

Exercise 3(E)

1. Simple interest on a sum of money for 2 years at 4% is ₹450. Find compound interest on the same sum and at the same rate for 1 year, if the interest is reckoned half yearly.
Solution:

Given: S.I. = ₹450; N = 2 years and rate(R) = 4%

Let's consider the principal to be P

Now, we have

$$\begin{aligned} P &= (S.I \times 100)/(R \times T) \\ &= (450 \times 100)/(4 \times 2) \\ &= 5625 \end{aligned}$$

Thus, the principal is ₹5625

Now,

When the interest is compounded half-yearly

P = ₹5,625; n = 1 year and r = 4%

$$\begin{aligned} A &= P[1 + r/(2 \times 100)]^{n \times 2} \\ &= 5625(1 + 4/200)^{1 \times 2} \\ &= 5625(51/50)^2 \\ &= 5852.25 \end{aligned}$$

Hence,

C.I. =

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2. Find the compound interest to the nearest rupee on ₹10,800 for 2½ years at 10% per annum.
Solution:

Given: P = ₹10,800, Time (N) = 2½ years and rate = 10% p.a

For 2 years,

We know that,

$$\begin{aligned} A &= P(1 + r/100)^n \\ &= 10800(1 + 10/100)^2 \\ &= 13068 \end{aligned}$$

And,

For ½ year

$$\begin{aligned} A &= P[1 + r/(2 \times 100)]^{n \times 2} \\ &= 13,068(1 + 10/200)^{1/2 \times 2} \\ &= 13068 \times 21/20 \\ &= 13721.40 \\ &\sim 13721 \text{ (nearest rupee)} \end{aligned}$$

Hence,

$$C.I. = A - P = ₹(13,721 - 10,800) = ₹2,921$$

3. The value of a machine, purchased two years ago, depreciates at the annual rate of

10%. If its present value is ₹97,200, find:

i. Its value after 2 years.

ii. Its value when it was purchased.

Solution:

Given,

Present value of machine(P) = ₹97,200

Depreciation rate = 10%

$$\begin{aligned}\text{(i) Value of machine after 2 years} &= P(1 - r/100)^n \\ &= 97200 (1 - 10/100)^2 \\ &= 97200 \times (9/10)^2 \\ &= 78732\end{aligned}$$

Thus, the value of the machine after 2 years is ₹78,732

(ii) Now,

To calculate the cost 2 years ago

We know that

$$A = P(1 - r/100)^n$$

$$97200 = P(1 - 10/100)^2$$

$$97200 = P(9/10)^2$$

$$P = \frac{97200 \times 100}{81}$$

$$P = 120000$$

Thus, the value of the machine when it was purchased was ₹1,20,000



4. Anuj and Rajesh lent the same sum of money for 2 years at 8% simple interest and compound interest respectively. Rajesh received ₹64 more than Anuj. Find the money lent and interest received.

Solution:

Let's assume the sum of money lent by both as ₹y

Then,

For Anuj

P = ₹y; rate = 8% and time = 2 years So,

$$\text{S.I.} = (P \times R \times T)/100$$

$$= (y \times 8 \times 2)/100$$

$$= 4y/25$$

For Rajesh

P = ₹y; rate = 8% and time = 2 years

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

$$= y \left[\left\{ 1 + \frac{8}{100} \right\}^2 - 1 \right]$$

$$= 104y/625$$

Now,

It's given that, difference in the interests i.e. C.I. - S.I. = ₹64 So,
 $104y/625 - 4y/25 = 64$
 $(104y - 100y)/625 = 64$
 $4y/625 = 64$
 $y = (64 \times 625)/4$
 $= 10,000$

Therefore,

The interest received by Anuj = $(4 \times ₹10,000)/25 = ₹1600$

The interest received by Rajesh = $(104 \times ₹10,000)/625 = ₹1664$

5. Calculate the sum of money on which the compound interest (payable annually) for 2 years be four times the simple interest on ₹4,715 for 5 years, both at the rate of 5% per annum.

Solution:

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

Let's assume the sum of money as P

So,

S.I. = $P \times r \times t$

=

=

The C.I. for 2 years = 4 times the S.I. for 5 years (according to question) We have,

C.I. =

$4715 \times 5 \times 2$

$4715 = 1$

$P = (4715 \times 10)/3$

$= 46000$

Therefore, the sum of money is ₹46,000

6. A sum of money was invested for 3 years, interest being compounded annually. The rates for successive years were 10%, 15% and 18% respectively. If the compound interest for the second year amounted to ₹4,950, find the sum invested.

Solution:

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

Then,

C.I. = $P [(1 + r/100)^n - 1]$

$4950 = P [(1 + 15/100)^1 - 1]$

$4950 = P(3/20)$

$P = (4950 \times 20)/3$

$= 33000$



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

So, for the first 2 years

$$A = \text{Rs.}33,000; r_1 = 10\%$$

$$A = P(1 + r_1/100)$$

$$33000 = P(1 + 10/100)$$

$$33000 = P(1 + 11/10)$$

$$P = (33000 \times 10)/11$$
$$= 30,000$$

Thus, the sum invested is ₹30,000.

7. A sum of money is invested at 10% per annum compounded half yearly. If the difference of amounts at the end of 6 months and 12 months is ₹189, find the sum of money invested.

Solution:

Let's assume the sum of money to be ₹y

And, given rate = 10% p.a. compounded half yearly

Now, for first

$$A = P[1$$

$$= y$$

$$=$$

$$=$$

And

For

$$A = P[1$$

$$= y[1$$

$$= y(1 + 10/200)$$

$$= (441/400)y$$

Also given, the difference between the above amounts = ₹189

So,

$$(441/400)y - (21/20)y = 189$$

$$(21/400)y = 189$$

$$y = (189 \times 400)/21$$

$$y = 3600$$

Thus, the sum of money invested is ₹3,600

8. Rohit borrows ₹86,000 from Arun for two years at 5% per annum simple interest. He immediately lends out this money to Akshay at 5% compound interest compounded annually for the same period. Calculate Rohit's profit in the transaction at the end of two years.

Solution:



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Compound Interest [Using Formula]**

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

Calculating S.I.

$$\begin{aligned} \text{S.I.} &= (P \times R \times T)/100 \\ &= (86000 \times 5 \times 2)/100 \\ &= 8600 \end{aligned}$$

Calculating C.I.

$$\begin{aligned} \text{C.I.} &= P [(1 + r/100)^n - 1] \\ &= 86000 [(1 + 5/100)^2 - 1] \\ &= 86000 (41/40) \\ &= 8815 \end{aligned}$$

Thus, the profit = C.I. - S.I. = ₹(8,815 - 8,600) = ₹215

9. The simple interest on a certain sum of money for 3 years at 5% per annum is ₹1,200. Find the amount and the compound interest due on this sum of money at the same rate and after 2 years. Interest is reckoned annually.

Solution:

Let's assume the sum of money
Rate = 5% p.a. and $n = 3$ years.

Then

1200

$x =$

$=$

So,

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

$P = ₹8,000$, rate = 5% p.a. and $n = 3$ years We

know that,

$$\begin{aligned} A &= P (1 + r/100)^n \\ &= 8000 (1 + 5/100)^2 \\ &= 8000 (1.1025) \\ &= 8820 \end{aligned}$$

Hence, C.I. = $A - P = ₹(8,820 - 8,000) = ₹820$

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

10. Nikita invests ₹6,000 for two years at a certain rate of interest compounded annually. At the end of first year it amounts to ₹6,720. Calculate:

(a) The rate of interest.

(b) The amount at the end of the second year.

Solution:

Let's assume $x\%$ to be the rate of interest

$P = ₹6000$, $n = 2$ year and $A = ₹6720$



Concise Selina Solutions for Class 9 Maths Chapter 3 - Compound Interest [Using Formula]

For the first year

$$A = P (1 + r/100)^n$$

$$6720 = 6000 (1 + x/100)^1$$

$$6720 = 6000 + 10x$$

$$6720 - 6000 = 60x$$

$$x = 720/10$$

$$= 12$$

Hence,

The rate of interest is 12%.

So,

The amount at the end of the second year will be

$$A = 6000 (1 + 12/100)^2$$

$$= 6000 (112/100)^2$$

$$= 7526.40$$

Therefore,

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



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