Comparing Quantities Using Proportion

Exercise 5.1

Q. 1. A. Find the ratio of the following

Smita works in office for 6 hours and Kajal works for 8 hours in her office. Find the ratio of their working hours.

Answer : Number of working hours of smita = 6 hours

Number of working hours of kajal = 8 hours

The formula for finding the ratio of their working hours is as follows

$$\text{Ratio} = \frac{\text{Number of working hours of smita}}{\text{Number of working hours of Kajal}}$$

$$= \frac{6 \text{ hours}}{8 \text{ hours}}$$

$$= \frac{6}{8} = \frac{3 \times 2}{4 \times 2}$$

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

∴ The ratio of their working hours is 3:4

Q. 1. B. Find the ratio of the following

One pot contains 8 litre of milk while other contains 750 milliliter.

Answer : One pot of milk = 8 litre

Other pot of milk = 750 milliliter

The formula for finding the ratio is as follows

$$\text{Ratio} = \frac{\text{One pot of milk}}{\text{Other pot of milk}}$$

1 litre = 1000 milliliter

∴ 8 litre = 8000 milliliter

$$\text{Ratio} = \frac{8000}{750} = \frac{800}{75}$$

$$= \frac{800}{25} : \frac{75}{25}$$

= 32:3

∴ The ratio is 32:3

Q. 1. C. Find the ratio of the following

speed of a cycle is 15km/h and speed of the scooter is 30km/h.

Answer : Speed of a cycle = 15km/h

Speed of the scooter = 30km/h

The formula for finding the ratio between the speed of cycle and the scooter is as follows

$$\text{Ratio} = \frac{\text{Speed of a cycle}}{\text{Speed of the scooter}}$$

$$= \frac{15}{30}$$

$$= \frac{1 \times 15}{2 \times 15}$$

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

∴ The ratio of their working hours is 1:2

Q. 2. If the compound ratio of 5:8 and 3:7 is 45:x. Find the value of x.

Answer : The compound ratio of 5:8 and 3:7 = 45:x

Here from the given ratios, a = 5,b = 8,c = 3 and d = 7.Then

$$\frac{5}{8} \times \frac{3}{7} = \frac{45}{X}$$

If a:b and c:d are any ratios, then their compound ratio $= \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

So, ac:bd

$$\Rightarrow \frac{5}{8} \times \frac{3}{7} = \frac{15}{56}$$

$$\Rightarrow \frac{15}{56} = \frac{45}{X}$$

$$\Rightarrow \frac{X}{45} = \frac{56}{15}$$

$$\Rightarrow X = \frac{56 \times 45}{15} = \frac{2520}{15}$$

$$\Rightarrow X = 168$$

∴ The Value of X is 168

Q. 3. If the compound ratio of 7:5 and 8:x is 84:60. Find x.

Answer : The compound ratio of 7:5 and 8:x = 84:60

Here from the given ratios, a = 7,b = 5,c = 8 and d = X. Then

$$\frac{7}{5} \times \frac{8}{X} = \frac{84}{60}$$

If a:b and c:d are any ratios, then their compound ratio $= \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

So, ac:bd

$$\Rightarrow \frac{7}{5} \times \frac{8}{X} = \frac{56}{5X}$$

$$\Rightarrow \frac{56}{5X} = \frac{84}{60}$$

$$\Rightarrow \frac{5X}{56} = \frac{60}{84}$$

$$\Rightarrow 5X = \frac{60 \times 56}{84} = \frac{3360}{84}$$

$$\Rightarrow 5X = 40$$

$$\Rightarrow X = \frac{40}{5}$$

$$\Rightarrow X = 8$$

∴ The Value of X is 8

Q. 4. The compound ratio of 3:4 and the inverse ratio of 4:5 is 45:x. Find x.

Answer : The compound ratio of 3:4 and the inverse ratio of 4:5 = 45:x

The inverse ratio of 4:5 = 5:4

Here from the given ratios, a = 3,b = 4,c = 5 and d = 4.Then

$$\frac{3}{4} \times \frac{5}{4} = \frac{45}{X}$$

If a:b and c:d are any ratios, then their compound ratio $= \frac{a}{b} \times \frac{c}{d} = \frac{ac}{bd}$

So, ac:bd

$\Rightarrow \frac{3}{4} \times \frac{5}{4} = \frac{15}{16}$

$\Rightarrow \frac{15}{16} = \frac{45}{X}$

$\Rightarrow \frac{X}{45} = \frac{16}{15}$

$\Rightarrow X = \frac{16 \times 45}{15} = \frac{720}{15}$

$\Rightarrow X = 48$

$\therefore$ The Value of X is 48

Q. 5. In a primary school there shall be 3 teachers to 60 students. If there are 400 students enrolled in the school, how many teachers should be there in the school in the same ratio?

Answer : Number of teachers for 60 students = 3

Number of teachers for 400 students = X

The ratio of students = 60:400

The ratio of teachers = 3: X

The ratio of teachers = The ratio of students

60:400 = 3:X

$$\Rightarrow \frac{60}{400} = \frac{3}{X}$$

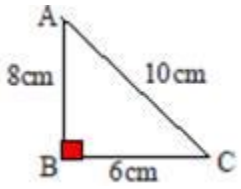
$$\Rightarrow X = \frac{400 \times 3}{60} = \frac{1200}{60}$$

$$\Rightarrow X = 20$$

∴ There are 20 teachers for 400 students in the school

Q. 6. In the given figure, ABC is a triangle. Write all possible ratios by taking measures of sides pair wise.

(Hint: Ratio of AB:BC = 8:6)



Answer : In the given triangle, the measurement of the side AB = 8 cm

The measurement of the side BC = 6 cm

The measurement of the side AC = 10 cm

$$\text{The ratio of AB: BC} = \frac{\text{The measurement of the side AB}}{\text{The measurement of the side BC}}$$

$$= \frac{8}{6}$$

$$= \frac{4 \times 2}{3 \times 2} = \frac{4}{3}$$

∴ The ratio of AB:BC = $\frac{4}{3}$

$$\text{The ratio of AB : AC} = \frac{\text{The measurement of the side AB}}{\text{The measurement of the side AC}}$$

$$= \frac{8}{10}$$

$$= \frac{4 \times 2}{5 \times 2} = \frac{4}{5}$$

∴ The ratio of AB:AC = $\frac{4}{5}$

$$\text{The ratio of BC} : \text{AC} = \frac{\text{The measurement of the side BC}}{\text{The measurement of the side AC}}$$

$$= \frac{6}{10}$$

$$= \frac{3 \times 2}{5 \times 2} = \frac{3}{5}$$

∴ The ratio of BC:AC = $\frac{3}{5}$

$$\text{The ratio of BC} : \text{AB} = \frac{\text{The measurement of the side BC}}{\text{The measurement of the side AB}}$$

$$= \frac{6}{8}$$

$$= \frac{3 \times 2}{4 \times 2} = \frac{3}{4}$$

∴ The ratio of BC:AB = $\frac{3}{4}$

$$\text{The ratio of AC} : \text{AB} = \frac{\text{The measurement of the side AC}}{\text{The measurement of the side AB}}$$

$$= \frac{10}{8}$$

$$= \frac{5 \times 2}{4 \times 2} = \frac{5}{4}$$

∴ The ratio of AC:AB = $\frac{5}{4}$

$$\text{The ratio of AC : BC} = \frac{\text{The measurement of the side AC}}{\text{The measurement of the side BC}}$$

$$= \frac{10}{6}$$

$$= \frac{5 \times 2}{3 \times 2} = \frac{5}{3}$$

∴ The ratio of AC:AB = $\frac{5}{3}$

Q. 7. If 9 out of 24 students scored below 75% marks in a test. Find the ratio of student scored below 75% marks to the student scored 75% and above marks.

Answer : Given that the total number of students = 24

Number of students scored below 75% marks in a test = 9

Number of students scored 75% and above marks in a test = The total number of students - Number of students scored below 75% marks

⇒ 24-9 = 15

$$\text{Ratio} = \frac{\text{Numberof students scored below 75\% marks}}{\text{Number of students scored 75\% and above marks}}$$

$$= \frac{9}{15}$$

$$= \frac{3 \times 3}{5 \times 3} = \frac{3}{5}$$

∴ The ratio of student scored below 75% marks to the student scored 75% and above marks is $\frac{3}{5}$

Q. 8. Find the ratio of number of vowels in the word' MISSISSIPPI' to the number of consonants in the simplest form.

Answer : The number of vowels in the word' MISSISSIPPI' = 4(I) = 4

The number of consonants in the word' MISSISSIPPI' = (1M, 4S, 2P) = 7

$$\text{Ratio} = \frac{\text{number of vowels}}{\text{number of consonants}}$$

$$= \frac{4}{7}$$

Or

The number of vowels in the word' MISSISSIPPI' = (I) = 1

The number of consonants in the word' MISSISSIPPI' = (M, S, P) = 3

$$\text{Ratio} = \frac{\text{number of vowels}}{\text{number of consonants}}$$

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

∴ The ratio is 4:7 or 1:3

Q. 9. Rajendra and Rehana own a business. Rehana receives 25% of the profit in each month. If Rehana received 2080 in particular month, what is the total profit in that month?

Answer : The % of profit received by rehana in each month = 25%

The amount received by rehana at particular month = 2080

Let the total profit = X

25% of X = 2080

Here % compares every number to 100,

$$\frac{25}{100} \times X = 2080$$

$$X = \frac{2080 \times 100}{25} = 2080 \times 4$$

X = 8320

∴ The total profit in that month is Rs. 8320

Q. 10. In triangle ABC, AB = 2.2 cm, BC = 1.5 cm and AC = 2.3 cm. In triangle XYZ, XY = 4.4 cm, YZ = 3 cm and XZ = 4.6 cm. Find the ratio AB:XY, BC:YZ, AC:XZ. Are the lengths of corresponding sides of ΔABC and ΔXYZ are in proportion?

[Hint: Any two triangles are said to be in proportion, if their corresponding sides are in the same ratio]

Answer : Given that,

In triangle ABC,

AB = 2.2 cm

BC = 1.5 cm

AC = 2.3 cm

In triangle XYZ,

XY = 4.4 cm

YZ = 3 cm

XZ = 4.6 cm

To Find the ratio AB:XY,

$$\text{The ratio of AB : XY} = \frac{\text{The length of the side AB}}{\text{The length of the side XY}}$$

$$= \frac{2.2}{4.4}$$

$$= \frac{1 \times 2.2}{2 \times 2.2} = \frac{1}{2}$$

∴ The ratio of AB:XY = $\frac{1}{2}$

To Find the ratio BC:YZ,

$$\text{The ratio of BC : YZ} = \frac{\text{The length of the side BC}}{\text{The length of the side YZ}}$$

$$= \frac{1.5}{3}$$

$$= \frac{1 \times 1.5}{2 \times 1.5} = \frac{1}{2}$$

∴ The ratio of BC:YZ = $\frac{1}{2}$

To Find the ratio AC:XZ,

$$\text{The ratio of AC : XZ} = \frac{\text{The length of the side AC}}{\text{The length of the side XZ}}$$

$$= \frac{2.3}{4.6}$$

$$= \frac{1 \times 2.3}{2 \times 2.3} = \frac{1}{2}$$

∴ The ratio of AC:XZ = $\frac{1}{2}$

∴ The ratios of AB:XY, BC:YZ, AC:XZ are $\frac{1}{2}, \frac{1}{2}, \frac{1}{2}$

Here, the lengths of corresponding sides of ΔABC and ΔXYZ are in proportion because their corresponding sides are in the same ratio $\frac{1}{2}$.

Q. 11. Madhuri went to a super market. The price changes are as follows. The price of rice reduced by 5% jam and fruits reduced by 8% and oil and dal increased by 10%. Help Madhuri to find the changed prices in the given table.

Item	Original price/kg	Changed price
Rice	Rs. 30	
Jam	Rs. 100	
Apple	Rs. 280	
Oil	Rs. 120	
Dal	Rs. 80	

Answer : To find the changed price of Rice,

Original price = Rs. 30

Reduction = 5% of 30

$$= \frac{5}{100} \times 30$$

= 1.5

Changed Price = Original price – Reduction

= 30 – 1.5

= Rs. 28.5

∴ The changed price of rice is Rs. 28.5

To find the changed price of Jam,

Original price = Rs. 100

Reduction = 8% of 100

$$= \frac{8}{100} \times 100$$

= 8

Changed Price = Original price – Reduction

= 100 – 8

= Rs. 92

∴ The changed price of jam is Rs. 92

To find the changed price of Apples,

Original price = Rs. 280

Reduction = 8% of 280

$$= \frac{8}{100} \times 280 \; = \; 0.08 \times 280$$

= 22.4

Changed Price = Original price – Reduction

= 280 – 22.4

= Rs. 257.6

∴ The changed price of apples is Rs. 257.6

To find the changed price of Oil,

Original price = Rs. 120

Increased price = 10% of 120

$$= \frac{10}{100} \times 120$$

= 12

Changed Price = Original price + Increased price

= 120 + 12

= Rs. 132

∴ The changed price of oil is Rs. 132

To find the changed price of Dal,

Original price = Rs. 80

Increased price = 10% of 80

$$= \frac{10}{100} \times 80$$

= 8

Changed Price = Original price + Increased price

= 80 + 8

= Rs. 88

∴ The changed price of dal is Rs. 88

∴ The changed prices are as follows

Item	Original price/kg	Changed price
Rice	Rs. 30	Rs. 28.5
Jam	Rs. 100	Rs. 92
Apple	Rs. 280	Rs. 257.6
Oil	Rs. 120	Rs. 132
Dal	Rs. 80	Rs. 88

Q. 12. A. There were 2075 members enrolled in the club during last year. This year enrolment is decreased by 4% .

Find the decrease in enrolment.

Answer : Number of members enrolled in the club during last year = 2075

Decreased percentage of enrolment = 4%

Decrease in enrolment = 4% of 2075

$$= \frac{4}{100} \times 2075 = \frac{8300}{100}$$

= 83

∴ The decrease in enrolment is 83 members

Q. 12. B. There were 2075 members enrolled in the club during last year. This year enrolment is decreased by 4% .

How many members are enrolled during this year?

Answer : Members enrolled this year = Members enrolled last year - decrease in enrolment

Number of members enrolled in the club during last year = 2075

Decrease in enrolment = 83

∴ Members enrolled this year = 2075 – 83

= 1992

∴ Members enrolled this year is 1992 members.

Q. 13. A farmer obtained a yielding of 1720 bags of cotton last year. This year she expects her crop to be 20% more. How many bags of cotton does she expect this year?

Answer : Number of bags of cotton yielded last year = 1720

Expected crop in this year in % = 20% of 1720

$$20\ \%\ \text{of}\ 1720 = \frac{20}{100} \times 1720$$

= 344

Expected cotton bags in this year = Number of bags of cotton yielded last year + Expected crop

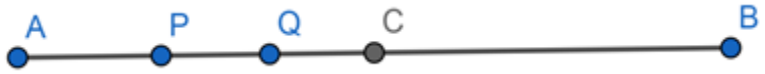
= 1720 + 344

= 2064 bags

∴ Expected cotton bags in this year is 2064 bags

Q. 14. Points P and Q are both in the line segment AB and on the same side of its midpoint. P divides AB in the ratio 2:3, and Q divides AB in the ratio 3:4. If PQ = 2, then find the length of the line segment AB.

Answer : From the given, draw a line segment below



Let the length of the line segment AB = X

P divides AB in the ratio = 2:3

$$\text{Thus the length of AP} = \frac{2X}{2+3} = \frac{2X}{5}$$

The length of PB = AB-AP

$$= X - \frac{2X}{5}$$

$$= \frac{3X}{5}$$

∴PB = $\frac{3x}{5}$

Q divides AB in the ratio = 3:4

Thus the length of AQ = $\frac{3X}{3+4} = \frac{3X}{7}$

The length of QB = AB-AQ

$$= X - \frac{3X}{7}$$

$$= \frac{4X}{7}$$

∴ QB = $\frac{4x}{7}$

The length of PQ in the line segment = AQ-AP

$$= \frac{3X}{7} - \frac{2X}{5}$$

B y solving this,

$$= \frac{15X - 14X}{35}$$

$$PQ = \frac{X}{35}$$

Given, PQ = 2

$$\therefore \frac{X}{35} = 2$$

X = 35 × 2

∴ X = 70

The length of the line segment AB is 70 cm

Exercise 5.2

Q. 1. In the year 2012, it was estimated that there were 36.4 crore Internet users worldwide. In the next ten years, that number will be increased by 125%. Estimate the number of Internet users worldwide in 2022.

Answer : Internet users in the year 2012 = 36.4 crore

% of Increase in the next ten years = 125%

$$125\% \text{ of } 36.4 = \frac{125}{100} \times 36.4$$

= 45.5

Number of Internet users in the year 2022 = Number of Internet users in the year 2012 + Increased users

= 36.4 + 45.5

= 81.9 crore

∴ The number of Internet users worldwide in the year 2022 is 81.9 crore

Q. 2. A owner increases the rent of his house by 5% at the end of each year. If currently its rent is Rs. 2500 per month, how much will be the rent after 2 years?

Answer : Rent of the house = Rs. 2500

% of Increase in each year = 5%

Rent increase in first year :

5% of 2500 = $\frac{5}{100} \times 2500$

= 125

Rent increase in first year = Rent of the house + increase in %

= 2500 + 125

= Rs. 2625

Rent increase in second year :

5% of 2625 = $\frac{5}{100} \times 2625$

= 131.25

Rent increase in second year = Rent of the house in first year + increase in %

= 2625 + 131.25

= Rs. 2756.25

∴ The rent after 2 years is Rs. 2756.25

Q. 3. On Monday, the value of a company's shares was Rs. 7.50. The price increased by 6% on Tuesday, decreased by 1.5% on Wednesday, and decreased by 2% on Thursday. Find the value of each share when trade opened on Friday.

Answer : The value of a company's shares on Monday = Rs. 7.50

To find the value of a company's shares on Tuesday,

Value on Monday = Rs. 7.50

% Increase = 6% of 7.50

$= \frac{6}{100} \times 7.50$

= 0.45

Value on Tuesday = Value on Monday + value on Increase percentage

= 7.50 + 0.45

= Rs. 7.95

∴ The Value on Tuesday is Rs. 7.95

To find the value of a company's shares on Wednesday,

Value on Tuesday = Rs. 7.95

% decrease = 1.5% of 7.95

$$= \frac{1.5}{100} \times 7.95$$

= 0.11925

Value on Wednesday = Value on Tuesday - value on decrease percentage

= 7.95 – 0.11925

= Rs. 7.83075

∴ The Value on Wednesday is Rs. 7.83075

Value on Thursday = Rs. 7.83075

% decrease = 2% of 7.83075

$$= \frac{2}{100} \times 7.83075$$

= 0.156

Value on Thursday = Value on Wednesday - value on decrease percentage

= 7.83075-0.156

= Rs. 7.674

∴ The Value on Thursday is Rs. 7.674

The value of share when opened on Friday is equal to the Thursday's closing price.

∴ The opening Value of the share on Friday is Rs. 7.674

Q. 4. With most of the Xerox machines, you can reduce or enlarge your original by entering a percentage for the copy. Reshma wanted to enlarge a 2 cm by 4 cm drawing. She set the Xerox machine for 150% and copied her drawing. What will be the dimensions of the copy of the drawing be?

Answer : The original size of the drawing = 2cm × 4cm

Size to be enlarged = 150%

Enlarged new size = 150% of 2cm × 4cm

150% of 2cm = $\frac{150}{100} \times 2$

= 3 cm

150% of 4cm = $\frac{150}{100} \times 4$

= 6 cm

∴ The dimensions of the copy of the drawing is 3 × 6 cm

Q. 5. The printed price of a book is Rs. 150. And discount is 15%. Find the actual amount to be paid.

Answer : The printed price of a book = Rs. 150

Discount = 15%

= 15% of 150

$$= \frac{15}{100} \times 150$$

= 22.5

The actual amount to pay = printed price of a book – discount

= 150 – 22.5

= Rs. 127.50

∴ The actual amount to be paid is Rs. 127.50

Q. 6. The marked price of an gift item is Rs. 176 and sold it for Rs. 165. Find the discount percent.

Answer : Market price = Rs. 176

Sale price = Rs. 165

Discount = Market price - Sale price

= 176 – 165

Discount = 11

$$\text{Discount percent} = \frac{\text{Discount}}{\text{market price}} \times 100$$

$$\text{Discount percent} = \frac{11}{176} \times 100 = \frac{1100}{176}$$

$$= 6.25\% \text{ or } 6\frac{1}{4}\%$$

$$\therefore \text{The discount percent of an gift item is } 6\frac{1}{4}\%$$

Q. 7. A shop keeper purchased 200 bulbs for Rs. 10 each. However 5 bulbs were fused and put them into scrap. The remaining were sold at Rs. 12 each. Find the gain or loss percent.

Answer : Number of bulbs purchased at Rs. 10 = 200

Purchase price = 200 × 10 = Rs. 2000

If 5 bulbs were defective, remaining bulbs = 195

Sale price = 12

Sale price of 195 bulbs = 195×12 = Rs. 2340

Profit = sale price – purchase price

= 2340 – 2000

= Rs. 340

$$\text{Profit percent} = \frac{\text{profit}}{\text{purchase price}} \times 100$$

$$= \frac{340}{2000} \times 100$$

$$= \frac{34}{2}$$

= 17%

∴ The gain percent is 17%

Q. 8. Complete the following table with appropriate entries (Wherever possible)

S. No.	Cost Price (C.P.)	Expenses	Selling Price(S.P.)	Profit	Loss	Profit Percentage	Loss Percentage
1	` 750	` 50		` 80			
2	` 4500	` 500			` 1,000		
3	` 46,000	` 4000	` 60,000				
4	` 300	` 50				12%	
5	` 330	` 20					10%

Answer : 1) Given that, cost price = ‘ 750

Expense = Rs. 50

Profit = Rs. 80

Selling price = cost price+ Expense + profit

= 750 + 50 + 80

∴ Selling price = Rs. 880

Purchase price = cost price+ Expense

= 750+50

= Rs. 800

$$\text{Profit percent} = \frac{\text{profit}}{\text{purchase price}} \times 100$$

$$= \frac{80}{800} \times 100$$

= 10%

∴ Profit percent = 10%

2) Given that, cost price = 4500

Expense = Rs. 500

Loss = Rs. 1000

Selling price = cost price+ Expense - loss

= 4500 + 500 – 1000

∴ Selling price = Rs. 4000

Purchase price = cost price + Expense

= 4500+500

= Rs. 5000

$$\text{loss percent} = \frac{\text{loss}}{\text{purchase price}} \times 100$$

$$= \frac{1000}{5000} \times 100$$

= 20%

∴ Loss percent = 20%

3) Given that, cost price = ‘ 46000

Expense = Rs. 4000

Selling price = Rs. 60000

Purchase price = cost price+ Expense

= 46000 + 4000

= Rs. 50000

Profit = selling price – purchase price

= 60000 – 50000

= Rs. 10000

∴ Profit = Rs. 10000

$$\text{Profit percent} = \frac{\text{profit}}{\text{purchase price}} \times 100$$

$$= \frac{10000}{50000} \times 100$$

= 20%

∴ Profit percent = 20%

4) Given that, cost price = ‘ 300

Expense = Rs. 50

Profit percent = 12%

Purchase price = cost price + Expense

= 300 + 50

= Rs. 350

$$\text{Profit} = \text{purchase price} \times \text{Profit percent}$$

$$= 350 \times \frac{12}{100}$$

= Rs. 42

∴ Profit = Rs. 42

Selling price = purchase price + profit

= 350 + 42

= Rs. 392

∴ Selling price = Rs. 392

5) Given that, cost price = ‘ 330

Expense = Rs. 20

Loss percent = 10%

Purchase price = cost price+ Expense

= 330 + 20

= Rs. 350

$$\text{loss} = \text{purchase price} \times \text{loss percent}$$

$$= 350 \times \frac{10}{100}$$

= Rs. 35

∴ Loss = Rs. 35

Selling price = purchase price - loss

= 350 – 35

= Rs. 315

∴ Selling price = Rs. 315

S. No.	Cost Price (C.P.)	Expenses	Selling Price(S.P.)	Profit	Loss	Profit Percentage	Loss Percentage
1	‘750	Rs. 50	Rs. 880	Rs. 80	-	10%	-
2	‘4500	Rs. 550	Rs. 4000	-	Rs. 1,000	-	20%
3	Rs. 46,000	Rs. 4000	Rs. 60,000	Rs. 10000	-	20%	-
4	Rs. 300	Rs. 50	Rs. 392	Rs. 42	-	12%	-
5	Rs. 330	Rs. 20	Rs. 315	-	Rs. 35	-	10%

Q. 9. A table was sold for Rs. 2,142 at a gain of 5%. At what price should it be sold to gain 10%.

Answer : Selling price = Rs. 2142

Profit percent = 5%

Let the cost price of the table = X

$$\text{Profit} = \text{cost price} \times \text{Profit percent}$$

$$= \frac{5X}{100}$$

Selling price = cost price + profit

$$\Rightarrow X + \frac{5X}{100} = 2142$$

$$\Rightarrow \left(1 + \frac{5}{100}\right)X = 2142$$

$$\Rightarrow 105X = 214200$$

$$\Rightarrow X = 2040$$

∴ Cost price = Rs. 2040

Then, For the profit of 10%

$$\text{Profit} = \text{cost price} \times \text{Profit percent}$$

$$= 2040 \times \frac{10}{100}$$

= Rs. 204

Selling price = cost price + profit

= 2040+204

= 2244

∴ The selling price of the table at 10% profit is Rs. 2244

Q. 10. Gopi sold a watch to Ibrahim at 12% gain and Ibrahim sold it to John at a loss of 5%. If John paid Rs. 1,330, then find how much did Gopi sold it?

Answer : Given that,

Profit percent of gopi = 12%

S.P of Ibrahim = Rs. 1330

Loss percent of Ibrahim = 5%

Let the cost price of gopi = X

S.P of Gopi = C.P of Ibrahim = 12%

$$\text{profit} = \text{cost price} \times \text{profit percent}$$

$= \frac{12X}{100}$ = 0.12X

Selling price = cost price + profit

$\Rightarrow X + 0.12X$

$\Rightarrow (1 + 0.12)X$

$\Rightarrow 1.12X$

∴ S.P of gopi = 1.12X = C.P of Ibrahim

To find the S.P of Ibrahim,

$$\text{loss} = \text{cost price} \times \text{loss percent}$$

$$= 1.12X \times \frac{5}{100}$$

= 0.056X

∴ Loss = 0.056X

Selling price = Cost price - loss

= 1.12X – 0.056X

= 1.064X

∴ Selling price of I brahim = 1.064X

Given, S.P of Ibrahim = Rs. 1330

⇒1.064X = 1330

$\Rightarrow X = \frac{1330}{1.064}$

X = 1250

∴ The cost price of gopi is Rs. 1250

Q. 11. Madhu and Kavitha purchased a new house for Rs. 3,20,000. Due to some economic problems they sold the house for Rs. 2, 80,000.

Find (a) The loss incurred (b) the loss percentage.

Answer : Given that, C.P of house = Rs. 3,20,000

S.P of house = Rs. 2,80,000

(a) loss = cost price – selling price

= 320000 – 280000

= 40000

∴ The loss incurred is Rs. 40000

$(b) \text{loss percent} = \frac{\text{loss}}{\text{c.p}} \times 100$

$= \frac{40000}{320000} \times 100$

$= \frac{40000}{3200}$

= 12.5

∴ The loss percentage is 12.5%

Q. 12. A pre-owned car show-room owner bought a second-hand car for Rs. 1,50,000. He spent Rs. 20,000 on repairs and painting, then sold it for Rs. 2,00,000. Find whether he gets profit or loss. If so, what percent?

Answer : Purchase price of a car = Rs. 1,50,000

Repairs and painting = Rs. 20,000

Selling price = Rs. 2,00,000

Total cost price = purchasing price + Repair charges

= Rs. 1,50,000 + Rs. 20,000

= Rs. 1,70,000

∴ Cost price = Rs. 1,70,000

Here, selling price > cost price, so there is a profit.

Profit = selling price - cost price

= 2,00,000 - 1,70,000

= 30,000

∴ Profit = Rs. 30,000

On cost price of Rs. 1,70,000 profit is 30,000

If cost price is Rs. 100, profit will be?

$$\text{profit percent} = \frac{\text{profit}}{\text{c. p}} \times 100$$

$$= \frac{30000}{170000} \times 100$$

$$= \frac{30000}{1700}$$

= 17.65%

∴ Profit percent = 17.65%

Q. 13. Lalitha took a parcel from a hotel to celebrate her birthday with her friends. It was billed with Rs. 1,450 including 5% VAT. Lalitha asked for some discount, the hotel owner gave

8% discount on the bill amount. Now find the actual amount that lalitha has to pay to the hotel owner

Answer : The cost of parcel including 5% VAT = Rs. 1450

Discount given by the hotel owner = 8%

Actual discount = 8% of 1450

$$= 1450 \times \frac{8}{100}$$

= 116

∴ Actual discount = Rs. 116

The actual amount paid by lalitha = bill amount – actual discount

= 1450 – 116

= Rs. 1334

∴ The actual amount paid by lalitha is Rs. 1334.

Q. 14. If VAT is included in the price, find the original price of each of the following.

S. No.	Item	VAT %	Bill amount (in Rs.)	Original Price (in Rs.)
(i)	Diamond	1%	Rs. 10,100	
(ii)	Pressure cooker	5%	Rs. 2,940	
(iii)	Face powder	14.5%	Rs. 2,940	

Answer : (i) Bill amount of diamond = Rs. 10100

VAT = 1%

Original price = Bill amount - VAT

= 10100 - 1% of 10100

$$= 10100 - (\frac{1}{100} \times 10100)$$

$$= 10100 - 101$$

$= 9999$

∴ The original price of diamond is Rs. 9999

(ii) Bill amount of pressure cooker = Rs. 2940

VAT = 5%

Original price = Bill amount - VAT

= 2940 – 5% of 2940

$= 2940 - (\frac{5}{100} \times 2940)$

$= 2940 - 147$

$= 2793$

∴ The original price of pressure cooker is Rs. 2793

(iii) Bill amount of face powder = Rs. 229

VAT = 14.5%

Original price = Bill amount - VAT

= 229 – 14.5% of 229

$= 229 - (\frac{14.5}{100} \times 229)$

$= 229 - 33.205$

$= 195.795$

∴ The original price of face powder is Rs. 195.80(approximate)

Q. 15. Find the buying price of each of the following items when a sales tax of 5% is added on them.

(i) a towel of Rs. 50
(ii) Two bars of soap at Rs. 35 each.

Answer : (i) cost of a towel = Rs. 50

Sales tax on a towel = 5% of 50

$$= \frac{5}{100} \times 50$$

= Rs. 2.5

∴ Sales tax on a towel = Rs. 2.5

Buying price = cost + sales tax

= 50+2.5

= Rs. 52.5

∴ The buying price of a towel = Rs. 52.5

(ii) cost of a soap bar = Rs. 35

Cost of two soap bars = 35×2 = Rs. 70

Sales tax on a soap bars = 5% of 70

$$= \frac{5}{100} \times 70$$

= Rs. 3.5

∴ Sales tax on a towel = Rs. 3.5

Buying price = cost + sales tax

= 70 + 3.5

= Rs. 73.5

∴ The buying price of a soap bars = Rs. 73.5

Q. 16. A Super-Bazar prices an item in rupees and paise so that when 4% sales tax is added, no rounding is necessary because the result is exactly in 'n' rupees, where 'n' is a positive integer. Find the smallest value of 'n'.

Answer : Let the final rupees of an item = n

Let the initial rupees before tax = x

Sales tax = 4%

Initial rupees + sales tax = final rupee

$$\Rightarrow X + \frac{4}{100}X = n$$

$$X + \frac{1}{25}X = n$$

$$\frac{26}{25}X = n$$

$$X = n\frac{25}{26}$$

Here, n should be the factor of 26.so, the factor of 26 are 1,2,13,26.

For X to be terminating decimal, n can be either 13 or 26. 13 is smaller

∴ n = 13

Exercise 5.3

Q. 1. Sudhakar borrows Rs. 15000 from a bank to renovate his house. He borrows the money at 9% p.a. simple interest over 8 years. What are his monthly repayments?

Answer : Principal (P) = Rs. 15000

Time period (T) = 8

Rate of interest (R) = 9%

$$I = \frac{PTR}{100}$$

$$I = \frac{15000 \times 8 \times 9}{100}$$

I = Rs. 10800

∴ Interest for 8 years is Rs. 10800

Amount to be paid at the end of 8 years = Principal + interest

Amount = 15000+10800

= 25800

∴ Amount to be paid at the end of 8 years is Rs. 25800

$$\text{Monthly repayment} = \frac{\text{amount}}{\text{number of months}}$$

⇒ Monthly repayment = $\frac{25800}{8\times12}$

= 268.75

∴ Sudhakar pays Rs. 268.75 monthly.

Q. 2. A TV was bought at a price of Rs. 21000. After 1 year the value of the TV was depreciated by 5% (Depreciation means reduction of the value due to use and age of the item). Find the value of the TV after 1 year.

Answer : Cost price of TV = Rs. 21000

Depreciation = 5%

Depreciation after 1 year = 5% of 21000

$$= \frac{5}{100} \times 21000$$

∴ Depreciation after 1 year = Rs. 1050

Value of TV after 1 year = cost price – depreciation

= 21000 – 1050

= Rs. 19950

∴The value of TV after 1 year is Rs. 19,950

Q. 3. Find the amount and the compound interest on Rs. 8000 at 5% per annum, for 2 years compounded annually.

Answer : Principal (P) = Rs. 8000

Time period (n) = 2

Rate of interest (R) = 5%

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

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

$= 8000 \times 1.05^2$

$= 8820$

∴ Amount = Rs. 8820

$$\text{Compound interest} = P(1+\frac{R}{100})^n - P$$

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

$= (8000 \times 1.05^2) - 8000$

$= 8820 - 8000$

$= 820$

∴ Compound Interest = Rs. 820

Q. 4. Find the amount and the compound interest on Rs. 6500 for 2 years, compounded annually, the rate of interest being 5% per annum during the first year and 6% per annum during the second year.

Answer : Principal (P) for 1st year = Rs. 6500

Rate of interest (R) for first year = 5%

Interest on first year = 5% of 6500

$$= \frac{5}{100} \times 6500$$

= 325

∴ Interest for 1st year = Rs. 325

Principal (P) for second year = Principal (P) for 1st year + Interest for 1st year

Principal (P) for second year = Rs. 6500 + Rs. 325 = Rs. 6825

Rate of interest (R) for second year = 6%

Interest on second year = 6% of 6825

$= \frac{6}{100} \times 6825$

= 409.5

∴ Interest for 2nd year = Rs. 409.5

Total interest = Rs. 325+Rs. 409.5 = Rs. 734.5

Amount at second year = Principal (P) for 2nd year + Interest for 2nd year

= 6825+409.5

= 7234.5

∴ Amount at second year = Rs. 7234.5

Q. 5. Prathibha borrows Rs. 47000 from a finance company to buy her first car. The rate of simple interest is 17% and she borrows the money over a 5 year period.

Find:
(a) How much amount Prathibha should repay the finance company at the end of five years.
(b) her equal monthly repayments.

Answer : (a) Principal (P) = Rs. 47000

Time period (T) = 5

Rate of interest (R) = 17%

$$I = \frac{PTR}{100}$$

$$I = \frac{47000 \times 5 \times 17}{100}$$

I = Rs. 39950

∴ Interest for 5 years is Rs. 39950

Amount at the end of 5 years = Principal + interest

Amount = 47000+39950

= 86950

∴ Amount at the end of 5 years is Rs. 86950

(b)

$$\text{Monthly repayment} = \frac{\text{amount}}{\text{number of months}}$$

⇒ Monthly repayment = $\frac{86950}{5 \times 12}$

= 1449.17

∴ Prathibha's monthly repayment isRs. 1449.17.

Q. 6. The population of Hyderabad was 68,09,000 in the year 2011. If it increases at the rate of 4.7% per annum. What will be the population at the end of the year 2015.

Answer : The population of Hyderabad (P) = 68,09,000

Time period (n) = 2015-2011 = 4

Rate of interest (R) = 4.7%

$$\text{Population at 2015} = P(1 + \frac{R}{100})^n$$

$$= 6809000(1 + \frac{4.7}{100})^4$$

= 6809000×1.047^4

= 81821994

∴ The population of Hyderabad at the end of 2015 = 8,18,21,994

Q. 7. Find Compound interest paid when a sum of Rs. 10000 is invested for 1 year and 3 months at $8\frac{1}{2}$ % per annum compounded annually.

Answer : Principal (P) = Rs. 10000

Rate of interest (R) = 8.5%

Time period (T) = 1year 3 months

For T = 1 year,

$$I = \frac{PTR}{100}$$

$$I = \frac{10000 \times 1 \times 8.5}{100}$$

I = Rs. 850

∴ Interest for 1 year is Rs. 850

Amount at the end of 1 year = Principal + interest

Amount = 10000+850

= 10850

∴ Amount at the end of 1 year is Rs. 10850

For T = 3 months = $\frac{3}{12}\text{year} = \frac{1}{4}\text{year}$

$$I = \frac{PTR}{100}$$

$$I = \frac{10850 \times \frac{1}{4} \times 8.5}{100}$$

I = Rs. 230.56

∴ Interest for 1/4 year is Rs. 230.56

Amount at the end of 1/4 year = Principal + interest

Amount = 10850+230.56

= 11080.56

∴ Amount at the end of 1/4 year is Rs. 11080.56

Total interest for 1.3 year = Interest for 1 year + Interest for 1/4 year

= 850+230.56

= 1080.56

∴ The compound interest paid is Rs. 1080.56

Q. 8. 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 $\frac{1}{2}$ years, if the interest is compounded annually and compounded half yearly.

Answer : For compounded Annually

Principal (P) = Rs. 80000

Time period (n) = 1

Rate of interest (R) = 10%

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

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

= 80000×1.05^3

= 88000

∴ Amount for 1 year = Rs. 88000

$$\text{Rate of interest (R) for half year} = 10\%\times\frac{1}{2} = 5\%$$

= 4400

∴ Amount for 1.5 years = Rs. 88000+4400 = Rs. 92400

$$\text{Compound interest} = A - P$$

= 92400-80000

∴ Compound Interest = Rs. 12400

For compounded half yearly

Principal (P) = Rs. 80000

Time period (n) = 3

Rate of interest (R) for half year = 10%× $\frac{1}{2}$ = 5%

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

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

= 80000×1.05^3

= 92610

∴ Amount = Rs. 92610

$$\text{Compound interest} = A - P$$

= 92610-80000

∴ Compound Interest = Rs. 12610

∴ The difference in amounts = amount for For compounded half yearly - amount for compounded annually

= 92610-92400

= Rs. 210

∴ The difference in amounts is Rs. 210

Q. 9. I borrowed Rs. 12000 from Prasad at 6% per annum simple interest for 2 years. Had I borrowed this sum at 6% per annum compounded annually, what extra amount would I have to pay?

Answer : Principal (P) = Rs. 12000

Rate of interest (R) = 6%

Time period (T) = 2years

$$I = \frac{PTR}{100}$$

$$I = \frac{12000 \times 2 \times 6}{100}$$

I = Rs. 1440

∴ Interest for 2 years is Rs. 1440

This sum to be borrowed at 6% per annum compounded annually,

Principal (P) = Rs. 12000

Rate of interest (R) = 6%

Time period (n) = 2years

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

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

$= 12000 \times 1.06^2$

= 13483.2

∴ Amount = Rs. 13483.2

$$\text{Compound interest} = A - P$$

= 13483.2-12000

∴ Compound Interest = Rs. 1483.2

∴ The difference in interest = 1483.2 - 1440

= Rs. 43.2

∴ The difference in interest is Rs. 43.2

Q. 10. 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 : Principal (P) = 506000

Rate of interest (R) = 2.5%

Time period (n) = 2hours

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

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

$= 506000 \times 1.025^2$

= 531616.25

∴ The number of the bacteria at the end of 2 hours is 531616(approximately)

Q. 11. Kamala borrowed Rs. 26400 from a bank to buy a scooter at a rate of 15% per annum compounded yearly. What amount will she pay at the end of 2 years and 4 months to clear the loan?

Answer : Principal (P) = 26400

Rate of interest (R) = 15%

Time period (T) = 2 years and 4 months

Amount for 2 years,

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

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

= 26400×1.15^2

= Rs. 34914

∴ Amount for 2 year = Rs. 34914

Interest for remaining 4 months = $34914 \times 15 \times \frac{1}{3} \times \frac{1}{100}$

= 1745.70

∴ Total amount for 2 years and 4 months = Rs. 34914 + 1745.70

= Rs. 36659.70

∴ The total amount to clear the loan is Rs. 36659.70

Q. 12. Bharathi borrows an amount of Rs. 12500 at 12% per annum for 3 years at a simple interest and Madhuri borrows the same amount for the same time period at 10% per annum, compounded annually. Who pays more interest and by how much?

Answer : Principal (P) = Rs. 12500

Rate of interest (R) = 12%

Time period (T) = 3years

Interest paid by bharathi,

$I = \frac{PTR}{100}$

$I = \frac{12500 \times 3 \times 12}{100}$

I = Rs. 4500

∴ Interest paid by bharathi is Rs. 4500

Amount paid by madhuri,

Principal (P) = Rs. 12500

Rate of interest (R) = 10%

Time period (n) = 3years

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

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

$= 12500 \times 1.1^3$

= Rs. 16637.5

∴ Amount paid by madhuri is Rs. 16637.5

Interest = A-P

= Rs. 16637.5 – 12500

= Rs. 4137.5

∴ Interest paid by madhuri is Rs. 4137.5

On comparing the interests paid by bharathi and madhuri,

4500-4137.5 = 362.5

∴ Bharathi paid Rs.362.5 more than by madhuri.

Q. 13. Machinery worth Rs. 10000 depreciated by 5%. Find its value after 1 year.

Answer : Principal (P) = 10000

Depreciation (R) = 5%

Time period (n) = 1 year

$$\text{value after depreciation} = P(1-\frac{R}{100})^n$$

$$= 10000(1-\frac{5}{100})^1$$

$$= 10000 \times \frac{95}{100}$$

= Rs. 9500

∴ The value of machinery after 1 year is Rs. 9500

Q. 14. Find the population of a city after 2 years which is at present 12 lakh, if the rate of increase is 4%.

Answer : Present population (P) = 12 lakh

Rate of interest (R) = 4%

Time period (n) = 2years

$$\text{Population after 2 years} = P(1 + \frac{R}{100})^n$$

$$= 1200000(1 + \frac{4}{100})^2$$

= 1200000×1.04^2

= 1297920

∴ The population of a city after 2 years is 1297920

Q. 15. Calculate compound interest on Rs. 1000 over a period of 1 year at 10% per annum, if interest is compounded quarterly?

Answer : Principal (P) = 1000

Rate of interest (R) = 10%

Time period (n) = 1 year

For quarterly, n = 4

$$\text{Rate of interest (R) for quarterly} = \frac{10}{4} = \frac{5}{2}\%$$

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

$$= 1000(1 + \frac{\frac{5}{2}}{100})^4$$

$$= 1000(1 + \frac{2.5}{100})^4$$

$$= 1000(\frac{102.5}{100})^4$$

= 1103.81

∴ Amount = Rs. 1103.81

Interest = A-P

= 1103.81-1000

= 103.81

∴ Compound interest = Rs. 103.81