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 / 12 years
= 3 / 4 years
= 13 / 4 years
Hence,
Simple Interest (I) = (P × R × T) / 100
= Rs {4000 × (15 / 2) × (13 / 4)} / 100
= Rs (4000 × 15 × 13) / (100 × 2 × 4)
On simplification, we get,
= Rs 5 × 15 × 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 / 12 years
= 1 / 4 years
= 9 / 4 years
R = 6%
Hence,
3. Find the rate of interest when Rs 800 fetches Rs 130 as a simple interest in 2 years 6 months.
Solution:
Here
P = Rs 800
T = 2 years 6 months
\[= \frac{6}{12} \text{ years}\]
\[= \frac{1}{2} \text{ years}\]
\[= 5 / 2 \text{ years}\]
Hence,
\[R = \frac{(I \times 100)}{(P \times T)}\]
\[= \frac{(130 \times 100)}{(800 \times (5 / 2))} \% \text{ p.a.}\]
On simplification, we get,
\[= \frac{(130 \times 2)}{(800 \times 5)} \% \text{ p.a.}\]
\[= (13 \div 20) \% \text{ p.a.}\]
\[= 6.5 \% \text{ p.a.}\]
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 lakhs
\[= Rs 3.3 \times 100000\]
\[= Rs 330000\]
R = 6.5% per annum
I = Rs 75075
Hence,
T = \left( \frac{I \times 100}{P \times R} \right)
= \left( \frac{75075 \times 100}{330000 \times 6.5} \right) \text{ years}
= \left( \frac{75075 \times 100 \times 10}{330000 \times 65} \right) \text{ years}
On further calculation, we get,
= \left( \frac{75075}{330 \times 65} \right) \text{ years}
= \frac{1155}{330} \text{ years}
We get,
= 7 \frac{1}{2} \text{ years}
= \frac{15}{2} \text{ years}

5. Find the sum of money when
(i) simple interest at \( \frac{7}{4} \% \) p.a. for \( \frac{7}{2} \) 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 = Rs 2356.25
R = \( \frac{7}{4} \% \) p.a.
= 29 / 4 \% p.a.
T = \( \frac{7}{2} \) years
= 5 / 2 years
Hence,
P = \left( \frac{I \times 100}{R \times T} \right)
= \left( \frac{2356.25 \times 100}{29 / 4 \times (5 / 2)} \right)
On further calculation, we get,
= \left( \frac{235625 \times 4 \times 2}{29 \times 5} \right)
= \left( \frac{235625 \times 8}{29 \times 5} \right)
We get,
= Rs 1625 \times 8
= Rs 13000

(ii) Amount (A) = Rs 11300
Rate (R) = 4% p.a.
Time (T) = 3 years 3 months
Let the principal be Rs \( x \)
Hence,
S.I. = \( \frac{P \times R \times T}{100} \)
We get,
\( = \frac{13x}{100} \)
Then,
Amount = Principal + Simple Interest
\( = Rs \ x + Rs \ 13x / 100 \)
\( = Rs \ (x + 13x) / 100 \)
We get,
\( = Rs \ (100x + 13x) / 100 \)
\( = Rs \ (113x / 100) \)
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 \( x \)
Amount = \( 3 \times Rs \ x \)
\( = Rs \ 3x \)
Interest = Amount – Principal
\( = Rs \ 3x – Rs \ x \)
\( = Rs \ 2x \)
Rate = \( \frac{13\frac{1}{3}}{3} \) % p.a.
\( = \frac{40}{3} \) % p.a.
Time (T) = \( \frac{(I \times 100)}{(P \times R)} \)
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,
\[
P = \text{Rs 40000}
\]
\[
A = \text{Rs 4576.50}
\]
\[
T = 2 \text{ years}
\]
Interest = Amount – Principal
\[
= \text{Rs 4576.50} – \text{Rs 4050}
\]
\[
= \text{Rs 526.50}
\]
Let the rate of simple interest = R\% per annum
Then,
\[
R = \left(\frac{I \times 100}{P \times T}\right)
\]
\[
= \left(\frac{526.50 \times 100}{4050 \times 2}\right) \% \text{ p.a.}
\]
On further calculation, we get,
\[
= \left(\frac{526.50 \times 10}{405 \times 2}\right) \% \text{ p.a.}
\]
\[
= \frac{5265}{810} \% \text{ p.a.}
\]
We get,
\[
= 6.5\% \text{ p.a.}
\]
Now,
\[
P = \text{Rs 1 lakh}
\]
\[
= \text{Rs 100000}
\]
\[
R = 6.5\% \text{ p.a.}
\]
\[
T = 3 \text{ years}
\]
\[
I = \left(\frac{P \times R \times T}{100}\right)
\]
\[
= \text{Rs } \left(100000 \times 6.5 \times 3\right) / 100
\]
We get,
\[
= \text{Rs } 19500
\]
Amount = Principal + Interest
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:
Principal \( (P_1) \) = Rs 9600
Rate \( (R_1) \) = 10%
Period = \( (T) \) = 3 years 6 months
\[ \frac{3}{2} \text{ years} = \frac{7}{2} \text{ years} \]
Simple interest = \( \frac{P \times R \times T}{100} \)
= \( \frac{9600 \times 10 \times 7}{100 \times 2} \)
We get,
= Rs 3360

Second case:
Simple interest = Rs 3360 \times 2
= Rs 6720
Rate \( (R) \) = 7.5% p.a. and
Period \( (T) \) = 2 years
Therefore,
Principal = \( \frac{S.I \times 100}{R \times T} \)
= \( \frac{6720 \times 100}{7.5 \times 2} \)
= Rs \( \frac{6720 \times 100 \times 10}{75 \times 2} \)
= 6720000 / 150
We get,
= 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 \( \frac{6000 \times 10 \times 1}{100} \) = 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 \( \frac{6600 \times 10 \times 1}{100} \) = 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 \( \frac{1875 \times 4 \times 1}{100} \) = 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 \( \frac{1950 \times 4 \times 1}{100} \) = 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
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 \( \frac{12000 \times 10 \times 1}{100} \) = 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 \( \frac{13200 \times 10 \times 1}{100} \) = Rs 1320
Amount at the end of second year = Rs 13200 + Rs 1320 = Rs 14520
Principal for the third year = Rs 14520
Interest for the third year = Rs \( \frac{14520 \times 10 \times 1}{100} \) = Rs 1452
Amount at the end of third year = Rs 14520 + Rs 1452 = Rs 15972
Hence,
Compound interest for 3 year = Final amount – (original) Principal
= Rs 15972 – Rs 12000
= 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 \( \frac{46875 \times 4 \times 1}{100} \) = Rs 46875 / 25
= Rs 1875
Hence, interest for the first year is Rs 1875
(ii) Amount at the end of first year
= Rs 46875 + Rs 1875
We get,
= Rs 48750
Principal for the second year = Rs 48750
Interest for the second year = Rs \( \frac{48750 \times 4 \times 1}{100} \)
= Rs \( \frac{48750}{25} \)
We get,
= Rs 1950
Amount at the end of second year = Rs 48750 + Rs 1950
We get,
= Rs 50700
Hence, the amount at the end of second year is Rs 50700
(iii) Principal for the third year = Rs 50700
Interest for the third year = Rs \( \frac{50700 \times 4 \times 1}{100} \)
We get,
= Rs 507 \times 4
= 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.
Interest for the first year = Rs \( \frac{6000 \times 10 \times 1}{100} \)
= 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 \( \frac{6600 \times 10 \times 1}{100} \)
We get,
= Rs 660
Amount at the end of second year = Rs 6600 + Rs 660
= Rs 7260
Compound interest for the second year = Final amount – (original) Principal
= Rs 7260 – Rs 6000
= Rs 1260
Principal for the third year = Rs 7260
Interest for the third year = Rs \( \frac{7260 \times 10 \times 1}{100} \)
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 \( \frac{5000 \times 6 \times 1}{100} \)
= Rs 50 \times 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 \( \frac{5300 \times 8 \times 1}{100} \)
= Rs 53 \times 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.) = \( \frac{PRT}{100} \)
= Rs \( \frac{20000 \times 8 \times 2}{100} \)

We get,
= Rs 3200
Now,
Amount on compound interest
A = P \{1 + \left(\frac{R}{100}\right)\}^n
= Rs 20000 \{1 + \left(\frac{8}{100}\right)\}^2
On further calculation,
We get,
= Rs 20000 \times \left(\frac{27}{25}\right) \times \left(\frac{27}{25}\right)
= Rs 32 \times 729
= Rs 23328
Therefore,
Compound interest = Final amount – (original) Principal
= Rs 23328 – Rs 20000
We get,
= Rs 3328
Hence,
Difference in compound interest – simple interest
= Rs 3328 – Rs 3200
= 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 \( \frac{1}{2} \) 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,
Amount (A) = \( P \left( 1 + \frac{R}{100} \right)^n \)
= Rs 15000 \( \left( 1 + \frac{10}{100} \right)^2 \)
On further calculation, we get,
= Rs 15000 \times \left( \frac{11}{10} \right) \times \left( \frac{11}{10} \right)
We get,
= Rs 18150
Therefore,
Compound interest = Amount – Principal
= Rs 18150 – 15000
We get,
= Rs 3150
(ii) Principal (P) = Rs 156250
Rate (R) = 8% p.a. or 4% half-yearly
Period (n) = \( \frac{1}{2} \) years
= 3 half-year
Therefore,
Amount (A) = \( P \left( 1 + \frac{R}{100} \right)^n \)
= Rs 156250 \( \left( 1 + \frac{4}{100} \right)^3 \)
On further calculation, we get,
= Rs 156250 \times \left( \frac{26}{25} \right)^3
= Rs 156250 \times \left( \frac{26}{25} \right) \times \left( \frac{26}{25} \right) \times \left( \frac{26}{25} \right)
We get,
= Rs 175760
Hence,
Compound interest = Amount – Principal
= Rs 175760 – Rs 156250
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. = \( \frac{PRT}{100} \)
= \( \frac{4800 \times 5 \times 2}{100} \)
We get,
= Rs 480
And when interest is compounded annually
Amount (A) = \( P \{1 + \left(\frac{R}{100}\right)\}^n \)
= Rs 4800 \( \{1 + \left(\frac{5}{100}\right)\}^2 \)
= Rs 4800 \( \times (\frac{21}{20}) \times (\frac{21}{20}) \)
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 = \( P \{1 + \left(\frac{r}{100}\right)\}^n \)
= \( 3125 \{1 + (4 / 100)\} \{1 + (5 / 100)\} \{1 + (6 / 100)\} \)
On further calculation, we get,
\[= 3125 \times \left(\frac{26}{25}\right) \times \left(\frac{21}{20}\right) \times \left(\frac{53}{50}\right)\]
We get,
\[= \frac{14469}{4}\]
\[= \text{Rs } 3617.25\]
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
\[= \frac{24}{12} = \frac{1}{3}\text{ years}\]
Therefore,
Amount = \[P \left\{1 + \left(\frac{R}{100}\right)\right\}^n\]
\[= \text{Rs } 26400 \left\{1 + \left(\frac{5}{100}\right)^2\right\} \times \left[1 + \left\{\frac{15}{3 \times 100}\right\}\right]\]
On further calculation, we get,
\[= \text{Rs } 26400 \times \left(\frac{23}{20}\right) \times \left(\frac{23}{20}\right) \times \left(\frac{21}{20}\right)\]
We get,
\[= \frac{366597}{10}\]
\[= \text{Rs } 36659.70\]

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
Simple Interest = \( \frac{PRT}{100} \)
= \( \frac{18000 \times 8 \times 2}{100} \)
= Rs 2880

In case of compound interest
\( A = P \left\{ 1 + \left( \frac{R}{100} \right) \right\}^n \)
= Rs 18000 \( \left\{ 1 + \left( \frac{8}{100} \right) \right\}^2 \)
= Rs 18000 \( \times \left( \frac{27}{25} \right)^2 \)
= Rs 18000 \( \times \left( \frac{27}{25} \right) \times \left( \frac{27}{25} \right) \)
We get,
= Rs 104976 / 5
= Rs 20995.20

Hence,
Compound interest = Amount – Principal
= Rs 20995.20 – Rs 18000
= Rs 2995.20

Difference between compound interest and simple interest
= Rs 2995.20 – Rs 2880
= Rs 115.20

6. Mukesh borrowed 75000 from a bank. If the rate of interest is 12% per annum, find the amount he would be paying after \( \frac{3}{2} \) 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) = \( \frac{3}{2} \) years or 3 half-years

(i) When the interest compounded yearly
Amount (A) = \( P \left\{ 1 + \left( \frac{R}{100} \right) \right\}^n \)
= Rs 75000 \( \left\{ 1 + \left( \frac{12}{100} \right) \right\} \left\{ 1 + \left( \frac{6}{100} \right) \right\} \)
= Rs 75000 \( \times \left( \frac{28}{25} \right) \times \left( \frac{53}{50} \right) \)
On simplification, we get,
= Rs 89040

(ii) When the interest compounded half-yearly
Then,
Amount = Rs 75000 \{1 + (6 / 100)\}^3
= Rs 75000 \times (53 / 50)^3
= Rs 75000 \times (53 / 50) \times (53 / 50) \times (53 / 50)
We get,
= Rs 446631 / 5
= Rs 89326.20

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,
Amount (A) = P \{1 + (R / 100)\}^n
= Rs 10000 \{1 + (7 / 100)\}^2
= Rs 10000 \times (107 / 100) \times (107 / 100)
On simplification, we get,
= Rs 11449
(ii) Amount after 3rd year = Rs 11449 \times (107 / 100)
We get,
= Rs 12250.43
Therefore,
Interest on the 3rd year = Rs 12250.43 – 11449
= 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,
\[ 9261 = P \left( \frac{21}{20} \right)^3 \]
\[ P = \frac{9261 \times 20 \times 20 \times 20}{21 \times 21 \times 21} \]
On simplification, we get,
\[ = \text{Rs} \ 8000 \]
Therefore, the sum of money = \text{Rs} \ 8000

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

Solution:
Given
Amount (A) = \text{Rs} \ 140608
Rate (R) = 8% p.a. = 4% half-yearly
Period (n) = 3 half-year
\[ A = P \left\{ 1 + \left( \frac{R}{100} \right) \right\}^n \]
\[ 140608 = P \left\{ 1 + \left( \frac{4}{100} \right) \right\}^3 \]
\[ 140608 = P \left( \frac{26}{25} \right)^3 \]
Therefore,
\[ P = 140608 \times \left( \frac{25}{26} \right) \times \left( \frac{25}{26} \right) \times \left( \frac{25}{26} \right) \]
On further calculation, we get,
\[ P = \text{Rs} \ 125000 \]
Hence,
Principal = \text{Rs} \ 125000

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

Solution:
Given
Principal (P) = \text{Rs} \ 2000
Amount (A) = \text{Rs} \ 2315.25
Period (n) = 3 years
Let the rate of interest be \( r \)% p.a.
WKT
\[ \frac{A}{P} = \left\{ 1 + \left( \frac{r}{100} \right) \right\}^n \]
\[ \frac{2315.25}{2000} = \left\{ 1 + \left( \frac{r}{100} \right) \right\}^3 \]
\[ \left\{ 1 + \left( \frac{r}{100} \right) \right\}^3 = \frac{231525}{100 \times 2000} \]
On calculating, we get,
\[
\left(1 + \frac{r}{100}\right)^3 = \frac{9261}{8000}
\]
\[
\left(1 + \frac{r}{100}\right)^3 = \left(\frac{21}{20}\right)^3
\]
We get,
\[
1 + \frac{r}{100} = \frac{21}{20}
\]
\[
\frac{r}{100} = \frac{21}{20} - 1
\]
\[
\frac{r}{100} = \frac{1}{20}
\]
We get,
\[
r = \frac{100}{20}
\]
\[
r = 5
\]
Therefore, rate of interest = 5% p.a.

11. If Rs 40000 amounts to Rs 46305 in \(\frac{1}{2}\) 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) = \(\frac{1}{2}\) years = 3/2 years
So half yearly, 2n = 2 \times (3/2) = 3 years.
Let the rate of interest be \(r\)% p.a.

WKT
\[
\frac{A}{P} = (1 + \frac{r}{100})^n
\]
\[
\frac{46305}{40000} = (1 + \frac{r}{100})^{3/2}
\]
\[
(1 + \frac{r}{100})^3 = \frac{46305}{40000}
\]
On further calculation, we get,
\[
(1 + \frac{r}{100})^3 = \frac{9261}{8000}
\]
\[
(1 + \frac{r}{100})^3 = \left(\frac{21}{20}\right)^3
\]
We get,
\[
(1 + \frac{r}{100}) = \left(\frac{21}{20}\right)
\]
\[
\frac{r}{100} = \left(\frac{21}{20}\right) - 1
\]
\[
\frac{r}{100} = \frac{1}{20}
\]
\[
r = \frac{100}{20}
\]
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
\[
\frac{A}{P} = \left(1 + \frac{r}{100}\right)^n
\]
\[
\frac{17576}{15625} = \left(1 + \frac{4}{100}\right)^n
\]
We get,
\[
\left(\frac{26}{25}\right)^3 = \left(\frac{26}{25}\right)^n
\]
\[
n = 3
\]
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
\[
\frac{A}{P} = \left(1 + \frac{r}{100}\right)^n
\]
\[
\frac{18522}{16000} = \left(1 + \frac{5}{100}\right)^n
\]
On further calculation, we get,
\[
\frac{9261}{8000} = \left(\frac{21}{20}\right)^n
\]
\[
\left(\frac{21}{20}\right)^3 = \left(\frac{21}{20}\right)^n
\]
So,
\[
n = 3 \text{ half years}
\]
Therefore,
\[
\text{Time} = \frac{3}{2} = \frac{3}{2} \text{ years}
\]