Exercise 8.1   Page: 119

1. Find the ratio of the following:
    a) Speed of a cycle 15 km per hour to the speed of scooter 30 km per hour.
    b) 5 m to 10 km
    c) 50 paise to ₹ 5

Solution:

a) Ratio of the speed of cycle to the speed of scooter $= \dfrac{15}{30} = \dfrac{1}{2} = 1{:}2$

b) Since 1 km = 1000 m,
    $$\Rightarrow \frac{5m}{10km} = \frac{5m}{10 \times 1000m} = \frac{5m}{10000m} = \frac{1}{2000} = 1{:}2000$$
    Required ratio= 1:2000

c) Since Re 1 = 100 paise,
    $$\Rightarrow \frac{50\ paise}{₹\ 5} = \frac{50\ paise}{5 \times 100\ paise} = \frac{50\ paise}{500\ paise} = \frac{1}{10} = 1{:}10$$

    Required ratio= 1:10

2. Convert the following ratios to percentages.
    a) 3:4
    b) 2:3

Solution:

a) $3{:}4 = \dfrac{3}{4} = \dfrac{3}{4} \times \dfrac{100}{100} = \dfrac{3}{4} \times 100\% = 0.75 \times 100\% = 75\%$

b) $2{:}3 = \dfrac{2}{3} = \dfrac{2}{3} \times \dfrac{100}{100} = \dfrac{2}{3} \times 100\% = 0.666 \times 100\% = 66.66\% = 66\dfrac{2}{3}\%$

3. 72% of 25 students are good in mathematics. How many are not good in mathematics?

Solution:

It is given that 72% of 25 students are good in mathematics.
∴, Percentage of students who are not good in mathematics $= (100 - 72)\%$
                                                            $= 28\%$

Here, Number of students who are good in mathematics $= \dfrac{72}{100} \times 25 = 18$
∴, Number of students who are good in mathematics $= 25\text{-}18 = 7$
            [Also, 28% of 25$= \dfrac{28}{100} \times 25 = 7$]
∴, 7 students are not good in mathematics.

4. A football team won 10 matches out of the total number of matches they played. If their win percentage was 40, then how many matches did they play in all?

Solution:

Let the total number of matches played by the team be x.
Given that the team won 10 matches and the winning percentage of the team was 40%.

$$\therefore, \frac{40}{100} \times x = 10$$

$\Longrightarrow 40x = 10 \times 100$

$\Longrightarrow 40x = 1000$

$$\Longrightarrow x \quad = \frac{1000}{40}$$

$$= \frac{100}{4}$$

$$= 25$$

$\therefore$, the team played 25 matches.

5. **If Chameli had ₹600 left after spending 75% of her money, how much did she have in the beginning?**

Solution:

Let the amount of money which Chameli had in the beginning be x.

Given that, after spending 75% of ₹ x, she was left with ₹ 600.

$\therefore, \quad (100 - 75)\%$ of x = ₹ 600

Or, 25 % of x = ₹ 600

$$\frac{25}{100} \times x = ₹\ 600$$

x = 600×4

= 2400

$\therefore$, Chameli had ₹ 2400 in the beginning.

6. **If 60% people in city like cricket, 30% like football and the remaining like other games, then what per cent of the people like other games? If the total number of people are 50 lakh, find the exact number who like each type of game.**

Solution:

Percentage of people who like other games = (100 − 60 − 30)%

= (100 − 90)% = 10 %

Total number of people= 50 lakh

$\therefore$, Number of people who like cricket $= \frac{60}{100} \times 50$ = 30 lakh

Number of people who like football $= \frac{30}{100} \times 50$ = 15 lakh

Number of people who like other games$= \frac{10}{100} \times 50$ = 5 lakh

Exercise 8.2   Page: 125

1. A man got a 10% increase in his salary. If his new salary is ₹1,54,000, find his original salary.
Solution:

  Let the original salary be x.
  Given that, the new salary is ₹1,54,000.
  Original salary + Increment = New salary
  Given that the increment is 10% of the original salary.

$$\therefore, x + \left(\frac{10}{100} \times x\right) = 154000$$
$$x + \frac{x}{10} = 154000$$
$$\frac{11x}{10} = 154000$$
$$x = 154000 \times \frac{10}{11}$$
$$= 140000$$

∴, the original salary was ₹ 1,40,000.

2. On Sunday 845 people went to the Zoo. On Monday only 169 people went. What is the per cent decrease in the people visiting the zoo on Monday?
Solution:

  Given that on Sunday, 845 people went to the zoo
    and on Monday, 169 people went.
  Decrease in the number of people = 845 − 169 = 676

$$\text{Percentage decrease} = \left(\frac{\text{Decrease in the number of people} \times 100}{\text{Number of people who went to zoo on sunday}}\right)\%$$
$$= \left(\frac{676 \times 100}{845}\right)\%$$
$$= 80\%$$

3. A shopkeeper buys 80 articles for ₹ 2,400 and sells them for a profit of 16%. Find the selling price of one article.
Solution:

  Given that the shopkeeper buys 80 articles for ₹ 2,400.

$$\text{Cost of one article} = \frac{2400}{80} = ₹ \, 30$$

  Profit percent = 16

$$\text{Profit percent} = \frac{\text{Profit}}{\text{C.P}} \times 100$$
$$16 = \frac{\text{Profit}}{₹ \, 30} \times 100$$
$$\text{Profit} = \frac{16 \times 30}{100}$$
$$= 4.8$$

  ∴,Selling price of one article = C.P. + Profit
              = ₹ (30 + 4.80)
              = ₹ 34.80

4. The cost of an article was ₹ 15,500. ₹ 450 were spent on its repairs. If it is sold for a profit of 15%, find the selling price of the article.

Solution:

Total cost of an article = Cost + Overhead expenses

= ₹ 15500 + ₹ 450

= ₹ 15950

Profit percent = 15

Profit percent = $\frac{\text{Profit}}{\text{C.P}} \times 100$

$15 = \frac{\text{Profit}}{₹\,15950} \times 100$

Profit $= \frac{15 \times ₹\,15950}{100}$

= 2392.50

∴, Selling price of the article = C.P. + Profit

= ₹ (15950 + 2392.50)

= ₹ 18342.50

5. A VCR and TV were bought for ₹ 8,000 each. The shopkeeper made a loss of 4% on the VCR and a profit of 8% on the TV. Find the gain or loss percent on the whole transaction.

Solution:

C.P. of a VCR = ₹ 8000

The shopkeeper made a loss of 4 % on VCR.

This means if C.P. is ₹ 100, then S.P. is ₹ 96.

When C.P. is ₹ 8000,

S.P. $= \left(\frac{96}{100} \times 8000\right) = ₹\,7680$

C.P. of a TV = ₹ 8000

The shopkeeper made a profit of 8 % on TV.

This means that if C.P. is ₹ 100, then S.P. is ₹ 108.

When C.P. is ₹ 8000,

S.P. $= \left(\frac{108}{100} \times 8000\right) = ₹\,8640$

Total S.P. = ₹ 7680 + ₹ 8640 = ₹ 16320

Total C.P. = ₹ 8000 + ₹ 8000 = ₹ 16000

Since, total S.P.> total C.P⟹profit.

Profit = ₹ 16320 − ₹ 16000 = ₹ 320

∴, the shopkeeper had a gain of 2% on the whole transaction.

6. During a sale, a shop offered a discount of 10% on the marked prices of all the items. What would a customer have to pay for a pair of jeans marked at ₹ 1450 and two shirts marked at ₹ 850 each?

Solution:

Total marked price = ₹ (1,450 + 2 × 850)

= ₹ (1,450 +1,700)

= ₹ 3,150

Given that, discount percentage = 10%

Discount = ₹ $\left(\frac{10}{100} \times 3150\right)$ = ₹ 315

Also, Discount = Marked price − Sale price

₹ 315 = ₹ 3150 − Sale price

∴   Sale price = ₹ (3150 − 315)

                  = ₹ 2835

∴, the customer will have to pay ₹ 2,835.

7. A milkman sold two of his buffaloes for ₹ 20,000 each. On one he made a gain of 5% and on the other a loss of 10%. Find his overall gain or loss.
   (Hint: Find CP of each)

Solution:

S.P. of each buffalo = ₹ 20000

The milkman made a gain of 5% while selling one buffalo.

This means if C.P. is ₹ 100, then S.P. is ₹ 105.

C.P. of one buffalo = $\frac{100}{105} \times 20000$

                  = ₹ 19,047.62

Also, the second buffalo was sold at a loss of 10%.

This means if C.P. is ₹ 100, then S.P. is ₹ 90.

∴C.P. of other buffalo = $\frac{100}{90} \times 20000$

                  = ₹ 22222.22

Total C.P. = ₹ 19047.62 + ₹ 22222.22 = ₹ 41269.84

Total S.P. = ₹ 20000 + ₹ 20000 = ₹ 40000

Loss = ₹ 41269.84 − ₹ 40000 = ₹ 1269.84

∴, the overall loss of milkman was ₹ 1,269.84.

8. The price of a TV is ₹ 13,000. The sales tax charged on it is at the rate of 12%. Find the amount that Vinod will have to pay if he buys it,

Solution:

On ₹ 100, the tax to be paid = ₹ 12

Here,   on ₹ 13000, the tax to be paid will be = $\frac{12}{100} \times 13000$

                  = ₹ 1560

Required amount = Cost + Sales Tax

                  = ₹ 13000 + ₹ 1560

                  = ₹ 14560

∴, Vinod will have to pay ₹ 14,560 for the T.V.

9. Arun bought a pair of skates at a sale where the discount given was 20%. If the amount he pays is ₹ 1,600, find the marked price.

Solution:

Let the marked price be x.

Exercise 8.3   Page: 133

1. Calculate the amount and compound interest on

(a) ₹ 10800 for 3 years at $12\frac{1}{2}$ % per annum compounded annually.
Solution:

> Principal (P) = ₹ 10, 800
> Rate (R) = $12\frac{1}{2}$% = $\frac{25}{2}$ % (annual)
> Number of years (n) = 3
>
> Amount, A $= P\left(1+\frac{R}{100}\right)^n$
> $= ₹\left[10800\left(1+\frac{25}{200}\right)^3\right]$
> $= ₹\left[10800\left(\frac{225}{200}\right)^3\right]$
> $= ₹\ 15377.34375$
> $= ₹\ 15377.34$ (approximately)
>
> C.I. $= A - P = ₹\ (15377.34 - 10800) = ₹\ 4,577.34$

(b) ₹ 18000 for $2\frac{1}{2}$ years at 10% per annum compounded annually.
Solution:

> Principal (P) = ₹ 18,000
> Rate (R) = 10% annual
> Number of years (n) = $2\frac{1}{2}$
> The amount for 2 years and 6 months can be calculated by calculating the amount for 2 years using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 2 years.
> First, the amount for 2 years has to be calculated.
> Amount, A $= P\left(1+\frac{R}{100}\right)^n$
> $= ₹\left[18000\left(1+\frac{1}{10}\right)^2\right]$
> $= ₹\left[18000\left(\frac{11}{10}\right)^2\right]$
> $= ₹\ 21780$
>
> By taking ₹ 21780 as principal, the S.I. for the next $\frac{1}{2}$ year will be calculated.
>
> S.I $= \dfrac{21780 \times \frac{1}{2} \times 10}{100} = ₹\ 1089$
> ∴ Interest for the first 2 years $= ₹\ (21780 - 18000) = ₹\ 3780$

And interest for the next $\frac{1}{2}$ year = ₹ 1089

∴   Total C.I. = ₹ 3780 + ₹ 1089
                         = ₹ 4,869
     Amount, A = P + C.I.
                         = ₹ 18000 + ₹ 4869
                         = ₹ 22,869

(c) ₹ 62500 for $1\frac{1}{2}$ years at 8% per annum compounded half yearly.
Solution:

Principal (P) = ₹ 62,500
Rate = 8% per annum or 4% per half year
Number of years = $1\frac{1}{2}$
There will be 3 half years in $1\frac{1}{2}$ years.

$$\text{Amount, A} = P\left(1 + \frac{R}{100}\right)^n$$
$$= ₹\left[62500\left(1 + \frac{4}{100}\right)^3\right]$$
$$= ₹\left[62500\left(\frac{104}{100}\right)^3\right]$$
$$= ₹\left[62500\left(\frac{26}{25}\right)^3\right]$$
$$= ₹\ 70304$$

C.I. = A − P = ₹ 70304 − ₹ 62500 = ₹ 7,804

(d) ₹ 8000 for 1 year at 9% per annum compound half yearly.
    (You could use the year by year calculation using SI formula to verify)
Solution:

Principal (P) = ₹ 8000
Rate of interest = 9% per annum or $\frac{9}{2}$ % per half year
Number of years = 1 year
There will be 2 half years in 1 year.

$$\text{Amount, A} = P\left(1 + \frac{R}{100}\right)^n$$
$$= ₹\left[8000\left(1 + \frac{9}{200}\right)^2\right]$$
$$= ₹\left[8000\left(\frac{209}{200}\right)^2\right]$$
$$= ₹\ 8736.20$$

C.I. = A − P = ₹ 8736.20 − ₹ 8000 = ₹ 736.20

(e) ₹ 10000 for 1 year at 8% per annum compounded half yearly.

Solution:

Principal (P) = ₹ 10,000
Rate = 8% per annum or 4% per half year
Number of years = 1 year
There are 2 half years in 1 year.

Amount, A $= P \left(1 + \frac{R}{100}\right)^n$

$= ₹ \left[10000 \left(1 + \frac{4}{100}\right)^2\right]$

$= ₹ \left[10000 \left(1 + \frac{1}{25}\right)^2\right]$

$= ₹ \left[10000 \left(\frac{26}{25}\right)^2\right]$

$= ₹\ 10816$

C.I. $= A - P = ₹\ 10816 - ₹\ 10000 = ₹\ 816$

2. Kamala borrowed ₹ 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?
   (Hint: Find A for 2 years with interest is compounded yearly and then find SI on the 2nd year amount for $\frac{4}{12}$ years.)

Solution:

Principal (P) = ₹ 26,400
Rate (R) = 15% per annum
Number of years (n) $= 2\frac{4}{12}$

The amount for 2 years and 4 months can be calculated by first calculating the amount for 2 years using the compound interest formula, and then calculating the simple interest for 4 months on the amount obtained at the end of 2 years.
First, the amount for 2 years has to be calculated.

Amount, A $= P \left(1 + \frac{R}{100}\right)^n$

$= ₹ \left[26400 \left(1 + \frac{15}{100}\right)^2\right]$

$= ₹ \left[26400 \left(1 + \frac{3}{20}\right)^2\right]$

$= ₹ \left[26400 \left(\frac{23}{20}\right)^2\right]$

$= ₹\ 34914$

By taking ₹ 34,914 as principal, the S.I. for the next $\frac{1}{3}$ years will be calculated.

$$S.I = \frac{34914 \times \frac{1}{3} \times 15}{100} = ₹\ 1745.70$$

Interest for the first two years $= ₹\ (34914 - 26400) = ₹\ 8,514$

And interest for the next $\frac{1}{3}$ year = ₹ 1,745.70

Total C.I. = ₹ (8514 + ₹ 1745.70) = ₹ 10,259.70

Amount = P + C.I. = ₹ 26400 + ₹ 10259.70 = ₹ 36,659.70

3. Fabina borrows ₹ 12,500 at 12% per annum for 3 years at simple interest and Radha borrows the same amount for the same time period at 10% per annum, compounded annually. Who pays more interest and by how much?

Solution:

Interest paid by Fabina $= \dfrac{P \times R \times T}{100}$

$$= \dfrac{12500 \times 12 \times 3}{100}$$
$$= 4500$$

Amount paid by Radha at the end of 3 years $= A = P\left(1 + \dfrac{R}{100}\right)^n$

$$A = ₹\left[12500\left(1 + \dfrac{10}{100}\right)^3\right]$$
$$= ₹\left[12500\left(\dfrac{110}{100}\right)^3\right]$$
$$= ₹\,16637.50$$

C.I. $= A - P = ₹\,16637.50 - ₹\,12500 = ₹\,4{,}137.50$

The interest paid by Fabina is ₹ 4,500 and by Radha is ₹ 4,137.50.

∴, Fabina pays more interest.

₹ 4500 − ₹ 4137.50 = ₹ 362.50

Hence, Fabina will have to pay ₹ 362.50 more.

4. I borrowed ₹ 12000 from Jamshed at 6% per annum simple interest for 2 years. Had I borrowed this sum at 6% per annum compound interest, what extra amount would I have to pay?

Solution:

P = ₹ 12000

R = 6% per annum

T = 2 years

S.I $= \dfrac{P \times R \times T}{100} = \dfrac{12000 \times 6 \times 2}{100} = ₹\,1440$

To find the compound interest, the amount (A) has to be calculated.

Amount, A $= P\left(1 + \dfrac{R}{100}\right)^n$

$$= ₹\left[12000\left(1 + \dfrac{6}{100}\right)^2\right]$$
$$= ₹\left[12000\left(1 + \dfrac{3}{50}\right)^2\right]$$
$$= ₹\left[12000\left(\dfrac{53}{50}\right)^2\right]$$
$$= ₹\,13483.20$$

∴ C.I. = A − P
= ₹ 13483.20 − ₹ 12000
= ₹ 1,483.20
C.I. − S.I. = ₹ 1,483.20 − ₹ 1,440
= ₹ 43.20
∴, the extra amount to be paid is ₹ 43.20.

5. **Vasudevan invested ₹ 60000 at an interest rate of 12% per annum compounded half yearly. What amount would he get**
   i. **after 6 months?**
   ii. **after 1 year?**

Solution:

i. P = ₹ 60,000
   Rate = 12% per annum = 6% per half year
   n = 6 months = 1 half year

   Amount, A $= P \left(1 + \frac{R}{100}\right)^n$
   $= ₹ \left[60000 \left(1 + \frac{6}{100}\right)^1\right]$
   $= ₹ \left[60000 \left(1 + \frac{3}{50}\right)^1\right]$
   $= ₹ \left[60000 \times \frac{53}{50}\right]$
   = ₹ 63600

ii. There are 2 half years in 1 year.
    n = 2

    Amount, A $= P \left(1 + \frac{R}{100}\right)^n$
    $= ₹ \left[60000 \left(1 + \frac{6}{100}\right)^2\right]$
    $= ₹ \left[60000 \left(1 + \frac{3}{50}\right)^2\right]$
    $= ₹ \left[60000 \times \frac{53}{50} \times \frac{53}{50}\right]$
    = ₹ 67416

6. **Arif took a loan of ₹ 80,000 from a bank. If the rate of interest is 10% per annum, find the difference in amounts he would be paying after $1\frac{1}{2}$ years if the interest is**
   i. **Compounded annually**
   ii. **Compounded half yearly**

Solution:

i. P = ₹ 80,000
   R = 10% per annum
   n = $1\frac{1}{2}$ years
   The amount for 1 year and 6 months can be calculated by first calculating the amount for

1 year using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 1 year.

First, the amount for 1 year has to be calculated.

$$\text{Amount, A} = P\left(1 + \frac{R}{100}\right)^n$$
$$= ₹\left[80000\left(1 + \frac{10}{100}\right)^1\right]$$
$$= ₹\left[80000 \times \frac{11}{100}\right]$$
$$= ₹\,88000$$

By taking ₹ 88,000 as principal, the SI for the next $\frac{1}{2}$ year will be calculated.

$$\text{S.I} = \frac{P \times R \times T}{100} = \frac{88000 \times 10 \times \frac{1}{2}}{100} = ₹\,4400$$

Interest for the first year = ₹ 88000 − ₹ 80000 = ₹ 8,000

And interest for the next $\frac{1}{2}$ year = ₹ 4,400

Total C.I. = ₹ 8000 + ₹ 4,400 = ₹ 1,2400

A = P + C.I.= ₹ (80000 + 12400)
= ₹ 92,400

    ii.   The interest is compounded half yearly.

Rate = 10% per annum = 5% per half year

There will be three half years in $1\frac{1}{2}$ years.

$$\text{Amount, A} = P\left(1 + \frac{R}{100}\right)^n$$
$$= ₹\left[80000\left(1 + \frac{5}{100}\right)^3\right]$$
$$= ₹\left[80000 \times \left(\frac{105}{100}\right)^3\right]$$
$$= ₹\,92610$$

Difference between the amounts = ₹ 92,610 − ₹ 92,400 = ₹ 210

7. Maria invested ₹ 8,000 in a business. She would be paid interest at 5% per annum compounded annually. Find.
    i.   The amount credited against her name at the end of the second year
    ii.   The interest for the 3rd year.

Solution:

    i.   P = ₹ 8,000

R = 5% per annum

n = 2 years

$$\text{Amount, A} = P\left(1 + \frac{R}{100}\right)^n$$
$$= ₹\left[8000\left(1 + \frac{5}{100}\right)^2\right]$$

$$= ₹ \left[8000 \times \left(\frac{105}{100} \right)^2 \right]$$
$$= ₹ \, 8820$$

ii.   The interest for the next one year, i.e. the third year, has to be calculated. By taking ₹ 8,820 as principal, the S.I. for the next year will be calculated.

$$S.I = \frac{P \times R \times T}{100} = \frac{8820 \times 5 \times 1}{100} = ₹ \, 441$$

8.   Find the amount and the compound interest on ₹ 10,000 for $1\frac{1}{2}$ years at 10% per annum, compounded half yearly. Would this interest be more than the interest he would get if it was compounded annually?

Solution:

P = ₹ 10,000
Rate = 10% per annum = 5% per half year
n = $1\frac{1}{2}$ years
There will be 3 half years in $1\frac{1}{2}$ years.
$$\text{Amount, A} = P \left(1 + \frac{R}{100} \right)^n$$
$$= ₹ \left[10000 \left(1 + \frac{5}{100} \right)^3 \right]$$
$$= ₹ \left[10000 \times \left(\frac{105}{100} \right)^3 \right]$$
$$= ₹ \, 11576.25$$

C.I. = A − P
    = ₹ 11576.25 − ₹ 10000
    = ₹ 1,576.25

The amount for 1 year and 6 months can be calculated by first calculating the amount for 1 year using the compound interest formula, and then calculating the simple interest for 6 months on the amount obtained at the end of 1 year.
The amount for the first year has to be calculated first.
$$\text{Amount, A} = P \left(1 + \frac{R}{100} \right)^n$$
$$= ₹ \left[10000 \left(1 + \frac{10}{100} \right)^1 \right]$$
$$= ₹ \left[10000 \times \left(\frac{11}{10} \right)^1 \right]$$
$$= ₹ \, 11000$$

By taking ₹ 11,000 as the principal, the S.I. for the next $\frac{1}{2}$ year will be calculated.
$$S.I = \frac{P \times R \times T}{100} = \frac{11000 \times 10 \times \frac{1}{2}}{100} = ₹ \, 550$$

∴ Interest for the first year = ₹ 11000 − ₹ 10000 = ₹ 1,000
∴ Total compound interest = ₹ 1000 + ₹ 550 = ₹ 1,550

∴, the interest would be more when compounded half yearly than the interest when compounded annually.

9. Find the amount which Ram will get on ₹ 4,096, he gave it for 18 months at $12\frac{1}{2}$ per annum, interest being compounded half yearly.

Solution:

P = ₹ 4,096

R = $12\frac{1}{2}$ per annum = $\frac{25}{2}$ per annum = $\frac{25}{4}$ per half year

n = 18 months

There will be 3 half years in 18 months. Therefore,

Amount, A = $P\left(1+\frac{R}{100}\right)^{n}$

$\qquad = ₹\left[4096\left(1+\frac{25}{4\times100}\right)^{3}\right]$

$\qquad = ₹\left[4096\times\left(1+\frac{1}{16}\right)^{3}\right]$

$\qquad = ₹\,4096\times\left(\frac{17}{16}\right)^{3}$

$\qquad = ₹\,4913$

∴, the required amount is ₹ 4,913.

10. The population of a place increased to 54000 in 2003 at a rate of 5% per annum
   i.   find the population in 2001
   ii. what would be its population in 2005?

Solution:

i.   It is given that, population in the year 2003 = 54,000

$54000 = (\text{Population in 2001})\left(1+\frac{5}{100}\right)^{2}$

$54000 = (\text{Population in 2001})\left(\frac{105}{100}\right)^{2}$

$54000 = (\text{Population in 2001})\left(\frac{105}{100}\times\frac{105}{100}\right)$

Population in 2001= $54000\times\frac{100}{105}\times\frac{100}{105}$ =48979.59

∴, the population in the year 2001 was approximately 48,980.

ii.   (Population in 2005)= $54000\left(1+\frac{5}{100}\right)^{2}$

$\qquad = 54000\left(1+\frac{1}{20}\right)^{2}$

$\qquad = 54000\left(\frac{21}{20}\right)^{2}$

$\qquad = 59535$

∴, the population in the year 2005 would be 59,535.

11. In a laboratory, the count of bacteria in a certain experiment was increasing at the rate of 2.5% per hour. Find the bacteria at the end of 2 hours if the count was initially 5,06,000.

Solution:

The initial count of bacteria is given as 5,06,000.

$$\text{Bacteria at the end of 2 hours} = 506000\left(1 + \frac{2.5}{100}\right)^2$$
$$= 506000\left(1 + \frac{1}{40}\right)^2$$
$$= 506000\left(\frac{41}{40}\right)^2$$
$$= 531616.25$$

∴, the count of bacteria at the end of 2 hours will be 5,31,616 (approx.).

12. A scooter was bought at ₹ 42,000. Its value depreciated at the rate of 8% per annum. Find its value after one year.

Solution:

Principal = Cost price of the scooter = ₹ 42,000
Depreciation = 8% of ₹ 42,000 per year
$$= \frac{P \times R \times T}{100} = \frac{42000 \times 8 \times 1}{100} = ₹ 3360$$
Value after 1 year = ₹ 42000 − ₹ 3360 = ₹ 38,640