Exercise 8.1

Question 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) 50 m to 10 km

(c) 50 paise to ₹ 5

Answer 1:

(a) Speed of cycle = 15 km/hr

Speed of scooter = 30 km/hr

Hence ratio of speed of cycle to that of scooter = 15 : 30

$$= \frac{15}{30} = \frac{1}{2} = 1 : 2$$

(b) ∵ 1 km = 1000 m

∴ 10 km = 10 x 1000 = 10000 m

$$\therefore \text{Ratio} = \frac{5 \text{ m}}{10000 \text{ m}} = \frac{1}{2000} = 1 : 2000$$

(c) ∵ ₹ 1 = 100 paise

∴ ₹ 5 = 5 x 100 = 500 paise

$$\text{Hence Ratio} = \frac{50 \text{ paise}}{500 \text{ paise}} = \frac{1}{10} = 1 : 10$$

Question 2:

Convert the following ratios to percentages:

(a) 3 : 4 (b) 2 : 3

Answer 2:

(a) Percentage of $3 : 4 = \frac{3}{4} \times 100\ \% = 75\%$

(b) Percentage of $2 : 3 = \frac{2}{3} \times 100\ \% = 66\frac{2}{3}\%$

Question 3:

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

Answer 3:

Total number of students = 25

Number of good students in mathematics = 72% of 25

$= \frac{72}{100} \times 25 = 18$

Number of students not good in mathematics = 25 – 18 = 7

Hence percentage of students not good in mathematics = $\frac{7}{25} \times 100 = 28\%$

Question 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?

Answer 4:

Let total number of matches be x

According to question,

40% of total matches = 10

$\Rightarrow$ 40% of x = 10

$\Rightarrow \frac{40}{100} \times x = 10$

$\Rightarrow x = \frac{10 \times 100}{40} = 25$

Hence total number of matches are 25.

Question 5:

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

Answer 5:

Let her money in the beginning be ₹ x.

According to question,

$x - 75\% \text{ of } x = 600$

$$\Rightarrow \quad x - \frac{75}{100} \times x = 600$$

$$\Rightarrow \quad x - \frac{3}{4}x = 600$$

$$\Rightarrow \quad x\left(1 - \frac{3}{4}\right) = 600$$

$$\Rightarrow \quad x\left(\frac{4-3}{4}\right) = 600$$

$$\Rightarrow \quad x = 600 \text{ x } 4 = ₹\ 2400$$

Hence the money in the beginning was ₹ 2,400.

Question 6:

If 60% people in a city like cricket, 30% like football and the remaining like other games, then what percent 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.

Answer 6:

Number of people who like cricket = 60%

Number of people who like football = 30%

Number of people who like other games = 100% – (60% + 30%) = 10%

Now Number of people who like cricket = 60% of 50,00,000

$$= \frac{60}{100} \times 50,00,000 = 30,00,000$$

And Number of people who like football = 30% of 50,00,000

$$= \frac{30}{100} \times 50,00,000 = 15,00,000$$

$\therefore$ Number of people who like other games = 10% of 50,00,000

$$= \frac{10}{100} \times 50,00,000 = 5,00,000$$

Hence, number of people who like other games are 5 lakh.

Exercise 8.2

Question 1:

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

Answer 1:

Let original salary be ₹ 100.

Therefore New salary i.e., 10% increase = 100 + 10 = ₹ 110

$\because$ New salary is ₹ 110, when original salary = ₹ 100

$\therefore$ New salary is ₹ 1, when original salary = $\frac{100}{110}$

$\therefore$ New salary is ₹ 1,54,000, when original salary = $\frac{100}{110} \times 154000$ = ₹ 1,40,000

Hence original salary is ₹ 1,40,000.

Question 2:

On Sunday 845 people went to the Zoo. On Monday only 169 people went. What is the percent decrease in the people visiting the Zoo on Monday?

Answer 2:

On Sunday, people went to the Zoo = 845

On Monday, people went to the Zoo = 169

Number of decrease in the people = 845 – 169 = 676

Decrease percent = $\frac{676}{845} \times 100$ = 80%

Hence decrease in the people visiting the Zoo is 80%.

Question 3:

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

Answer 3:

No. of articles = 80

Cost Price of articles = ₹ 2,400

And Profit = 16%

$\because$ Cost price of articles is ₹ 100, then selling price = 100 + 16 = ₹ 116

$\therefore$ Cost price of articles is ₹ 1, then selling price = $\frac{116}{100}$

$\therefore$ Cost price of articles is ₹ 2400, then selling price = $\frac{116}{100} \times 2400$ = ₹ 2784

Hence, Selling Price of 80 articles = ₹ 2784

Therefore Selling Price of 1 article = $\frac{2784}{80}$ = ₹ 34.80

Question 4:

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

Answer 4:

Here, C.P. = ₹ 15,500 and Repair cost = ₹ 450

Therefore Total Cost Price = 15500 + 450 = ₹ 15,950

Let C.P be ₹ 100, then S.P. = 100 + 15 = ₹ 115

$\because$ When C.P. is ₹ 100, then S.P. = ₹ 115

$\therefore$ When C.P. is ₹ 1, then S.P. = $\frac{115}{100}$

$\therefore$ When C.P. is ₹ 15950, then S.P. = $\frac{115}{100} \times 15950$ = ₹ 18,342.50

Question 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.

Answer 5:

Cost price of VCR = ₹ 8000 and Cost price of TV = ₹ 8000

Total Cost Price of both articles = ₹ 8000 + ₹ 8000 = ₹ 16,000

Now VCR is sold at 4% loss.

Let C.P. of each article be ₹ 100, then S.P. of VCR = 100 – 4 = ₹ 96

$\because$ When C.P. is ₹ 100, then S.P. = ₹ 96

$\therefore$ When C.P. is ₹ 1, then S.P. = $\frac{96}{100}$

$\therefore$ When C.P. is ₹ 8000, then S.P. = $\frac{96}{100} \times 8000$ = ₹ 7,680

And TV is sold at 8% profit, then S.P. of TV = 100 + 8 = ₹ 108

$\because$ When C.P. is ₹ 100, then S.P. = ₹ 108

$\therefore$ When C.P. is ₹ 1, then S.P. = $\frac{108}{100}$

$\therefore$ When C.P. is ₹ 8000, then S.P. = $\frac{108}{100} \times 8000$ = ₹ 8,640

Then, Total S.P. = ₹ 7,680 + ₹ 8,640 = ₹ 16,320

Since S.P. > C.P.,

Therefore Profit = S.P. – C.P. = 16320 – 16000 = ₹ 320

And Profit% = $\frac{\text{Profit}}{\text{Cost Price}} \times 100 = \frac{320}{16000} \times 100$ = 2%

Question 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?

Answer 6:

Rate of discount on all items = 10%

Marked Price of a pair of jeans = ₹ 1450 and Marked Price of a shirt = ₹ 850

Discount on a pair of jeans = $\frac{\text{Rate} \times \text{M.P.}}{100} = \frac{10 \times 1450}{100}$ = ₹ 145

$\therefore$ S.P. of a pair of jeans = ₹ 1450 – ₹ 145 = ₹ 1305

Marked Price of two shirts = 2 x 850 = ₹ 1700

Discount on two shirts = $\frac{\text{Rate} \times \text{M.P.}}{100} = \frac{10 \times 1700}{100}$ = ₹ 170

$\therefore$ S.P. of two shirts = ₹ 1700 – ₹ 170 = ₹ 1530

Therefore, the customer had to pay = 1305 + 1530 = ₹ 2,835

Question 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)

Answer 7:

S.P. of each buffalo = ₹ 20,000

S.P. of two buffaloes = ₹ 20,000 x 2 = ₹ 40,000

One buffalo is sold at 5% gain.

Let C.P. be ₹ 100, then S.P. = 100 + 5 = ₹105

$\because$ When S.P. is ₹ 105, then C.P. = ₹ 100

$\therefore$ When S.P. is ₹ 1, then C.P. = $\frac{100}{105}$

$\therefore$ When S.P. is ₹ 20,000, then C.P. = $\frac{100}{105} \times 20000$ = ₹ 19,047.62

Another buffalo is sold at 10% loss.

Let C.P. be ₹ 100, then S.P. = 100 – 10 = ₹ 90

$\because$ When S.P. is ₹ 90, then C.P. = ₹ 100

$\therefore$ When S.P. is ₹ 1, then C.P. = $\frac{100}{90}$

$\therefore$ When S.P. is ₹ 20,000, then C.P. = $\frac{100}{90} \times 20000$ = ₹ 22,222.22

Total C.P. = ₹ 19,047.62 + ₹ 22,222.22 = ₹ 41,269.84

Since C.P. > S.P.

Therefore here it is loss.

Loss = C.P. – S.P. = ₹ 41,269.84 – ₹ 40,000.00 = ₹ 1,269.84

Question 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.

Answer 8:

C.P. = ₹ 13,000 and S.T. rate = 12%

Let C.P. be ₹ 100, then S.P. for purchaser = 100 + 12 = ₹ 112

∵ When C.P. is ₹ 100, then S.P. = ₹ 112

∴ When C.P. is ₹ 1, then S.P. = $\frac{112}{100}$

∴ When C.P. is ₹ 13,000, then S.P. = $\frac{112}{100} \times 13000$ = ₹ 14,560

Question 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.

Answer 9:

S.P. = ₹1,600 and Rate of discount = 20%

Let M.P. be ₹ 100, then S.P. for customer = 100 – 20 = ₹ 80

∵ When S.P. is ₹ 80, then M.P. = ₹ 100

∴ When S.P. is ₹1, then M.P. = $\frac{100}{80}$

∴ When S.P. is ₹1600, then M.P. = $\frac{100}{80} \times 1600$ = ₹ 2,000

Question 10:

I purchased a hair-dryer for ₹ 5,400 including 8% VAT. Find the price before VAT was added.

Answer 10:

C.P. = ₹ 5,400 and Rate of VAT = 8%

Let C.P. without VAT is ₹100, then price including VAT = 100 + 8 = ₹ 108

∵ When price including VAT is ₹ 108, then original price = ₹ 100

$\therefore$ When price including VAT is ₹ 1, then original price = $\frac{100}{108}$

$\therefore$ When price including VAT is ₹ 5400,

then original price = $\frac{100}{108} \times 5400$ = ₹ 5000

Exercise 8.3

Question 1:

Calculate the amount and compound interest on:

(a) ₹ 10,800 for 3 years at $12\frac{1}{2}\%$ per annum compounded annually.

(b) ₹ 18,000 for $2\frac{1}{2}$ years at 10% per annum compounded annually.

(c) ₹ 62,500 for $1\frac{1}{2}$ years at 8% per annum compounded annually.

(d) ₹ 8,000 for 1 years at 9% per annum compounded half yearly. (You could the year by year calculation using S.I. formula to verify).

(e) ₹ 10,000 for 1 years at 8% per annum compounded half yearly.

Answer 1:

(a) Here,

Principal (P) = ₹ 10800, Time (n) = 3 years,

Rate of interest (R) = $12\frac{1}{2}\% = \frac{25}{2}\%$

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

$= 10800\left(1+\frac{25}{2\times 100}\right)^3$

$= 10800\left(1+\frac{1}{2\times 4}\right)^3$

$= 10800\left(1+\frac{1}{8}\right)^3$

$= 10800\left(\frac{9}{8}\right)^3$

$= 10800\times\frac{9}{8}\times\frac{9}{8}\times\frac{9}{8}$

= ₹ 15,377.34

Compound Interest (C.I.) = A – P = ₹ 10800 – ₹15377.34 = ₹4,577.34

(b) Here,

Principal (P) = ₹ 18,000, Time $(n) = 2\frac{1}{2}$ years, Rate of interest (R) = 10% p.a.

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

$= 18000\left(1+\frac{10}{100}\right)^2$

$= 18000\left(1+\frac{1}{10}\right)^2$

$= 18000\left(\frac{11}{10}\right)^2$

$= 18000\times\frac{11}{10}\times\frac{11}{10}$

= ₹ 21,780

Interest for $\frac{1}{2}$ years on ₹ 21,780 at rate of 10% = $\frac{1}{2}\times\frac{21780\times10\times1}{100}$ = ₹ 1,089

Total amount for $2\frac{1}{2}$ years = ₹ 21,780 + ₹ 1089 = ₹ 22,869

Compound Interest (C.I.) = A – P = ₹ 22869 – ₹ 18000 = ₹ 4,869

(c) Here,

Principal (P) = ₹ 62500, Time $(n) = 1\frac{1}{2} = \frac{3}{2}$ years = 3 half-years (compounded half yearly)

Rate of interest (R) = 8% = 4% (compounded half yearly)

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

$= 62500\left(1+\frac{4}{100}\right)^2 = 62500\left(1+\frac{1}{25}\right)^3$

$= 62500\left(\frac{26}{25}\right)^3$

$= 62500\times\frac{26}{25}\times\frac{26}{25}\times\frac{26}{25}$ = ₹ 70,304

Compound Interest (C.I.) = A – P = ₹ 70304 – ₹ 62500 = ₹ 7,804

(d) Here,

Principal (P) = ₹ 8000, Time (n) = 1 years = 2 half-years(compounded half yearly)

Rate of interest (R) = 9% = $\frac{9}{2}$% (compounded half yearly)

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

$= 8000\left(1+\frac{9}{2\times100}\right)^2$

$= 8000\left(1+\frac{9}{200}\right)^2$

$= 8000\left(\frac{209}{200}\right)^2$

$= 8000\times\frac{209}{200}\times\frac{209}{200}$

= ₹ 8,736.20

Compound Interest (C.I.) = A – P = ₹ 8736.20 – ₹ 8000 = ₹ 736.20

(e) Here,

Principal (P) = ₹ 10,000, Time (n) = 1 years = 2 half-years (compounded half yearly)

Rate of interest (R) = 8% = 4% (compounded half yearly)

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

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

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

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

$= 10000\times\frac{26}{25}\times\frac{26}{25}$ = ₹ 10,816

Compound Interest (C.I.) = A – P = ₹ 10,816 – ₹ 10,000 = ₹ 816

Question 2:

Kamala borrowed ₹ 26,400 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).

Answer 2:

Here,

Principal (P) = ₹ 26,400, Time (n) = 2 years 4 months, Rate of interest (R) = 15% p.a.

Amount for 2 years (A) = $P\left(1+\frac{R}{100}\right)^n$

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

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

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

$= 26400\times\frac{23}{20}\times\frac{23}{20}$

= ₹ 34,914

Interest for 4 months = $\frac{4}{12}=\frac{1}{3}$ years at the rate of 15%

$=\frac{1}{3}\times\frac{34914\times15\times1}{100}$ = ₹ 1745.70

$\therefore$ Total amount = ₹ 34,914 + ₹ 1,745.70

= ₹ 36,659.70

Question 3:

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

Answer 3:

Here,

Principal (P) = ₹ 12,500, Time (T) = 3 years, Rate of interest (R) = 12% p.a.

Simple Interest for Fabina = $\frac{P \times R \times T}{100} = \frac{12500 \times 12 \times 3}{100}$ = ₹ 4,500

Amount for Radha, P = ₹ 12,500, R = 10% and n = 3 years

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

$= 12500\left(1+\frac{10}{100}\right)^3$

$= 12500\left(1+\frac{1}{10}\right)^3$

$= 12500\left(\frac{11}{10}\right)^3$

$= 12500 \times \frac{11}{10} \times \frac{11}{10} \times \frac{11}{10}$

= ₹ 16,637.50

$\therefore$ C.I. for Radha = A – P = ₹ 16,637.50 – ₹ 12,500 = ₹ 4,137.50

Here, Fabina pays more interest = ₹ 4,500 – ₹ 4,137.50 = ₹ 362.50

Question 4:

I borrows ₹ 12,000 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?

Answer 4:

Here,

Principal (P) = ₹12,000, Time (T) = 2 years, Rate of interest (R) = 6% p.a.

Simple Interest = $\frac{P \times R \times T}{100} = \frac{12000 \times 6 \times 2}{100}$ = ₹ 1,440

Had he borrowed this sum at 6% p.a., then

Compound Interest $= P\left(1+\frac{R}{100}\right)^n - P$

$= 12000\left(1+\frac{6}{100}\right)^2 - 12000$

$= 12000\left(1+\frac{3}{50}\right)^2 - 12000$

$= 12000\left(\frac{53}{50}\right)^2 - 12000$

$= 12000 \times \frac{53}{50} \times \frac{53}{50} - 12000$

= ₹ 13,483.20 – ₹ 12,000

= ₹ 1,483.20

Difference in both interests = ₹ 1,483.20 – ₹ 1,440.00 = ₹ 43.20

Question 5:

Vasudevan invested ₹ 60,000 at an interest rate of 12% per annum compounded half yearly. What amount would he get:

(i) after 6 months?

(ii) after 1 year?

Answer 5:

Here, Principal (P) = ₹ 60,000,

Time (n) = 6 months = 1 half-year (compounded half yearly)

Rate of interest (R) = 12% = 6% (compounded half yearly)

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

$$= 60000\left(1+\frac{6}{100}\right)^{1}$$

$$= 60000\left(1+\frac{3}{50}\right)^{1}$$

$$= 60000\left(\frac{53}{50}\right)^{1}$$

$$= 60000\times\frac{53}{50} = ₹\ 63{,}600$$

After 6 months Vasudevan would get amount ₹ 63,600.

(ii) Here, Principal (P) = ₹ 60,000,

Time (n) = 1 year = 2 half-years (compounded half yearly)

Rate of interest (R) = 12% = 6% (compounded half yearly)

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

$$= 60000\left(1+\frac{6}{100}\right)^{2}$$

$$= 60000\left(1+\frac{3}{50}\right)^{2}$$

$$= 60000\left(\frac{53}{50}\right)^{2}$$

$$= 60000\times\frac{53}{50}\times\frac{53}{50} = ₹\ 67{,}416$$

After 1 year Vasudevan would get amount ₹ 67,416.

Question 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.

Answer 6:

(i) Here,

Principal (P) = ₹ 80,000, Time $(n) = 1\frac{1}{2}$ years, Rate of interest (R) = 10%

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

$= 80000\left(1+\frac{10}{100}\right)^1$

$= 80000\left(1+\frac{1}{10}\right)^1$

$= 80000\left(\frac{11}{10}\right)^1$

= ₹ 88,000

Interest for $\frac{1}{2}$ year = $\frac{88000\times10\times1}{100\times2}$ = ₹ 4,400

Total amount = ₹ 88,000 + ₹ 4,400 = ₹ 92,400

(ii) Here, Principal (P) = ₹ 80,000,

Time $(n) = 1\frac{1}{2}$ year = 3 half-years (compounded half yearly)

Rate of interest (R) = 10% = 5% (compounded half yearly)

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

$= 80000\left(1+\frac{5}{100}\right)^3$

$= 80000\left(1+\frac{1}{20}\right)^3$

$= 80000\left(\frac{21}{20}\right)^3$

$= 80000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$ = ₹ 92,610

Difference in amounts = ₹ 92,610 – ₹ 92,400 = ₹ 210

Question 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 third year.

Answer 7:

(i) Here,

Principal (P) = ₹ 8000, Rate of Interest (R) = 5%, Time (n) = 2 years

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

$$= 8000\left(1+\frac{5}{100}\right)^2$$

$$= 8000\left(1+\frac{1}{20}\right)^2$$

$$= 8000\left(\frac{21}{20}\right)^2$$

$$= 8000\times\frac{21}{20}\times\frac{21}{20} = ₹\ 8{,}820$$

(ii) Here,

Principal (P) = ₹ 8000, Rate of Interest (R) = 5%, Time (n) = 3 years

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

$$= 8000\left(1+\frac{5}{100}\right)^3$$

$$= 8000\left(1+\frac{1}{20}\right)^3$$

$$= 8000\left(\frac{21}{20}\right)^3$$

$$= 8000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20} = ₹\ 9{,}261$$

Interest for 3rd year = A – P = ₹ 9,261 – ₹ 8,820 = ₹ 441

Question 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?

Answer 8:

Here,
Principal (P) = ₹ 10000, Rate of Interest (R) = 10% = 5% (compounded half yearly)
Time (n) = $1\frac{1}{2}$ years = 3 half-years (compounded half yearly)

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

$= 10000\left(1+\frac{5}{100}\right)^{3}$

$= 10000\left(1+\frac{1}{20}\right)^{3}$

$= 10000\left(\frac{21}{20}\right)^{3}$

$= 10000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$ = ₹ 11,576.25

Compound Interest (C.I.) = A – P = ₹ 11,576.25 – ₹ 10,000 = ₹ 1,576.25

If it is compounded annually, then

Here, Principal (P) = ₹ 10000, Rate of Interest (R) = 10%, Time (n) = $1\frac{1}{2}$ years

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

$= 10000\left(1+\frac{10}{100}\right)^{1}$

$= 10000\left(1+\frac{1}{10}\right)^{1}$

$= 10000\left(\frac{11}{10}\right)^{1}$

$= 10000 \times \frac{11}{10} = ₹\ 11{,}000$

Interest for $\frac{1}{2}$ year $= \frac{11000 \times 1 \times 10}{2 \times 100} = ₹\ 550$

$\therefore$ Total amount = ₹ 11,000 + ₹ 550 = ₹ 11,550

Now, C.I. = A – P = ₹ 11,550 – ₹ 10,000 = ₹ 1,550

Yes, interest ₹ 1,576.25 is more than ₹ 1,550.

Question 9:

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

Answer 9:

Here, Principal (P) = ₹ 4096,

Rate of Interest (R) = $12\frac{1}{2} = \frac{25}{2}\% = \frac{25}{4}\%$ (compounded half yearly)

Time (n) = 18 months = $1\frac{1}{2}$ years = 3 half-years (compounded half yearly)

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

$= 4096\left(1 + \frac{25}{4 \times 100}\right)^3$

$= 4096\left(1 + \frac{1}{4 \times 4}\right)^3$

$= 4096\left(\frac{17}{16}\right)^3$

$= 4096 \times \frac{17}{16} \times \frac{17}{16} \times \frac{17}{16}$

= ₹ 4,913

Question 10:

The population of a place increased to 54,000 in 2003 at a rate of 5% per annum.

(i) Find the population in 2001.

(ii) What would be its population in 2005?

Answer 10:

(i) Here, $A_{2003} = 54{,}000$, $R = 5\%$, $n = 2$ years

Population would be less in 2001 than 2003 in two years.

Here population is increasing.

$$\therefore \quad A_{2003} = P_{2001}\left(1+\frac{R}{100}\right)^{n}$$

$$\Rightarrow \quad 54000 = P_{2001}\left(1+\frac{5}{100}\right)^{2}$$

$$\Rightarrow \quad 54000 = P_{2001}\left(1+\frac{1}{20}\right)^{2}$$

$$\Rightarrow \quad 54000 = P_{2001}\left(\frac{21}{20}\right)^{2}$$

$$\Rightarrow \quad 54000 = P_{2001}\times\frac{21}{20}\times\frac{21}{20}$$

$$\Rightarrow \quad P_{2001} = \frac{54000\times 20\times 20}{21\times 21}$$

$$\Rightarrow \quad P_{2001} = 48{,}980 \text{ (approx.)}$$

(ii) According to question, population is increasing.

Therefore population in 2005,

$$A_{2005} = P\left(1+\frac{R}{100}\right)^{n}$$

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

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

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

$$= 54000\times\frac{21}{20}\times\frac{21}{20} = 59{,}535$$

Hence population in 2005 would be 59,535.

Question 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.

Answer 11:

Here, Principal (P) = 5,06,000, Rate of Interest (R) = 2.5%, Time (n) = 2 hours

After 2 hours, number of bacteria,

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

$$= 506000\left(1+\frac{2.5}{100}\right)^2$$

$$= 506000\left(1+\frac{25}{1000}\right)^2$$

$$= 506000\left(1+\frac{1}{40}\right)^2$$

$$= 506000\left(\frac{41}{40}\right)^2$$

$$= 506000\times\frac{41}{40}\times\frac{41}{40} = 5,31,616.25$$

Hence, number of bacteria after two hours are 531616 (approx.).

Question 12:

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

Answer 12:

Here, Principal (P) = ₹ 42,000, Rate of Interest (R) = 8%, Time (n) = 1 years

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

$$= 42000\left(1-\frac{8}{100}\right)^1$$

$$= 42000\left(1+\frac{2}{25}\right)^{1}$$

$$= 42000\left(\frac{27}{25}\right)^{1}$$

$$= 42000\times\frac{27}{25} = ₹\ 38{,}640$$

Hence, the value of scooter after one year is ₹ 38,640.