

EXERCISE 8.1

1. Find the simple interest on Rs 4000 at 7.5% p.a. for 3 years 3 months. Also, find the amount.

Solution:

Here

Principal (P) = Rs 4000

Rate of interest (R) = 7.5% p.a.

= $(15 / 2)$ % p.a.

Time (T) = 3 years 3 months

= $3\frac{3}{12}$ years

= $3\frac{1}{4}$ years

= $13 / 4$ years

Hence,

Simple Interest (I) = $(P \times R \times T) / 100$

= Rs $\{4000 \times (15 / 2) \times (13 / 4)\} / 100$

= Rs $(4000 \times 15 \times 13) / (100 \times 2 \times 4)$

On simplification, we get,

= Rs $5 \times 15 \times 13$

= Rs 975

Therefore,

Amount = P + I

= Rs 4000 + Rs 975

= Rs 4, 975

2. What sum of money will yield Rs 170.10 as simple interest in 2 years 3 months at 6% per annum?

Solution:

Here

I = Rs 170.10

T = 2 years 3 months

= $2\frac{3}{12}$ years

= $2\frac{1}{4}$ years

= $9 / 4$ years

R = 6%

Hence,

$$\begin{aligned}P &= (I \times 100) / (R \times T) \\&= \text{Rs } (170.10 \times 100) / \{6 \times (9 / 4)\} \\&\text{On calculating further, we get,} \\&= \text{Rs } (170.10 \times 100 \times 4) / (6 \times 9) \\&= \text{Rs } (17010 \times 4) / (6 \times 9) \\&= \text{Rs } (17010 \times 2) / (3 \times 9) \\&= \text{Rs } 34020 / 27 \\&= \text{Rs } 1260\end{aligned}$$

3. Find the rate of interest when Rs 800 fetches Rs 130 as a simple interest in 2 years 6 months.

Solution:

Here

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

$$T = 2 \text{ years } 6 \text{ months}$$

$$= 2\frac{6}{12} \text{ years}$$

$$= 2\frac{1}{2} \text{ years}$$

$$= 5 / 2 \text{ years}$$

Hence,

$$\begin{aligned}R &= (I \times 100) / (P \times T) \\&= (130 \times 100) / \{800 \times (5 / 2)\} \% \text{ p.a.}\end{aligned}$$

On simplification, we get,

$$= (130 \times 100 \times 2) / (800 \times 5) \% \text{ p.a.}$$

$$= (130 \times 2) / 40 \%$$

$$= 130 / 20 \% \text{ p.a.}$$

$$= 13 / 2 \%$$

$$= 6.5\% \text{ p.a.}$$

Therefore, the required rate of interest is 6.5% p.a.

4. Find the time when simple interest on Rs 3.3 lakhs at 6.5% per annum is Rs 75075.

Solution:

Here,

$$P = 3.3 \text{ lakhs}$$

$$= \text{Rs } 3.3 \times 100000$$

$$= \text{Rs } 330000$$

$$R = 6.5\% \text{ per annum}$$

$$I = \text{Rs } 75075$$

Hence,

$$\begin{aligned} T &= (I \times 100) / (P \times R) \\ &= (75075 \times 100) / (330000 \times 6.5) \text{ years} \\ &= (75075 \times 100 \times 10) / (330000 \times 65) \text{ years} \end{aligned}$$

On further calculation, we get,

$$\begin{aligned} &= (75075) / (330 \times 65) \text{ years} \\ &= 1155 / 330 \text{ years} \end{aligned}$$

We get,

$$\begin{aligned} &= 7 / 2 \text{ years} \\ &= 3\frac{1}{2} \text{ years} \end{aligned}$$

5. Find the sum of money when

(i) simple interest at $7\frac{1}{4}\%$ p.a. for years is Rs 2356.25

(ii) the final amount is Rs 11300 at 4% p.a. for 3 years 3 months.

Solution:

(i) Here,

$$I = \text{Rs } 2356.25$$

$$\begin{aligned} R &= 7\frac{1}{4}\% \text{ p.a.} \\ &= 29 / 4 \% \text{ p.a.} \end{aligned}$$

$$\begin{aligned} T &= 2\frac{1}{2} \text{ years} \\ &= 5 / 2 \text{ years} \end{aligned}$$

Hence,

$$\begin{aligned} P &= (I \times 100) / (R \times T) \\ &= \text{Rs } (2356.25 \times 100) / (29 / 4) \times (5 / 2) \end{aligned}$$

On further calculation, we get,

$$\begin{aligned} &= \text{Rs } (2356.25 \times 100 \times 4 \times 2) / (29 \times 5) \\ &= \text{Rs } (235625 \times 8) / (29 \times 5) \end{aligned}$$

We get,

$$\begin{aligned} &= \text{Rs } (47125 \times 8) / 29 \\ &= \text{Rs } 1625 \times 8 \\ &= \text{Rs } 13000 \end{aligned}$$

(ii) Amount (A) = Rs 11300

Rate (R) = 4% p.a.

Time (T) = 3 years 3 months

$$= 3\frac{3}{12} \text{ years}$$

$$= 3\frac{1}{4} \text{ years}$$

$$= 13/4 \text{ years}$$

Let the principal be Rs x

Hence,

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

$$= \text{Rs } (x \times 4 \times 13) / (100 \times 4)$$

We get,

$$= \text{Rs } 13x / 100$$

Then,

Amount = Principal + Simple Interest

$$= \text{Rs } x + \text{Rs } 13x / 100$$

$$= \text{Rs } (x + 13x) / 100$$

We get,

$$= \text{Rs } (100x + 13x) / 100$$

$$= \text{Rs } (113x / 100)$$

But, the amount given is Rs 11300

Hence,

$$113x / 100 = 11300$$

$$x = 11300 \times 100 / 113$$

$$x = 100 \times 100$$

We get,

$$x = 10000$$

Therefore, principal (P) = Rs 10000

6. How long will it take a certain sum of money to triple itself at $13\frac{1}{3}\%$ per annum simple interest?

Solution:

Let the sum of money be x

$$\text{Amount} = 3 \times \text{Rs } x$$

$$= \text{Rs } 3x$$

Interest = Amount – Principal

$$= \text{Rs } 3x - \text{Rs } x$$

$$= \text{Rs } 2x$$

$$\text{Rate} = 13\frac{1}{3} \% \text{ p.a.}$$

$$= 40/3 \% \text{ p.a.}$$

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

$$= (2x \times 100) / x \times (40 / 3) \text{ years}$$

On further calculation, we get,

$$= (2 \times 100 \times 3) / 40 \text{ years}$$

$$= (100 \times 3) / 20 \text{ years}$$

We get,

$$= 5 \times 3 \text{ years}$$

$$= 15 \text{ years}$$

7. At a certain rate of simple interest Rs 4050 amounts to Rs 4576.50 in 2 years. At the same rate of simple interest, how much would Rs 1 lakh amount to in 3 years?

Solution:

Here,

$$P = \text{Rs } 40000$$

$$A = \text{Rs } 4576.50$$

$$T = 2 \text{ years}$$

$$\text{Interest} = \text{Amount} - \text{Principal}$$

$$= \text{Rs } 4576.50 - \text{Rs } 4050$$

$$= \text{Rs } 526.50$$

Let the rate of simple interest = R% per annum

Then,

$$R = (I \times 100) / (P \times T)$$

$$= (526.50 \times 100) / (4050 \times 2) \% \text{ p.a.}$$

On further calculation, we get,

$$= (526.50 \times 10) / (405 \times 2) \% \text{ p.a.}$$

$$= 5265 / 810 \% \text{ p.a.}$$

We get,

$$= 6.5\% \text{ p.a.}$$

Now,

$$P = \text{Rs } 1 \text{ lakh}$$

$$= \text{Rs } 100000$$

$$R = 6.5\% \text{ p.a.}$$

$$T = 3 \text{ years}$$

$$I = (P \times R \times T) / 100$$

$$= \text{Rs } (100000 \times 6.5 \times 3) / 100$$

We get,

$$= \text{RS } 1000 \times 6.5 \times 3$$

$$= \text{Rs } 19500$$

$$\text{Amount} = \text{Principal} + \text{Interest}$$

$$\begin{aligned} &= \text{Rs } 100000 + \text{Rs } 19500 \\ &= \text{Rs } 119500 \end{aligned}$$

8. What sum of money invested at 7.5% p.a. simple interest for 2 years produces twice as much interest as Rs 9600 in 3 years 6 months at 10% p.a. simple interest?

Solution:

First Case:

$$\text{Principal (P}_1\text{)} = \text{Rs } 9600$$

$$\text{Rate (R}_1\text{)} = 10\%$$

$$\text{Period (T)} = 3 \text{ years } 6 \text{ months}$$

$$= 3\frac{1}{2} \text{ years} = 7/2 \text{ years}$$

$$\text{Simple interest} = (P \times R \times T) / 100$$

$$= (9600 \times 10 \times 7) / (100 \times 2)$$

We get,

$$= \text{Rs } 3360$$

Second case:

$$\text{Simple interest} = \text{Rs } 3360 \times 2$$

$$= \text{Rs } 6720$$

$$\text{Rate (R)} = 7.5\% \text{ p.a. and}$$

$$\text{Period (T)} = 2 \text{ years}$$

Therefore,

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

$$= (6720 \times 100) / (7.5 \times 2)$$

$$= \text{Rs } (6720 \times 100 \times 10) / (75 \times 2)$$

$$= 6720000 / 150$$

We get,

$$= \text{Rs } 44800$$

EXERCISE 8.2

1. Calculate the compound interest on Rs 6000 at 10% per annum for two years.

Solution:

Given

Rate of interest = 10% per annum

Principal for the first year = Rs 6000

Interest for the first year = Rs $(6000 \times 10 \times 1) / 100$
= Rs 600

Amount at the end of first year = Rs 6000 + Rs 600
= Rs 6600

Principal for the second year = Rs 6600

Interest for the second year = Rs $(6600 \times 10 \times 1) / 100$
= Rs 660

Amount for the second year = Rs 6600 + Rs 660
= Rs 7260

Therefore, compound interest for 2 years = final amount – (original) Principal
= Rs 7260 – Rs 6000

We get,

= Rs 1260

2. Salma borrowed from Mahila Samiti a sum of Rs 1875 to purchase a sewing machine. If the rate of interest is 4% per annum, what is the compound interest that she has to pay after 2 years?

Solution:

Principal for the first year = Rs 1875

Rate of interest = 4% p.a.

Interest for the first year = Rs $(1875 \times 4 \times 1) / 100$
= 75

Amount at the end of first year = Rs 1875 + Rs 75
= Rs 1950

Principal for the second year = Rs 1950

Interest for the second year = Rs $(1950 \times 4 \times 1) / 100$
= 78

Amount at the end of second year = Rs 1950 + Rs 78
= Rs 2028

Hence,

Compound interest paid by Salma = Final amount – (original) Principal
= Rs 2028 – Rs 1875

$$= \text{Rs } 153$$

3. Jacob invests Rs 12000 for 3 years at 10% per annum. Calculate the amount and the compound interest that Jacob will get after 3 years.

Solution:

Principal for the first year = Rs 12000

Rate of interest = 10% p.a.

Interest for the first year = Rs $(12000 \times 10 \times 1) / 100$

$$= \text{Rs } 1200$$

Amount at the end of first year = Rs 12000 + Rs 1200

$$= 13200$$

Principal for the second year = Rs 13200

Interest for the second year = Rs $(13200 \times 10 \times 1) / 100$

$$= \text{Rs } 1320$$

Amount at the end of second year = Rs 13200 + Rs 1320

$$= \text{Rs } 14520$$

Principal for the third year = Rs 14520

Interest for the third year = Rs $(14520 \times 10 \times 1) / 100$

$$= \text{Rs } 1452$$

Amount at the end of third year = Rs 14520 + Rs 1452

$$= \text{Rs } 15972$$

Hence,

Compound interest for 3 year = Final amount – (original) Principal

$$= \text{Rs } 15972 - \text{Rs } 12000$$

$$= \text{Rs } 3972$$

4. A man invests Rs 46875 at 4% per annum compound interest for 3 years.

Calculate:

(i) the interest for the first year

(ii) the amount standing to his credit at the end of second year

(iii) the interest for the third year

Solution:

(i) Principal for the first year = Rs 46875

Rate of interest = 4% per annum

Therefore,

Interest for the first year = Rs $(46875 \times 4 \times 1) / 100$

We get,

$$= \text{Rs } 46875 / 25$$

$$= \text{Rs } 1875$$

Hence, interest for the first year is Rs 1875

(ii) Amount at the end of first year

$$= \text{Rs } 46875 + \text{Rs } 1875$$

We get,

$$= \text{Rs } 48750$$

Principal for the second year = Rs 48750

$$\text{Interest for the second year} = \text{Rs } (48750 \times 4 \times 1) / 100$$

$$= \text{Rs } 48750 / 25$$

We get,

$$= \text{Rs } 1950$$

Amount at the end of second year = Rs 48750 + Rs 1950

We get,

$$= \text{Rs } 50700$$

Hence, the amount at the end of second year is Rs 50700

(iii) Principal for the third year = Rs 50700

$$\text{Interest for the third year} = \text{Rs } (50700 \times 4 \times 1) / 100$$

We get,

$$= \text{Rs } 507 \times 4$$

$$= \text{Rs } 2028$$

Hence, the interest for the third year is Rs 2028

5. Calculate the compound interest for the second year on Rs 6000 invested for 3 years at 10% p.a. Also find the sum due at the end of third year.

Solution:

Principal for the first year = Rs 6000

Rate of interest = 10% p.a.

$$\text{Interest for the first year} = \text{Rs } (6000 \times 10 \times 1) / 100$$

$$= \text{Rs } 600$$

Amount at the end of first year = Rs 6000 + Rs 600

$$= \text{Rs } 6600$$

Principal for the second year = Rs 6600

$$\text{Interest for the second year} = \text{Rs } (6600 \times 10 \times 1) / 100$$

We get,

$$= \text{Rs } 660$$

Amount at the end of second year = Rs 6600 + Rs 660

$$= \text{Rs } 7260$$

Compound interest for the second year = Final amount – (original) Principal

$$= \text{Rs } 7260 - \text{Rs } 6000$$

$$= \text{Rs } 1260$$

Principal for the third year = Rs 7260

Interest for the third year = Rs $(7260 \times 10 \times 1) / 100$

We get,
= Rs 726

Amount at the end of third year = Rs 7260 + Rs 726
= Rs 7986

6. Calculate the amount and the compound interest on Rs 5000 in 2 years when the rate of interest for successive years is 6% and 8% respectively.

Solution:

Principal for the first year = Rs 5000

Rate of interest = 6% p.a.

Interest for the first year = Rs $(5000 \times 6 \times 1) / 100$
= Rs 50×6

= Rs 300

Amount at the end of first year = Rs 5000 + Rs 300
= Rs 5300

Principal for the second year = Rs 5300

Rate of interest = 8% p.a.

Interest for the second year = Rs $(5300 \times 8 \times 1) / 100$
= Rs 53×8

We get,
= Rs 424

Amount for the second year = Rs 5300 + Rs 424
= Rs 5724

Compound interest for two years = Final amount – (original) Principal
= Rs 5724 – Rs 5000

We get,
= Rs 724

7. Calculate the difference between the compound interest and the simple interest on Rs 20000 in 2 years at 8% per annum.

Solution:

Principal (P) = Rs 20000

Rate (R) = 8% p.a.

Period (T) = 2 years

Hence,

Simple interest (S.I.) = $PRT / 100$
= Rs $(20000 \times 8 \times 2) / 100$

We get,
= Rs 3200

Now,
Amount on compound interest

$$A = P \{1 + (R / 100)\}^n$$
$$= \text{RS } 20000 \{1 + (8 / 100)\}^2$$

On further calculation,

We get,

$$= \text{Rs } 20000 \times (27 / 25) \times (27 / 25)$$
$$= \text{Rs } 32 \times 729$$
$$= \text{Rs } 23328$$

Therefore,

$$\text{Compound interest} = \text{Final amount} - (\text{original}) \text{Principal}$$
$$= \text{Rs } 23328 - \text{Rs } 20000$$

We get,

$$= \text{Rs } 3328$$

Hence,

$$\text{Difference in compound interest} - \text{simple interest}$$
$$= \text{Rs } 3328 - \text{Rs } 3200$$
$$= \text{Rs } 128$$

EXERCISE 8.3

1. Calculate the amount and compound interest on

(i) Rs 15000 for 2 years at 10% per annum compounded annually.

(ii) Rs 156250 for $1\frac{1}{2}$ years at 8% per annum compounded half-yearly.

(iii) Rs 100000 for 9 months at 4% per annum compounded quarterly.

Solution:

(i) Given

Principal (P) = Rs 15000

Rate (R) = 10% p.a.

Period (n) = 2 years

Hence,

$$\text{Amount (A)} = P \{1 + (R / 100)\}^n$$

$$= \text{Rs } 15000 \{1 + (10 / 100)\}^2$$

On further calculation, we get,

$$= \text{Rs } 15000 \times (11 / 10) \times (11 / 10)$$

We get,

$$= \text{Rs } 18150$$

Therefore,

$$\text{Compound interest} = \text{Amount} - \text{Principal}$$

$$= \text{Rs } 18150 - 15000$$

We get,

$$= \text{Rs } 3150$$

(ii) Principal (P) = Rs 156250

Rate (R) = 8% p.a. or 4% half-yearly

Period (n) = $1\frac{1}{2}$ years

= 3 half-year

Therefore,

$$\text{Amount (A)} = P \{1 + (R / 100)\}^n$$

$$= \text{Rs } 156250 \{1 + (4 / 100)\}^3$$

On further calculation, we get,

$$= \text{Rs } 156250 \times (26 / 25)^3$$

$$= \text{Rs } 156250 \times (26 / 25) \times (26 / 25) \times (26 / 25)$$

We get,

$$= \text{Rs } 175760$$

Hence,

$$\text{Compound interest} = \text{Amount} - \text{Principal}$$

$$= \text{Rs } 175760 - \text{Rs } 156250$$

= Rs 19510

2. Find the difference between the simple interest and compound interest on Rs 4800 for 2 years at 5% per annum, compound interest being reckoned annually.

Solution:

Given

Principal (P) = Rs 4800

Rate (R) = 5% p.a.

Period (n) = 2 years

Therefore,

S.I. = $PRT / 100$

= $(4800 \times 5 \times 2) / 100$

We get,

= Rs 480

And when interest is compounded annually

Amount (A) = $P \{1 + (R / 100)\}^n$

= Rs 4800 $\{1 + (5 / 100)\}^2$

= Rs 4800 $\times (21 / 20) \times (21 / 20)$

We get,

= Rs 5292

Hence,

Compound interest = Amount – Principal

= Rs 5292 – Rs 4800

= Rs 492

Now,

Difference in compound interest and simple interest = Rs 492 – Rs 480

= Rs 12

3. Find the compound interest on Rs 3125 for 3 years if the rates of interest for the first, second and third year are respectively 4%, 5% and 6% per annum.

Solution:

Given

Principal (P) = Rs 3125

Rate of interest for continuous 3 years = 4%, 5%, 6%

Period (n) = 3 years

Therefore,

Amount = $P \{1 + (r / 100)\}^n$

= 3125 $\{1 + (4 / 100)\} \{1 + (5 / 100)\} \{1 + (6 / 100)\}$

On further calculation, we get,
 $= 3125 \times (26 / 25) \times (21 / 20) \times (53 / 50)$

We get,
 $= \text{Rs } 14469 / 4$
 $= \text{Rs } 3617.25$

Hence,
Compound interest = Amount – Principal
 $= \text{Rs } 3617.25 - \text{Rs } 3125$
 $= \text{Rs } 492.25$

4. Kamla borrowed Rs 26400 from a Bank to buy a scooter at a rate of 15% p.a. compounded yearly. What amount will she pay at the end of 2 years and 4 months to clear the loan?

Solution:

Given

Money borrowed (P) = Rs 26400

Rate (R) = 15% p.a.

Period (n) = 2 years 4 months

$$= 2\frac{4}{12}$$
$$= 2\frac{1}{3} \text{ years}$$

Therefore,

$$\text{Amount} = P \{1 + (R / 100)\}^n$$
$$= \text{Rs } 26400 \{1 + (5 / 100)^2\} \times [1 + \{15 / (3 \times 100)\}]^1$$

On further calculation, we get,
 $= \text{Rs } 26400 \times (23 / 20) \times (23 / 20) \times (21 / 20)$

We get,
 $= \text{Rs } 366597 / 10$
 $= \text{Rs } 36659.70$

5. Anil borrowed Rs 18000 from Rakesh at 8% per annum simple interest for 2 years. If Anil had borrowed this sum at 8% per annum compound interest, what extra amount would he have to pay?

Solution:

Given

Money borrowed (P) = Rs 18000

Rate (R) = 8% p.a.

Time (n) = 2 years

$$\begin{aligned}\text{Simple Interest} &= PRT / 100 \\ &= \text{Rs } (18000 \times 8 \times 2) / 100 \\ &= \text{Rs } 2880\end{aligned}$$

In case of compound interest

$$\begin{aligned}A &= P \{1 + (R / 100)\}^n \\ &= \text{Rs } 18000 \{1 + (8 / 100)\}^2 \\ &= \text{Rs } 18000 \times (27 / 25)^2 \\ &= \text{Rs } 18000 \times (27 / 25) \times (27 / 25)\end{aligned}$$

$$\begin{aligned}\text{We get,} \\ &= \text{Rs } 104976 / 5 \\ &= \text{Rs } 20995.20\end{aligned}$$

Hence,

$$\begin{aligned}\text{Compound interest} &= \text{Amount} - \text{Principal} \\ &= \text{Rs } 20995.20 - \text{Rs } 18000 \\ &= \text{Rs } 2995.20\end{aligned}$$

Now,

$$\begin{aligned}\text{Difference between compound interest and simple interest} \\ &= \text{Rs } 2995.20 - \text{Rs } 2880 \\ &= \text{Rs } 115.20\end{aligned}$$

6. Mukesh borrowed 75000 from a bank. If the rate of interest is 12% per annum, find the amount he would be paying after $1\frac{1}{2}$ years if the interest is

- (i) compounded annually**
- (ii) compounded half-yearly**

Solution:

Given

Money borrowed (P) = Rs 75000

Rate (R) = 12% p.a. or 6% half- yearly

Period (n) = $1\frac{1}{2}$ years or 3 half-years

(i) When the interest compounded yearly

$$\begin{aligned}\text{Amount (A)} &= P \{1 + (R / 100)\}^n \\ &= \text{Rs } 75000 \{1 + (12 / 100)\} \{1 + (6 / 100)\} \\ &= \text{Rs } 75000 \times (28 / 25) \times (53 / 50)\end{aligned}$$

On simplification, we get,

$$= \text{Rs } 89040$$

(ii) When the interest compounded half-yearly

Then,

$$\begin{aligned}\text{Amount} &= \text{Rs } 75000 \{1 + (6 / 100)\}^3 \\ &= \text{Rs } 75000 \times (53 / 50)^3 \\ &= \text{Rs } 75000 \times (53 / 50) \times (53 / 50) \times (53 / 50) \\ \text{We get,} \\ &= \text{Rs } 446631 / 5 \\ &= \text{Rs } 89326.20\end{aligned}$$

7. Aryaman invested Rs 10000 in a company, he would be paid interest at 7% per annum compounded annually. Find

(i) the amount received by him at the end of 2 years

(ii) the interest for the 3rd year

Solution:

(i) Given

Investment to a company (P) = Rs 10000

Rate of interest (R) = 7% p.a.

Period (n) = 2 years

Hence,

$$\begin{aligned}\text{Amount (A)} &= P \{1 + (R / 100)\}^n \\ &= \text{Rs } 10000 \{1 + (7 / 100)\}^2 \\ &= \text{Rs } 10000 \times (107 / 100) \times (107 / 100)\end{aligned}$$

On simplification, we get,

$$= \text{Rs } 11449$$

(ii) Amount after 3rd year = Rs 11449 × (107 / 100)

We get,

$$= \text{Rs } 12250.43$$

Therefore,

Interest on the 3rd year = Rs 12250.43 – 11449

$$= \text{Rs } 801.43$$

8. What sum of money will amount to Rs 9261 in 3 years at 5% per annum compound interest?

Solution:

Given

Amount (A) = Rs 9261

Rate of interest = 5% p.a.

Time (T) = 3 years

Principal (P) = ?

$$A = P \{1 + (r / 100)\}^t$$

$$9261 = P \{1 + (5 / 100)\}^3$$

We get,

$$9261 = P (21 / 20)^3$$

$$P = (9261 \times 20 \times 20 \times 20) / (21 \times 21 \times 21)$$

On simplification, we get,

$$= \text{Rs } 8000$$

Therefore, the sum of money = Rs 8000

9. What sum invested for $1\frac{1}{2}$ years compounded half-yearly at the rate of 8% p.a. will amount to Rs 140608?

Solution:

Given

$$\text{Amount (A)} = \text{Rs } 140608$$

$$\text{Rate (R)} = 8\% \text{ p.a.} = 4\% \text{ half-yearly}$$

$$\text{Period (n)} = 1\frac{1}{2} \text{ years} = 3 \text{ half-year}$$

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

$$140608 = P \{1 + (4 / 100)\}^3$$

$$140608 = P (26 / 25)^3$$

Therefore,

$$P = 140608 \times (25 / 26) \times (25 / 26) \times (25 / 26)$$

On further calculation, we get,

$$P = \text{Rs } 125000$$

Hence,

$$\text{Principal} = \text{Rs } 125000$$

10. At what rate percent will Rs 2000 amount to Rs 2315.25 in 3 years at compound interest?

Solution:

Given

$$\text{Principal (P)} = \text{Rs } 2000$$

$$\text{Amount (A)} = \text{Rs } 2315.25$$

$$\text{Period (n)} = 3 \text{ years}$$

Let the rate of interest be r% p.a.

WKT

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

$$2315.25 / 2000 = \{1 + (r / 100)\}^3$$

$$\{1 + (r / 100)\}^3 = (231525) / (100 \times 2000)$$

On calculating, we get,

$$\{1 + (r / 100)\}^3 = 9261 / 8000$$

$$\{1 + (r / 100)\}^3 = (21 / 20)^3$$

We get,

$$1 + (r / 100) = 21 / 20$$

$$r / 100 = (21 / 20) - 1$$

$$r / 100 = 1 / 20$$

We get,

$$r = 100 / 20$$

$$r = 5$$

Therefore, rate of interest = 5% p.a.

11. If Rs 40000 amounts to Rs 46305 in $1\frac{1}{2}$ years, compound interest payable half-yearly, find the rate of interest per annum.

Solution:

Given

Principal (P) = Rs 40000

Amount (A) = Rs 46305

Period (n) = $1\frac{1}{2}$ years = $3/2$ years

So half yearly, $2n = 2 \times (3/2) = 3$ years.

Let the rate of interest be r% p.a.

WKT

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

$$46305 / 40000 = (1 + r / 100)^3$$

$$(1 + r / 100)^3 = 46305 / 40000$$

On further calculation, we get,

$$(1 + r / 100)^3 = 9261 / 8000$$

$$(1 + r / 100)^3 = (21 / 20)^3$$

We get,

$$(1 + r / 100) = (21 / 20)$$

$$r / 100 = (21 / 20) - 1$$

$$r / 100 = 1 / 20$$

$$r = 100 / 20$$

We get,

$$r = 5$$

Therefore, rate of interest = 5% for half year.

So, $2 \times 5 = 10\%$ per annum.

12. In what time will Rs 15625 amount to Rs 17576 at 4% per annum compound interest?

Solution:

Given

Amount (A) = Rs 17576

Principal (P) = Rs 15625

Rate (R) = 4% p.a.

Let period be n years

WKT

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

$$17576 / 15625 = \{1 + (4 / 100)\}^n$$

We get,

$$(26 / 25)^3 = (26 / 25)^n$$

$$n = 3$$

Therefore, time = 3 years

13. Rs 16000 invested at 10% p.a. compounded semi-annually, amounts to Rs 18522. Find the time period of investment.

Solution:

Given

Principal (P) = Rs 16000

Amount (A) = Rs 18522

Rate (R) = 10% p.a. or 5% semi-annually

Let period be n half-years

WKT

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

$$18522 / 16000 = \{1 + (5 / 100)\}^n$$

On further calculation, we get,

$$9261 / 8000 = (21 / 20)^n$$

$$(21 / 20)^3 = (21 / 20)^n$$

So,

$$n = 3 \text{ half years}$$

Therefore,

$$\text{Time} = 3 / 2 = 1\frac{1}{2} \text{ years}$$