Solution 5:**

Given : C.I.= Rs768.75; n= 2years and r = 5%

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

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

$\Rightarrow A = P\left(\frac{21}{20}\right)^2 = \frac{441}{400}P$

$\therefore A - P = C.I$

$\Rightarrow \frac{441}{400}P - P = Rs768.75$

$\Rightarrow \frac{41}{400}P = Rs768.75$

$\Rightarrow P = Rs\frac{768.75 \times 400}{41} = Rs7{,}500$ Ans.

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**Solution 6:**

Given : C.I.= Rs1,655; n= 3years and r = 10%

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

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

$\Rightarrow A = P\left(\frac{11}{10}\right)^3 = \frac{1,331}{1,000}P$

$\therefore A - P = C.I$

$\Rightarrow \frac{1,331}{1,000}P - P = Rs1,655$

$\Rightarrow \frac{331}{1,000}P = Rs1,655$

$\Rightarrow P = Rs\ \frac{1,655 \times 1,000}{331} = Rs5,000$ Ans.

**Solution 7:**

Given : Amount =Rs9,856; n=2years; $r_1$ =10% and $r_2$ =12%

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

$\Rightarrow 9,856 = P\left(1+\frac{10}{100}\right)\left(1+\frac{12}{100}\right)$

$\Rightarrow 9,856 = P\left(\frac{11}{10}\right)\left(\frac{28}{25}\right)$

$\Rightarrow P = Rs\ \frac{9,856 \times 10 \times 25}{11 \times 28} = Rs8,000$

Ans.

**Solution 8:**

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

$\Rightarrow (P + 4240) = P\left(1+\frac{10}{100}\right)\left(1+\frac{15}{100}\right)$

$\Rightarrow (P + 4240) = P\,(1.265)$

$\Rightarrow P = 16000$

The sum is ₹16,000

**Solution 9:**

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

$$\Rightarrow 6,615 = 6,000\left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^2 = \frac{6,615}{6,000}$$

$$\Rightarrow 1+\frac{r}{100} = \frac{21}{20}$$

$$\Rightarrow r = 5\%$$

At 5% per annum the sum of Rs.6,000 amounts to Rs.6,615 in 2 years when the interest is compounded annually.

**Solution 10:**

Let Rs.x and Rs.y be the money invested by Pramod and Rohit respectively such that they will get the same sum on attaining the age of 25 years.
Pramod will attain the age of 25 years after 25 – 16 = 9 years
Rohit will attain the age of 25 years after 25 -18 = 7 years

Let Principal = Rs y
Then Amount= Rs 1.44y
n= 2years

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

$$\Rightarrow 1.44y = y\left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \frac{1.44y}{y} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \frac{36}{25} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \left(\frac{6}{5}\right)^2 = \left(1+\frac{r}{100}\right)^2$$

On comparing,

$$\frac{6}{5} = 1+\frac{r}{100}$$

On solving, we get

$$r = 20\%$$

Pramod and Rohit should invest in 400:441 ratio respectively such that they will get the same sum on attaining the age of 25 years.

**Solution 11:**

Given: P = Rs. 4, 000, C.I. = Rs. 1, 324 and n = 3 years

Now, A = P + I

$\Rightarrow$ A = Rs. (4, 000 + 1, 324) = Rs. 5, 324

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

$$\Rightarrow 5324 = 4000\left(1+\frac{r}{100}\right)^3$$

$$\Rightarrow \frac{5324}{4000} = \left(1+\frac{r}{100}\right)^3$$

$$\Rightarrow \frac{1331}{1000} = \left(1+\frac{r}{100}\right)^3$$

$$\Rightarrow \left(1+\frac{R}{100}\right)^3 = \frac{1331}{1000} = \left(\frac{11}{10}\right)^3$$

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

$$\Rightarrow \frac{r}{100} = \frac{11}{10} - 1 = \frac{1}{10}$$

$$\Rightarrow r = \frac{100}{100} = 10\%$$

Thus, the rate of interest is 10%.

**Solution 12:**

Given: P=Rs5,000; A=Rs6,272 and n= 2years

(i)

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

$$\Rightarrow 6,272 = 5,000\left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \frac{6,272}{5,000} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \frac{784}{625} = \left(1+\frac{r}{100}\right)^2$$

$$\Rightarrow \left(\frac{28}{25}\right)^2 = \left(1+\frac{r}{100}\right)^2$$

On comparing

$$\frac{28}{25} = 1+\frac{r}{100}$$

On solving, we get

r =12%

(ii) Amount at the third year

$$= 5,000\left(1+\frac{12}{100}\right)^3$$

$$= 5,000\left(\frac{28}{25}\right)^3$$

= Rs7,024.64

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**Solution 13:**

Given : P=Rs7,000; A=Rs9,317 and r= 10%

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

$$\Rightarrow 9,317 = 7,000\left(1+\frac{10}{100}\right)^n$$

$$\Rightarrow \frac{9,317}{7,000} = \left(\frac{11}{10}\right)^n$$

$$\Rightarrow \frac{1,331}{1,000} = \left(\frac{11}{10}\right)^n$$

$$\Rightarrow \left(\frac{11}{10}\right)^3 = \left(\frac{11}{10}\right)^n$$

On comparing

n = 3years

**Solution 14:**

Given : P=Rs4,000; C.I.=Rs630.50 and r=5%

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

$$\Rightarrow 630.50 = 4,000\left[\left(1+\frac{5}{100}\right)^n - 1\right]$$

$$\Rightarrow \frac{630.50}{4,000} = \left[\left(\frac{21}{20}\right)^n - 1\right]$$

$$\Rightarrow \frac{1,261}{8,000} = \left(\frac{21}{20}\right)^n - 1$$

$$\Rightarrow \frac{1,261}{8,000} + 1 = \left(\frac{21}{20}\right)^n$$

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

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

On comparing

n = 3years

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## Solution 15:

Let share of A = Rs y
share of B = Rs (28,730 - y)
rate of interest= 10%
According to question
Amount of A in 3years= Amount of B in 5years

$$\Rightarrow y\left(1+\frac{10}{100}\right)^3 = (28,730-y)\left(1+\frac{10}{100}\right)^5$$

$$\Rightarrow y = (28,730-y)\left(1+\frac{10}{100}\right)^2$$

$$\Rightarrow y=(28,730-y)\left(\frac{121}{100}\right)$$

$$\Rightarrow 100y=121(28,730-y)$$

$$\Rightarrow 100y+121y=121\times 28,730$$

$$\Rightarrow 221y=121\times 28,730$$

$$\Rightarrow y=\frac{121\times 28,730}{221} = Rs15,730$$

Therefore share of A=Rs15,730
Share of B=Rs28,730 - Rs 15,730=Rs13,000

## Solution 16:

(i)Let share of John = Rs y
share of Smith = Rs (44,200 - y)
rate of interest= 10%
According to question
Amount of John in 4years= Amount of Smith in 2years

$$\Rightarrow y\left(1+\frac{10}{100}\right)^4 = (44,200-y)\left(1+\frac{10}{100}\right)^2$$

$$\Rightarrow y\left(1+\frac{10}{100}\right)^2 = (44,200-y)$$

$$\Rightarrow y\left(\frac{11}{10}\right)^2 =(44,200-y)$$

$$\Rightarrow 121y=100(44,200-y)$$

$$\Rightarrow 121y=100\times 44,200 - 100y$$

$$\Rightarrow 121y+100y=100\times 44,200$$

$$\Rightarrow 221y=100\times 44,200$$

$$\Rightarrow y=\frac{100\times 44,200}{221} = Rs20,000$$

Therefore share of John=Rs20,000
Share of Smith=Rs44,200- Rs 20,000=Rs24,200
(ii)Amount that each will receive

$$= 20,000\left(1+\frac{10}{100}\right)^4$$

$$= 20,000\left(\frac{11}{10}\right)^4$$

$$= Rs29,282$$

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**Solution 17:**

(i) I = Rs. 6000, T = 2 years and R = 10%

$$\therefore P = \frac{I \times 100}{R \times T} = \frac{6000 \times 100}{10 \times 2} = \text{Rs. } 30,000$$

(ii) P = Rs. 30,000, n = 3 years and r = 10%

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

$$= 30000\left(1 + \frac{10}{100}\right)^3$$

$$= 30000\left(\frac{11}{10}\right)^3$$

$$= 30000 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$$

$$= \text{Rs. } 39,930$$

(iii) C.I. earned in 3 years = A – P = Rs. (39, 930 – 30, 000) = Rs. 930

**Solution 18:**

Given: P = Rs. 8000, R = 5%, T = 2 years

For simple interest,

$$\text{S.I.} = \frac{P \times R \times T}{100}$$

$$= \frac{8,000 \times 5 \times 2}{100}$$

$$= \text{Rs. } 800$$

For compound interest,

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

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

$$= 8,000 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \text{Rs. } 8,820$$

C.I. = A – P

= Rs. (8, 820 – 8, 000)

= Rs. 820

Now, C.I. – S.I. = Rs. (820 – 800) = Rs. 20

Thus, the difference between the compound interest and the simple interest is Rs. 20.

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