Notes
Chapter – 8
Comparing Quantities

- **Ratio:** Comparing by division is called ratio. Quantities written in ratio have the same unit. Ratio has no unit. Equality of two ratios is called proportion.
- Product of extremes = Product of means
- **Percentage**: Percentage means for every hundred. The result of any division in which the divisor is 100 is a percentage. The divisor is denoted by a special symbol %, read as percent.
- **Profit and Loss**:

(i) **Cost Price** (CP): The amount for which an article is bought.
(ii) **Selling Price (SP):** The amount for which an article is sold.

- Additional expenses made after buying an article are included in the cost price and are known as **overhead expenses**. These may include expenses like amount spent on repairs, labour charges, transportation, etc.
- **Discount** is a reduction given on marked price. Discount = Marked Price – Sale Price.
- Discount can be calculated when discount percentage is given. Discount = Discount % of Marked Price
- Additional expenses made after buying an article are included in the cost price and are known as
- **overhead expenses.** CP = Buying price + Overhead expenses
- Sales tax is charged on the sale of an item by the government and is added to the Bill Amount. Sales tax = Tax% of Bill Amount
- **Simple Interest**: If the principal remains the same for the entire loan period, then the interest paid is called simple interest. SI=P×R×T / 100
- Compound interest is the interest calculated on the previous year's amount (A = P + I)

(i) Amount when interest is compounded annually =P(1+R100)n P is principal, R is rate of interest, n is time period
(ii) Amount when interest is compounded half yearly
$=P(1+R / 100)^{2n}$[R/ 2 is, half yearly rate and 2n = number 'half–years'

CHAPTER - 8

Comparing Quantities (Ex.8.1)

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 Rs. 5

Ans. (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) $\because$ 1 km = 1000m

$\therefore$ 10 km = 10×1000 = 10000 m

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

(c) $\because$ Rs 1 = 100 paise

$\therefore$ Rs 5 = 5×100 = 500 paise

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

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

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

$)0\ \% = 66\frac{2}{3}\%$

3. 72% of 25 students are g

Ans. 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 = $\frac{7}{25} \times 100 = 28\%$

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?

Ans. 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 is 25.

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

Ans. Total percentage of money she didn't spent = 100% - 75%=25%

According to question,

$\Rightarrow$ 25% = 600

$\Rightarrow$ 1% = 600/25

$\Rightarrow$ 100% $\frac{600}{25} \times 100$

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

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.

Ans. 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.

Ex.8.2

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

Ans. Let original salary be Rs.100.

Therefore New salary i.e., 10% increase

= 100 + 10 = Rs.110

∵ New salary is Rs.110, when original salary = Rs.100 ∴

New salary is Rs.1, when original salary = $\frac{100}{110}$

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

Hence original salary is Rs. 1,40,000.

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?

Ans. 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%.

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

Ans. No. of articles = 80

Cost Price of articles = Rs. 2,400

And Profit = 16%

∵ Cost price of articles is Rs.100, then selling price = 100 + 16 = Rs.116 ∴ Cost price of articles is Rs.1, then selling price = $\frac{116}{100}$

∴ Cost price of articles is Rs.2400, then selling price = $\frac{116}{100} \times 2400$ = Rs.2784

Hence, Selling Price of 80 articles = Rs.2784 Therefore Selling Price of 1 article

= $\frac{2784}{80}$ = Rs.34.80

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

Ans. Here, C.P. = Rs.15, 500 and Repair cost = Rs.450 Therefore Total Cost Price = 15500 + 450 = Rs.15,950 Let C.P. be Rs.100, then S.P. = 100 + 15 = Rs.115

∵ When C.P. is Rs.100, then S.P. = Rs.115 ∴ When C.P. is Rs.1, then SP = $\frac{115}{100}$

∴ When C.P. is Rs.15,950, then S.P.=

$\frac{115}{100} \times 15950$ = Rs.18, 342.50

5. A VCR and TV were bought for Rs.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.

Ans. Cost price of VCR = Rs.8000 and Cost price of TV = Rs.8000 Total

Cost Price of both articles

= Rs.8000 + Rs.8000 = Rs. 16,000

Now VCR is sold at 4% loss.

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

∵ When C.P. is Rs.100, then S.P. = Rs.96 ∴

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

∴ When C.P. is Rs.8000, then S.P.

$= \frac{96}{100} \times 8000$ = Rs.7,680

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

∵ When C.P. is Rs.100, then S.P. = Rs.108 ∴

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

∴ When C.P. is Rs.8000, then S.P.=

$\frac{108}{100} \times 8000$ = Rs.8, 640

than Total S.P = = Rs.7,680 + Rs.8,640 = Rs. 16,320

Since S.P. >C.P.,

Therefore Profit = S.P. – C.P.

= 16320 – 16000 = Rs.320

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

$= \frac{320}{16000} \times 100$ = 2%

Therefore, 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 Rs.1450and two shirts marked at Rs.850 each?

Ans. Rate of discount on all items = 10%

Marked Price of a pair of jeans = Rs.1450 and Marked Price of a shirt = Rs.850 Discount on a pair of jeans

$= \frac{\text{Rate} \times \text{M.P.}}{100} = \frac{10 \times 1450}{100}$ = Rs.145

∴ S.P. of a pair of jeans = Rs.1450 – Rs.145 = Rs.1305

Marked Price of two shirts = 2×850 = Rs.1700

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

∴S.P. of two shirts = Rs.1700 – Rs.170 = Rs.1530

∴ the customer had to pay = 1305 + 1530

= Discount on a pair of jeans

$= \frac{\text{Rate} \times \text{M.P.}}{100} = \frac{10 \times 1450}{100}$

= Rs.145

∴ S.P. of a pair of jeans

= Rs.1450 – Rs.145 = Rs.2,835

Thus, the customer will have to pay Rs.2, 835

7. A milkman sold two of his buffaloes for Rs.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)

Ans. S.P. of each buffalo = Rs.20,000

S.P. of two buffaloes = $₹ 20,000 \times 2$ = Rs.40,000

One buffalo is sold at 5% gain.

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

∵ When S.P. is Rs.105, then C.P. = Rs.100 ∴

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

∴ When S.P. is Rs.20,000, then C.P.

$= \frac{100}{105} \times 20000$ = Rs.19,047.62

Another buffalo is sold at 10% loss.

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

∵ When S.P. is Rs.90, then C.P. = Rs.100

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

∴ When S.P. is Rs.20,000, then C.P.

$= \frac{100}{90} \times 20000$ = Rs.22,222.22

Total C.P. = Rs.19, 047.62 + Rs.22, 222.22

= Rs.41, 269.84

Since C.P.>S.P.

Therefore here it is loss.

Loss = C.P. S.P.

= Rs.41, 269.84 – Rs. 40,000.00 = Rs.1, 269.84

The overall loss of milkman was Rs.1269.84

8. The price of a TV is Rs.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.

Ans. C.P. = Rs.13,000 and S.T. rate = 12% Let

C.P. be Rs.100, then S.P. for purchaser

= 100 + 12 = Rs.112

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

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

∴ When C.P is Rs.13, 000, then S.P. =

$\frac{112}{100} \times 13000$ = Rs.14, 560

He will have to pay Rs.14, 560.

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

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

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

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

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

∴ When S.P. is Rs.1600, then M.P.

$= \frac{100}{80} \times 1600$ = Rs.2,000

Thus, the marked price was Rs.2,000

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

Ans. C.P. = Rs.5, 400 and Rate of VAT = 8%

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

∵ When price including VAT is Rs.108, then original price = Rs.100 ∴

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

∴ When price including VAT is Rs.5400, then original price = $\frac{100}{108} \times 5400$ = Rs.5000

Thus, the price of Hair Dryer before the addition of VAT was Rs 5000

11. An article was purchased for Rs. 1239 including GST of 18%. Find the price of the article before GST was added?

Ans. Given, GST = 18%

Cost with GST included = Rs. 1239

Cost without GST = x Rs.

x + (18/100× x) = 1239

Cost before GST + GST = cost with GST x + (9x/50) = 1239

x = 1050

Price before GST = 1050 rupees

Ex.8.3

1. Calculate the amount and compound interest on:

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

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

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

(d) **Rs.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) **Rs.10, 000 for** 1 **years at 8% per annum compounded half yearly.**

Ans. (a) Here, Principal (P) = Rs. 10800, Time (n) = 3 years, Rate

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

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

$= 10800\left(1+\frac{25}{2\times100}\right)^3 = 10800\left(1+\frac{1}{2\times4}\right)^3$

$= 10800\left(1+\frac{1}{8}\right)^3 = 10800\left(\frac{9}{8}\right)^3$

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

= Rs. 15,377.34 (approx.)

Compound Interest (C.I.) = A –P

= Rs. 10800 – Rs. 15377.34 = Rs. 4,577.34

(b) Here, Principal (P) = Rs. 18,000, Time (n) = years, Rate of interest (R)

= 10% p.a.

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

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

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

= Rs. 21,780

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

Total amount for $2\frac{1}{2}$ years

= Rs. 21,780 + Rs. 1089 = Rs. 22,869

Compound Interest (C.I.) = A –P

= Rs. 22869 – Rs. 18000 = Rs. 4,869

(c) Here, Principal (P) = Rs. 62500, Time (n) = $1\frac{1}{2} = \frac{3}{2}$ years = 3 years (compounded half yearly)

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

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

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

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

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

$= 62500 \times \frac{26}{25} \times \frac{26}{25} \times \frac{26}{25}$

= Rs. 70,304

Compound Interest (C.I.) = A –P

= Rs. 70304 – Rs. 62500 = Rs. 7,804

(d) Here, Principal (P) = Rs. 8000, Time (n) = 1 years = 2 years(compounded half yearly) Rate of interest (R) = 9% = $\frac{9}{2}\%$ (compounded half yearly)

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

$= 8000\left(1+\frac{9}{2\times100}\right)^2 = 8000\left(1+\frac{9}{200}\right)^2$

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

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

= Rs. 8,736.20

Compound Interest (C.I.) = A –P

= Rs. 8736.20 – Rs. 8000

= Rs. 736.20

(e) Here, Principal (P) = Rs. 10,000, Time (n) = 1 years = 2 years (compounded half yearly) Rate of interest (R) = 8% = 4% (compounded half yearly)

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

Amount (A) =

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

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

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

$= 10000\times\frac{26}{25}\times\frac{26}{25}$

= Rs. 10,816

Compound Interest (C.I.) = A –P

= Rs. 10,816 – Rs. 10,000 = Rs. 816

2. Kamala borrowed Rs.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).

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

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

$= 26400\left(1+\frac{15}{100}\right)^2 = 26400\left(1+\frac{3}{20}\right)^2$

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

= Rs. 34,914

Interest for 4 months = $\frac{4}{12}=\frac{1}{3}$ years at the rate of 15% = $\frac{34914\times15\times1}{100}$

= Rs. 1745.70

∴ Total amount = Rs. 34,914 + Rs. 1,745.70

= Rs. 36,659.70

3. **Fabina borrows Rs.12,500 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?**

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

Simple Interest for F $\frac{P\times R\times T}{100}$

= $\frac{12500\times12\times3}{100}$ = Rs. 4,500

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

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

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

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

= Rs. 16,637.50

∴ C.I. for Radha = A – P

= Rs. 16,637.50 – Rs. 12,500 = Rs. 4,137.50

Thus, Fabina pays more interest

= Rs. 4,500 – Rs. 4,137.50 = Rs. 362.50

4. **I borrows Rs.12, 000 from Jam shed 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?**

Ans. Here, Principal (P) = Rs.12,000, Time (T) = 2 years, Rate of interest (R) = 6% p.a. Simple Interest

$$= \frac{P \times R \times T}{100}$$

$$= \frac{12000 \times 6 \times 2}{100} = \text{Rs. } 1,440$$

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

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

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

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

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

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

= Rs. 13,483.20 – Rs. 12,000

= Rs. 1,483.20

Difference in both interests

= Rs. 1,483.20 – Rs. 1,440.00 = Rs. 43.20

Thus, the extra amount to be paid is Rs.43.20

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

(i) After 6 months?

(ii) after 1year?

Ans. (i) Here, Principal (P) = Rs. 60,000, Time (n) = 6 months = 1 year(compounded half yearly)
Rate of interest (R) = 12% = 6% (compounded half yearly)

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

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

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

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

= $60000\times\frac{53}{50}$

= Rs.63,600

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

(ii) Here, Principal (P) = Rs. 60,000,

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

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

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

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

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

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

$60000\times\frac{53}{50}\times\frac{53}{50}$

=

= Rs. 67,416

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

6. Arif took a loan of Rs.80, 000 from a bank. If the rate of interest is 10% per annum, find the difference in amounts he would be paying after $1\frac{1}{2}$ year if the interest is:

(i) Compounded annually.

(ii) Compounded half yearly.

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

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

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

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

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

= Rs. 88,000

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

= Rs. 4,400

Total amount = Rs. 88,000 + Rs. 4,400 = Rs. 92,400

(ii) Here, Principal (P) = Rs.80, 000,

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

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

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

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

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

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

= $80000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 92,610

Difference in amounts

= Rs. 92,610 – Rs. 92,400 = Rs. 210

7 . Maria invested Rs.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.

Ans. (i) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 2 years

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

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

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

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

$= 8000\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 8,820

(ii) Here, Principal (P) = Rs. 8000, Rate of Interest (R) = 5%, Time (n) = 3 years Amount

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

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

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

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

$= 8000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 9,261

Interest for 3rd year = A – P

= Rs. 9,261 – Rs. 8,820 = Rs. 441

8. Find the amount and the compound interest on Rs.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?

Ans. Here, Principal (P) = Rs. 10000, Rate of Interest (R) = 10% = 5% (compounded half yearly)

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

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

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

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

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

= $10000\times\frac{21}{20}\times\frac{21}{20}\times\frac{21}{20}$

= Rs. 11,576.25

Compound Interest (C.I.) = A –P

= Rs. 11,576.25 – Rs. 10,000 = Rs. 1,576.25

If it is compounded annually, then

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

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

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

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

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

$= 10000\times\frac{11}{10}$

= Rs. 11,000

Interest for $\frac{1}{2}$ year = $\frac{11000\times1\times10}{2\times100}$ = Rs. 550

∴ Total amount = Rs. 11,000 + Rs. 550

= Rs. 11,550

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

= Rs. 1,550

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

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

Principal (P) = Rs. 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 years (compounded half yearly)

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

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

$= 4096\left(1+\frac{1}{4\times4}\right)^3$

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

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

= Rs. 4,913

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?

Ans. (i) Here, A_{2003} = Rs. 54,000, R = 5%, n = 2 years

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

population is increasing.

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

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

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

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

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

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

=48,979.5

$\Rightarrow P_{2001} =$ 48,980 (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.

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.

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

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.).

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

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

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

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

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

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

$= 42000\times\frac{27}{25}$

= Rs. 38,640

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