Compound Interest (Written)

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1. There is 60% increase in an amount in 6 years at simple interest. What will be the compound interest of Tk. 12,000 after 3 years at the same rate?

Since the sum of the money increase by 60% in 6 year, the rate of interest per annum will be $= \frac{60}{6}\% = 10\%$

given that,

principal amount P = tk. 12000.

time $n = 3$ years.

we know,

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

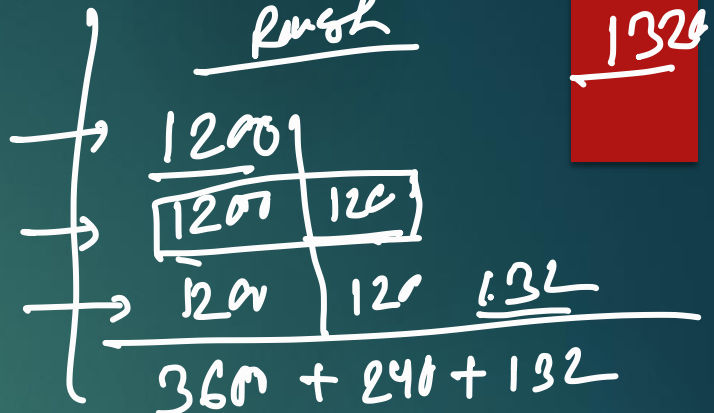
$$= 12000\left(1+\frac{10}{100}\right)^3$$

$= 12000(1+0.10)^3$

$= 12000 + 3972$

$= 15972$

Rough



$360 + 240 + 132$

$= 3972$

1324

$\therefore$ the compound interest will be $= (15972 - 12000)$ Taka

$= 3972$ Ans

2. What is the difference between the compound interests on Tk. 5000 for 1.5 years at 4% per annum compounded yearly and half-yearly?

Given that,

principal $P = 5000$ tk

time $n = 1.5$ years.

Interest rate $R = 4\%$ p.a.

5200 | 104 | 5304

$\frac{P}{100}$ (1)

C.I when interest is compounded annually.

$$= 5000 \times \left(1 + \frac{4}{100}\right) \times \left(1 + \frac{2}{100}\right)$$

$$= 5000 \times 1.04 \times 1.02$$

$$= 5304$$

1.12.

When interest is compounded half yearly.

$$= 5000\left(1+\frac{2}{100}\right)^3$$

$$= 5306.04$$

$\therefore$ Required difference will be

$$= (5306.04 - 5300)$$

$$= 6.04 \text{ Ans}$$

100
100 2
100 2 2.04
306.04
= 306.04

3. The difference between a simple interest and annually compounded interest of a principal of 2 years at 8% interest rate is Tk. 12.80. What is the principal amount?

Let, the principal be Tk. $100x$

$$\begin{array}{r} 8 \\ 8 \\ \hline 16.64 \end{array}$$

ATQ,

$$\left\{100x\left(1+\frac{8}{100}\right)^2 - 100x\right\} - \left(100x \times 2 \times \frac{8}{100}\right) = 12.80$$

$$\Rightarrow (116.64x - 100x) - 16x = 12.80$$

$$\Rightarrow 16.64x - 16x = 12.80$$

$$\Rightarrow 0.64x = 12.80$$

$\Rightarrow x = \frac{12.80}{0.64}$

$= \frac{1280}{64}\ 20$

$\therefore$ principal amount will be $= (20 \times 100)$ taka

$= 2000$ taka.

4. A bank offers 5% compound interest calculated on half-yearly basis. A customer deposits Tk. 1600 each on 1st January and 1st July of a year. At the end of the year, the amount he would have gained by way of interest is:

$$C = 1600\left(1+\frac{5/2}{100}\right)^2 + 1600\left(1+\frac{5/2}{100}\right)$$

$$= 1600\left(1+\frac{1}{40}\right)^2 + 1600 \times \left(1+\frac{1}{40}\right)$$

$$= 1600\left(\frac{41}{40}\right)^2 + 1600 \times \frac{41}{40}$$

$$= 1681 + 1640$$

$$= 3321$$

$\therefore$ Compound interest $= (3321 - 3200) = 121$ Tk. Ans.

$$\begin{array}{r} 40 \\ \hline 40 \quad 1 \\ \hline 80+1 = 81 \end{array}$$

5. The effective annual rate of interest corresponding to a nominal rate of 6% per annum payable half-yearly is:

let,
the sum be Rs. 100
Since the interest is compounded half-yearly, the compound principal will be,

$$C = 100\left(1+\frac{6/2}{100}\right)^{2}$$

$$= 100\left(\frac{103}{100}\right)^{2}$$

$$= 106.09$$

$$\begin{array}{r} 3 \\ 3\ 0.15 \\ \hline 6.09 \end{array}$$

∴ Effective rate of interest will be,

$$= \frac{(106.09 - 100) \times 100}{100}\%$$

$$= 6.09\%$$

Ans.

6. A sum of money compounded annually doubles itself in 15 years. In how many years will it become 8 times?

Let,
the principal be P
interest rate R% p.a.
required time to become 8 times of the principal in n years.

ATQ,

$$P\left(1+\frac{R}{100}\right)^{15} = 2P$$

$$\therefore \left(1+\frac{R}{100}\right)^{15} = 2$$

Again,

$$P\left(1+\frac{n}{100}\right)^n = 8P$$

$$\Rightarrow \left(1+\frac{n}{100}\right)^n = 8$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^n = 2^3$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^n = \left\{\left(1+\frac{r}{100}\right)^{15}\right\}^3$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^n = \left(1+\frac{r}{100}\right)^{45}$$

$$\Rightarrow n = 45.$$

∴ Required time 45 years.

7. A finance company declares that, at a certain compound interest rate, a sum of money deposited by anyone will become 8 times in 3 years. If the same amount is deposited at the same compound rate of interest, then in how many years will it become 16 times?

Let,
principal amount P
interest rate r% P.A.
required time to become 16 times in n.

ATQ,

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

$$\Rightarrow \left(1+\frac{r}{100}\right)^3 = 2^3$$

$$\Rightarrow 1+\frac{r}{100} = 2$$

Again,

$$P\left(1+\frac{r}{100}\right)^n = 16P$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^n = 2^4$$

$$\Rightarrow \left(1+\frac{r}{100}\right)^n = \left(1+\frac{r}{100}\right)^4$$

$\therefore n = 4$ years

So the amount will be 16 times in 4 years.

8. A person takes a loan of Tk. 1,60,000 from a lending institution at 9% compounded annually. If he makes 60,000 at the end of every year, how much will he have in debt after paying the 3rd installment?

After 1 year,

total outstanding $= 160000\left(1+\frac{9}{100}\right)$

$= 174400$ tk

After paying the 1st installment remaining outstanding,

$= (174400 - 60000)$ tk

$= 114400$ tk

After 2nd year,

total outstanding $= 114400(1+0.09)$

$= 124696$ tk.

After paying the 2nd installment, the outstanding amount will be,

$= (124656 - 60000)$ tk.

$= 64656$ tk

After 3rd year,

the outstanding amount $= 64656(1+0.03)$ tk

$= 70518.04$ tk.

after 3rd installment remaining debt,

$= (70518.04 - 60000)$ tk

$= 10518.04$ tk

Ans

9. A senior citizen invest Tk. 50 lac in a fixed deposit scheme at 11.5% annual interest for six months. In every six months he withdraws Tk. 2 lac from his principal plus interest earned. What will be his principal amount to invest after two years?

In two years, he withdraws = (4 × 200000) Tk
= 800000 Tk.

∴ Remaining principal = (5000000 − 800000) Tk
= 4200000 Tk.
Ans

10. Lamia owns a hairdressing salon. She borrows Tk. 2,500 from a bank to make improvements to her beauty salon. She is charged 4.5% per year compound interest. She pays the money back after 3 years. Calculate the total amount Lamia must pay to the bank.

given that,

the principal amount $P = 2500$ tk

rate of interest $r = 4.5\%$ p.a.

time $n = 3$ years.

we know,

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

$$= 2500\left(1 + \frac{4.5}{100}\right)^3$$

$$= 2852.92 \text{ tk}$$

112.5

112.5 5.0625

112.5 5.1620 5292

= 352.92

In three years Kamie will be Tk. 28305.92.

11. Shashi had a certain amount of money. He invested 2/3 of the total money in scheme A for 6 years and rest of the money he invested in scheme B for 2 years. Scheme A offers simple interest at a rate of 12% p.a. and scheme B offers compound interest (compound annually) at a rate of 10% p.a. If the total interest obtained from both the schemes is Rs. 2750. What was the total amount invested by him in scheme A and scheme B together ? (Approximate value)

Let,
the total investment be Rs. 300x
∴ Investment in scheme A will be 200x
∴ " " " B " " 100x.
∴ Interest income from scheme A will be,
$= 200x \times 6 \times \frac{12}{100} = 144x.$

Interest income from scheme B will be,

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

$$= 121x - 100x$$

$$= 21x.$$

ATQ,

$$144x + 21x = 2750.$$

$$\Rightarrow 165x = 2750$$

$$\Rightarrow x = \frac{2750}{165}$$

$$\therefore x = \frac{550}{33}$$

So, the total investment will be,

$$= \frac{300}{100} \times \frac{5500}{55}$$

$$= 5000 \text{ tk.}$$

Ans

Thank You