

### Exercise 2(C)

1. A sum is invested at compound interest, compounded yearly. If the interest for two successive years is ₹5,700 and ₹7,410, calculate the rate of interest.

**Solution:**

We know that.

Rate of interest (%) = (Difference in the interest of the two consecutive periods x 100)/(C.I. of preceding year x time)

$$\begin{aligned} &= [(7410 - 5700) \times 100] / (5700 \times 1) \\ &= 30\% \end{aligned}$$

Hence, the rate of interest is 30%

2. A certain sum of money is put at compound interest, compounded half-yearly. If the interest for two successive half-years are ₹650 and ₹760.50; find the rate of interest.

**Solution:**

The difference between the C.I. of two successive half-years is

$$= ₹(760.50 - 650)$$

$$= ₹110.50$$

So, ₹110.50 is the interest of one half-year on ₹650

Thus,

$$\begin{aligned} \text{Rate of interest} &= (100 \times I) / (P \times T) \% \\ &= (100 \times 110.50) / (650 \times \frac{1}{2}) \\ &= 34\% \end{aligned}$$

3. A certain sum amounts to ₹5,292 in two years and ₹5,556.60 in three years, interest being compounded annually. Find:

(i) the rate of interest.

(ii) the original sum.

**Solution:**

(i) Given,

Amount in two years = ₹5,292

Amount in three years = ₹5,556.60

So, the difference between the amounts of two successive years is

$$= ₹5,556.60 - ₹5,292$$

$$= ₹264.60$$

Hence, ₹264.60 is the interest for one year on ₹5,292

Thus,

$$\begin{aligned} \text{Rate of interest} &= (100 \times I) / (P \times T) \\ &= (100 \times 264.60) / (5292 \times 1) \\ &= 5\% \end{aligned}$$

(ii) Let's assume the sum of money to be ₹100

Then, the interest on it for the 1<sup>st</sup> year will be

$$= 5\% \text{ of ₹100}$$

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= ₹5

So, the amount in one year = ₹(100 + 5) = ₹105

Similarly,

The amount in two years = ₹105 + 5% of ₹105  
= ₹(105 + 5.25)  
= ₹110.25

When amount in two years is ₹110.25, sum = ₹100

Hence,

When amount in two years is ₹5,292, sum = ₹(100 × 5292)/110.25  
= ₹4,800

**4. The compound interest, calculated yearly, on a certain sum of money for the second year is ₹1,089 and for the third year it is ₹1,197.90. Calculate the rate of interest and the sum of money.**

**Solution:**

(i) C.I. for second year = ₹1,089

C.I. for third year = ₹1,197.90

Thus, the difference between the C.I. of two successive years

= ₹(1,197.90 – 1,089)

= ₹108.90

Hence, ₹108.90 is the interest of one year on ₹1,089

Thus,

Rate of interest =  $(100 \times I)/(P \times T)$

=  $(100 \times 108.90)/(1089 \times 1)$

= 10%

(ii) Let's assume the sum of money to be ₹100

So, interest on it for in the 1<sup>st</sup> year = 10% of ₹100

= ₹10

And, the amount after one year = ₹(100 + 10)

= ₹110

Similarly, C.I. for the 2<sup>nd</sup> year = 10% of ₹110

= ₹11

When C.I. for 2<sup>nd</sup> year is ₹11, the sum is ₹100

Hence,

When C.I. for 2<sup>nd</sup> year is ₹1,089, the sum is ₹(100 × 1089)/11 = ₹9,900

**5. Mohit invests ₹8,000 for 3 years at a certain rate of interest, compounded annually. At the end of one year it amounts to ₹9,440. Calculate:**

**(i) the rate of interest per annum.**

**(ii) the amount at the end of the second year.**

**(iii) the interest accrued in the third year.**

**Solution:**

For the 1<sup>st</sup> year

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$P = ₹8,000$ ;  $A = ₹9,440$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= ₹(9,440 - 8,000) \\ &= ₹1,440\end{aligned}$$

So,

$$\begin{aligned}\text{Rate} &= (I \times 100)/(P \times T) \\ &= (1,440 \times 100)/(8,000 \times 1) \\ &= 18\%\end{aligned}$$

(i) Hence, the rate of interest per annum is 18%

For the 2<sup>nd</sup> year

$P = ₹9,440$ ;  $R = 18\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (9440 \times 18 \times 1)/100 \\ &= ₹1,699.20\end{aligned}$$

And,

$$\text{Amount} = ₹(9,440 + 1,699.20) = ₹11,139.20$$

(ii) Hence, the amount at the end of second year is ₹11,139.20

For the 3<sup>rd</sup> year

$P = ₹11,139.20$ ;  $R = 18\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (11139.20 \times 18 \times 1)/100 \\ &= ₹2,005.06\end{aligned}$$

(iii) Hence, the interest accrued in the third year is ₹2,005.06

**6. Geeta borrowed ₹15,000 for 18 months at a certain rate of interest compounded semi-annually. If at the end of six months it amounted to ₹15,600; Calculate :**

(i) the rate of interest per annum.

(ii) the total amount of money that Geeta must pay at the end of 18 months in order to clear the account.

**Solution:**

For 1<sup>st</sup> half-year

$P = ₹15,000$ ;  $A = ₹15,600$  and  $T = \frac{1}{2}$  year

Now,

$$\begin{aligned}\text{Interest} &= ₹(15,600 - 15,000) \\ &= ₹600\end{aligned}$$

(i) Hence,

$$\begin{aligned}\text{Rate} &= (I \times 100)/(P \times T)\% \\ &= 8\%\end{aligned}$$

For 2<sup>nd</sup> half-year

$P = ₹15,600$ ;  $R = 8\%$  and  $T = \frac{1}{2}$  year

$$\begin{aligned}\text{Interest} &= (15,000 \times 8 \times \frac{1}{2})/100 \\ &= ₹624\end{aligned}$$

So,

$$\begin{aligned}\text{Amount} &= ₹(15,600 + 624) \\ &= ₹16,224\end{aligned}$$

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For 3<sup>rd</sup> half-year

$P = ₹16,224$ ;  $R = 8\%$  and  $T = \frac{1}{2}$  year

$$\begin{aligned}\text{Interest} &= (16,224 \times 8 \times \frac{1}{2})/100 \\ &= ₹648.96\end{aligned}$$

So,

$$\begin{aligned}\text{Amount} &= ₹(16,224 + 648.96) \\ &= ₹16,872.96\end{aligned}$$

Therefore, the total amount of money that Geeta must pay at the end of 18 months in order to clear the account is ₹16,872.96

**7. Ramesh invests ₹12,800 for three years at the rate of 10% per annum compound interest. Find:**

**(i) the sum due to Ramesh at the end of the first year.**

**(ii) the interest he earns for the second year.**

**(iii) the total amount due to him at the end of the third year.**

**Solution:**

For 1<sup>st</sup> year

$P = ₹12,800$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (12,800 \times 10 \times 1)/100 \\ &= ₹1,280\end{aligned}$$

And,

$$\begin{aligned}\text{Amount} &= ₹(12,800 + 1,280) \\ &= ₹14,080\end{aligned}$$

(i) Hence, at the sum due to Ramesh at the end of the first year is ₹14,080

For 2<sup>nd</sup> year

$P = ₹14,080$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (14,080 \times 10 \times 1)/100 \\ &= ₹1,408\end{aligned}$$

(ii) Hence, the interest the interest earned for the second year is ₹1,408

And,

$$\begin{aligned}\text{Amount} &= ₹(14,080 + 1,408) \\ &= ₹15,488\end{aligned}$$

For 3<sup>rd</sup> year

$P = ₹15,488$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= ₹(15,488 \times 10 \times 1)/100 \\ &= ₹1,548.80\end{aligned}$$

And,

$$\begin{aligned}\text{Amount} &= ₹(15,488 + 1,548.80) \\ &= ₹17,036.80\end{aligned}$$

(iii) Hence, the total amount due to Ramesh at the end of third year is ₹17,036.80

## Chapter 2 - Compound Interest

8. ₹8,000 is lent out at 7% compound interest for 2 years. At the end of the first year ₹3,560 are returned. Calculate:

(i) the interest paid for the second year.

(ii) the total interest paid in two years.

(iii) the total amount of money paid in two years to clear the debt.

**Solution:**

(i) For 1<sup>st</sup> year

$P = ₹8,000$ ;  $R = 7\%$  and  $T = 1$  year

Interest =  $(8,000 \times 7 \times 1)/100$

= ₹560

Amount = ₹(8,000 + 560)

= ₹8,560

Now, the money returned = ₹3,560

So,

Balance money for 2<sup>nd</sup> year = ₹(8,560 - 3,560)

= ₹5,000

For 2<sup>nd</sup> year

$P = ₹5,000$ ;  $R = 7\%$  and  $T = 1$  year

Interest paid for the second year =  $(5000 \times 7 \times 1)/100$

= ₹350

(ii) The total interest paid in two years = ₹(350 + 560)

= ₹910

(iii) The total amount of money paid in two years to clear the debt

= ₹(8,000 + 910)

= ₹8,910

9. The cost of a machine depreciated by ₹4,000 during the first year and by ₹3,600 during the second year. Calculate:

(i) The rate of depreciation

(ii) The original cost of the machine

(iii) It's cost at the end of the third year

**Solution:**

(i) Difference between depreciation in value between the first and second years is

₹(4,000 - 3,600) = ₹400

So, the depreciation of one year on ₹4,000 = ₹400

Hence, the rate of depreciation =  $(40/4000) \times 100\%$

= 10%

(ii) Let's assume ₹100 to be the original cost of the machine

Depreciation during the 1<sup>st</sup> year = 10% of ₹100

= ₹10

So,

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When the values depreciates by Rs.10 during the 1<sup>st</sup> year, then the original cost is ₹100

Then, when the depreciation during 1<sup>st</sup> year is ₹4,000, the original cost is

$$(100/10) \times 4,000 = ₹40,000$$

Hence, the original cost of the machine is ₹40,000.

(iii) Total depreciation during all the three years

= Depreciation in value during (1<sup>st</sup> year + 2<sup>nd</sup> year + 3<sup>rd</sup> year)

$$= ₹4,000 + ₹3,600 + 10\% \text{ of } (₹40,000 - ₹7,600)$$

$$= ₹4,000 + ₹3,600 + ₹3,240$$

$$= ₹10,840$$

Thus,

$$\text{The cost of the machine at the end of the third year} = ₹40,000 - ₹10,840$$

$$= ₹29,160$$

**10. Find the sum, invested at 10% compounded annually, on which the interest for the third year exceeds the interest of the first year by ₹252.**

**Solution:**

Let's assume the sum of money be ₹100

And, the rate of interest = 10% p.a.

Interest at the end of 1<sup>st</sup> year = 10% of ₹100

$$= ₹10$$

Amount at the end of 1<sup>st</sup> year = ₹(100 + 10)

$$= ₹110$$

Interest at the end of 2<sup>nd</sup> year = 10% of ₹110

$$= ₹11$$

Amount at the end of 2<sup>nd</sup> year = ₹(110 + 11)

$$= ₹121$$

Interest at the end of 3<sup>rd</sup> year = 10% of ₹121

$$= ₹12.10$$

Hence, the difference between interest of 3<sup>rd</sup> year and 1<sup>st</sup> year

$$= ₹(12.10 - 10)$$

$$= ₹2.10$$

Now,

When difference is ₹2.10, the principal is ₹100

When difference is ₹252, the principal =  $(100 \times 252)/(2 \times 10)$

$$= ₹12,000$$

Hence, the sum invested is ₹12,000

**11. A man borrows ₹10,000 at 10% compound interest compounded yearly. At the end of each year, he pays back 30% of the sum borrowed. How much money is left unpaid just after the second year?**

**Solution:**

For 1<sup>st</sup> year

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$P = ₹10,000$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (10,000 \times 10 \times 1)/100 \\ &= ₹1,000\end{aligned}$$

$$\begin{aligned}\text{Amount at the end of 1}^{\text{st}} \text{ year} &= ₹(10,000 + 1,000) \\ &= ₹11,000\end{aligned}$$

$$\begin{aligned}\text{Money paid at the end of 1}^{\text{st}} \text{ year} &= 30\% \text{ of } ₹10,000 \\ &= ₹3,000\end{aligned}$$

Hence,

$$\begin{aligned}\text{Principal for 2}^{\text{nd}} \text{ year} &= ₹(11,000 - 3,000) \\ &= ₹8,000\end{aligned}$$

For 2<sup>nd</sup> year

$P = ₹8,000$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= (8,000 \times 10 \times 1)/100 \\ &= ₹800\end{aligned}$$

And,

$$\begin{aligned}\text{Amount at the end of 2}^{\text{nd}} \text{ year} &= ₹8,000 + ₹800 \\ &= ₹8,800\end{aligned}$$

So,

$$\begin{aligned}\text{Money paid at the end of 2}^{\text{nd}} \text{ year} &= 30\% \text{ of } ₹10,000 \\ &= ₹3,000\end{aligned}$$

Hence,

$$\begin{aligned}\text{The principal for 3}^{\text{rd}} \text{ year} &= ₹8,800 - ₹3,000 \\ &= ₹5,800\end{aligned}$$

**12. A man borrows ₹10,000 at 10% compound interest compounded yearly. At the end of each year, he pays back 20% of the amount for that year. How much money is left unpaid just after the second year?**

**Solution:**

For 1<sup>st</sup> year

$P = ₹10,000$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= ₹(10,000 \times 10 \times 1)/100 \\ &= ₹1,000\end{aligned}$$

So,

$$\begin{aligned}\text{Amount at the end of 1}^{\text{st}} \text{ year} &= ₹(10,000 + 1,000) \\ &= ₹11,000\end{aligned}$$

And,

$$\begin{aligned}\text{Money paid at the end of 1}^{\text{st}} \text{ year} &= 20\% \text{ of } ₹11,000 \\ &= ₹2,200\end{aligned}$$

Hence,

$$\text{Principal for 2}^{\text{nd}} \text{ year} = ₹11,000 - ₹2,200 = ₹8,800$$

For 2<sup>nd</sup> year

$P = ₹8,800$ ;  $R = 10\%$  and  $T = 1$  year

$$\begin{aligned}\text{Interest} &= ₹(8,800 \times 10 \times 1)/100 \\ &= ₹880\end{aligned}$$