

### Exercise 3(B)

1. The difference between simple interest and compound interest on a certain sum is ₹54.40 for 2 years at 8 per cent per annum. Find the sum.

**Solution:**

Let's assume the principal (P) = x

R = 8%

T = 2 years

Now,

The simple interest is calculated as

$$\begin{aligned} \text{S.I.} &= (x \times 8 \times 2)/100 \\ &= 4x/25 \end{aligned}$$

The compound interest is calculated as

$$\begin{aligned} \text{C.I.} &= A - P \\ &= x(1 + 8/100)^2 - x \\ &= x[(1 + 2/25)^2 - 1] \\ &= x[(27/25)^2 - 1] \\ &= 104x/625 \end{aligned}$$

Given,

$$104x/625 - 4x/25 = 54.40$$

$$x(104/625 - 4/25) = 54.40$$

$$x(104/625 - 100/625) = 54.40$$

$$x(4/625) = 54.40$$

$$x = 54.40 \times 625/4$$

$$= 8500$$

Thus, the sum is ₹8,500



2. A sum of money, invested at compound interest, amounts to ₹19,360 in 2 years and to ₹23,425.60 in 4 years. Find the rate per cent and the original sum of money.

**Solution:**

Given: Amount after 2 years = ₹19360; So, n = 2 years and

Amount after 4 years = ₹23,425.60; So, n = 4

Let's assume the principal as X and the rate of C.I. as R

Now, we have

$$X(1 + R/100)^2 = 19360 \dots (1)$$

And,

$$X(1 + R/100)^4 = 23425.60 \dots (2)$$

Performing (2) ÷ (1), we have

$$\begin{aligned} (1 + R/100)^2 &= 23425.60/19360 \\ &= 2342560/1936000 \\ &= 14641/12100 \\ &= (121/110)^2 \end{aligned}$$

Now, taking square root on both sides we get

## Chapter 3 -Compound Interest

$$(1 + R/100) = 121/110$$

$$R/100 = 121/110 - 1$$

$$R = (11/110) \times 100 \\ = 10$$

Therefore, the rate of C.I. is 10%

Now,

Form (1), we have

$$X(1 + 10/100)^2 = 19360$$

$$X(11/10)^2 = 19360$$

$$X = (19360 \times 10 \times 10) / (11 \times 11) \\ = 16000$$

Thus, the principal sum is ₹16,000

**3. A sum of money lent out at C.I. at a certain rate per annum becomes three times of itself in 8 years. Find in how many years will the money becomes twenty-seven times of itself at the same rate of interest p.a.**

**Solution:**

Let's assume principal as x

Amount becomes, R = ?

We know,

$$A = P(1 + R/100)^T$$

Now,

**Case I:**

$$3x = P(1 + R/100)^8$$

Taking logs on both sides, we have

$$3^{1/8} = (1 + R/100)$$

**Case II:**

$$P = x, A = 27x, T = ?$$

$$27x = x(1 + R/100)^T$$

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

From (1) and (2), we have

$$3^{1/8} = 27^{1/T}$$

$$3^{1/8} = (3^3)^{1/T}$$

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

On comparing the exponents,

$$1/8 = 3/T$$

$$T = 3 \times 8 = 24$$

Thus, it will take 24 years for the money to become twenty-seven times of itself at the same rate of interest p.a.

**4. On what sum of money will compound interest (payable annually) for 2 years be the same as simple interest on ₹9,430 for 10 years, both at the rate of 5 per cent per**



## Chapter 3 -Compound Interest

annum?

**Solution:**

Given:  $P = ₹9430$ ,  $R = 5\%$  and  $n = 10$  years

Now, the simple interest is calculated as

$$SI = PNR/100$$

$$SI = (943 \times 5 \times 10)/100 \\ = ₹4,715$$

Now, let's assume a sum(principal)  $x$

We have,

$$CI = ₹4,715; T = 2 \text{ years and } R = 5\%$$

We know that,

$$CI = A - P$$

$$4715 = x(1 + R/100)^T - x \\ = x(1 + 5/100)^2 - x \\ = x[(21/20)^2 - 1] \\ = x[(441 - 400)/400] \\ = 41x/400$$

$$x = (4715 \times 400)/41$$

$$= 46000$$

Thus, the sum is ₹46000

**5. Kamal and Anand invest the same sum of money for 2 years at 5% at simple interest respectively. Anand received ₹15 more than Kamal. Find the sum by each and the interest received.**

**Solution:**

Let's assume the principal as Rs. 100,  $R = 5\%$  and for  $T = 2$  years

Then,

For Kamal,

$$SI = (100 \times 5 \times 2)/100 \\ = ₹10$$

And,

For Anand,

$$A = P(1 + R/100)^T \\ = 100(1 + 5/100)^T \\ = 100(21/20)^2 \\ = ₹441/4$$

So,

$$CI = 441/4 - 100 \\ = (441 - 400)/4 \\ = ₹41/4$$

$$\text{The difference of CI and SI} = 41/4 - 10 \\ = (41 - 40)/4 \\ = ₹1/4$$

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Now,

When the difference is ₹1/4, the principal is ₹100 So,

If the difference is 1, the principal =  $100 \times 4$   
= ₹400

And if the difference is Rs, 15, the principal =  $100 \times 4 \times 15$   
= ₹6000

Hence,

For Kamal, interest =  $(6000 \times 5 \times 2)/100$   
= ₹600

For Anand, interest =  $6000 (1 + 5/100)^2 - 6000$   
=  $6000 [(21/20)^2 - 1]$   
=  $6000 (441/400 - 1)$   
=  $6000 (41/400)$   
= ₹615

**6. Simple interest on a sum of money for 2 years at 4% is ₹450. Find compound interest of the same sum at the same rate for 2 years.**

**Solution:**

Given,  $T = 2$  years

Now,

$P =$

$=$

$=$

Now,  $P =$  and  $T = 2$  years

So, the amount is calculated as

$$\begin{aligned} A &= 5625(1 + 4/100)^2 \\ &= 5625(26/25)^2 \\ &= 3802500/625 \\ &= ₹6084 \end{aligned}$$

Hence,

$$CI = A - P$$

$$= 6084 - 5625$$

$$= ₹459$$

**7. Simple interest on a certain sum of money for 4 years at 4% per annum exceeds the compound interest on the same sum for 3 years at 5 percent per annum by ₹228. Find the sum.**

**Solution:**

Let's consider the principal as  $P$ ,

Given:  $R = 4\%$  and  $T = 4$  years for simple interest and  $R = 5\%$  and  $T = 3$  years for compound



## Chapter 3 -Compound Interest

interest

Now,

$$\begin{aligned} \text{SI} &= (P \times 4 \times 4)/100 \\ &= 4P/25 \end{aligned}$$

And,

$$\begin{aligned} \text{CP} &= P (1 + 5/100)^3 - P \\ &= P [(21/20)^3 - 1] \\ &= P (9261/8000 - 1) \\ &= 1261P/8000 \end{aligned}$$

Given: SI - CI = ₹228

So,

$$4P/25 - 1261P/8000 = 228$$

$$(4 \times 320P - 1261P)/8000 = 228$$

$$19P = 228 \times 8000$$

$$P = (228 \times 8000)/19$$

$$= 96000$$

Thus, the principal sum is ₹96000

**8. Compound interest on a certain sum of money at 5% per annum for two years is ₹246.**

**Calculate the simple interest on the same sum for 3 years at 6% per annum.**

**Solution:**

Given: CI = ₹246 and T = 2 years CI

= A

$$246 = A$$

$$246 = P$$

$$246 = P$$

$$P = (246 \times 400)$$

$$= 2400$$

Now, P = ₹2400, R = 6% and T = 3 years

$$\text{SI} = (2400 \times 6 \times 3)/100$$

$$= ₹432$$

Hence, the simple interest is ₹432

**9. A certain sum of money amounts to ₹23,400 in 3 years at 10% per annum simple interest. Find the amount of the same sum in 2 years and at 10% p.a. compound interest.**

**Solution:**

Let's the sum (principle) as x

Given: Amount = ₹23,400; R = 10% and T = 3 years Now,

$$\text{SI} = (x \times 10 \times 3)/100$$

$$= 3x/10$$

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We know that,

Amount = Principle + Interest

$$23400 = x + 3x/10$$

$$234000 = (10x + 3x)$$

$$x = 234000/13$$

$$x = 18000$$

Now,

Principle = ₹18000, R = 10% and n = 2 years

So,

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

$$= 18000 (1 + 10/100)^2$$

$$= 18000 (11/10)^2$$

$$= 18000 (121/100)$$

$$= 21780$$

Hence, the amount is ₹21,780

**10. Mohit borrowed a certain sum at 5% per annum compound interest and cleared this loan by paying ₹12,600 at the end of the first year and ₹17,640 at the end of the second year. Find the sum borrowed.**

**Solution:**

Let the sum borrowed be ₹P.

Now,

For the payment of ₹12,600 at the end of the first year, we have A

$$= ₹12,600$$

So,

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

$$12600 = P(1 + 5/100)$$

$$12600 = P(21/20)$$

$$P = (12600 \times 20)/21$$

$$= ₹12,000$$

Now, for the payment of ₹17,640 at the end of second year A

$$= ₹17,640; R = 5\% \text{ and } n = 2 \text{ years}$$

We know that,

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

$$17640 = P(1 + 5/100)^2$$

$$17640 = P(21/20)^2$$

$$P = (20/21)^2 \times 17640$$

$$= 16000$$

Thus, the sum borrowed = ₹(12,000 + 16,000) = ₹28,000

