

5. Comparing Quantities Using Proportion

Exercise : 5.1

Q.1 Find the ratio of the following

i) Smits works in office for 6 hours & kajal works for 8 hours in her office. Find the ratio of their working hours.

$$\begin{aligned} \text{Ans:- } \frac{\text{Working hours of smita}}{\text{Working hours of kajal}} &= \frac{6}{8} = \frac{2 \times 3}{2 \times 4} \\ &= \frac{3}{4} = \underline{\underline{3:2}} \end{aligned}$$

ii) One pot contains 8 litre of milk while other contains 750 millilitre.

$$\begin{aligned} \text{Ans:- } \frac{\text{one pot}}{\text{other pot}} &= \frac{8 \text{ l}}{750 \text{ ml}} = \frac{8 \times 100 \cancel{\phi} \text{ (1 l = 1000 ml)}}{75 \cancel{\phi}} \\ &= \frac{8 \times 100 \cancel{4}}{75 \cancel{3}} = \frac{8 \times 4}{3} \\ &= \frac{32}{3} = \underline{\underline{32:3}} \end{aligned}$$

iii) Speed of cycle is 15 km/h & speed of scooter is 30 km/h

$$\text{Ans:- } \frac{\text{Speed of cycle}}{\text{Speed of scooter}} = \frac{15 \text{ km/h}}{30 \text{ km/h}} = \frac{1}{2} = \underline{\underline{1:2}}$$

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

Ans:- The compound ratio of 5:8 & 3:7 is

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

According to given

$$\frac{15}{56} = \frac{45}{x}$$

$$15 \times x = 56 \times 45$$

$$x = \frac{56 \times \cancel{45} 3}{15}$$

$$x = 56 \times 3$$

$$x = \underline{168}$$

∴ Value of x is 168.

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

Ans:- The compound ratio of 7:5 & 8:x

$$= \frac{7}{5} \times \frac{8}{x} = \frac{56}{5x}$$

According to given

$$\frac{56}{5x} = \frac{84}{60}$$

$$5X \times 84 = 56 \times 60$$

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

$$5X = \frac{14 \times 60}{3} = \frac{2 \times 60}{3}$$

$$X = \frac{2 \times 20}{5}$$

$$X = \underline{\underline{8}}$$

∴ Value of X is 8.

Q.4 The compound ratio of 3:4 & the inverse ratio of 4:5 is 45:X. Find X.

Ans:- The inverse ratio of 4:5 is 45:X

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

& The compound of 3:4 & 5:4 is 45:X

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

$$15X = 16 \times 45$$

$$X = \frac{16 \times 45}{15} = 16 \times 3$$

$$X = 48$$

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 school, how many teachers should be there in school in the same ratio?

In a school, 3 teachers to 60 students.

No. of teachers for 400 students

$$\text{is : } \frac{3}{60} = \frac{x}{400}$$

$$3 \times 400 = 60x$$

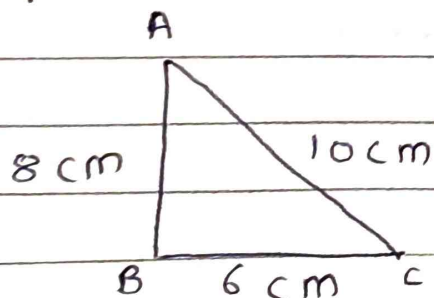
$$x = \frac{3 \times 400}{60}$$

$$x = \underline{\underline{20}}$$

\therefore 20 teachers for 400 students

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

Ans:-



$$AB = 8 \text{ cm}$$

$$BC = 6 \text{ cm}$$

$$AC = 10 \text{ cm}$$

In $\triangle ABC$,

$$\frac{AB}{BC} = \frac{8}{6} = \frac{4}{3} \quad AB:BC = 4:3$$

$$\frac{BC}{CA} = \frac{6}{10} = \frac{3}{5} \quad BC:AC = 3:5$$

$$\frac{CA}{AB} = \frac{10}{8} = \frac{5}{4} \quad CA:AB = 5:4$$

Q7 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% & above marks.

Out of 24 students, students who scored below 75% = 9

Students got 75% & above marks = $24 - 9$
= 15

Ratio of students scored below 75% = $\frac{9}{15}$
Ratio of students scored 75% or above = $\frac{15}{15}$
= $\frac{3}{5} = \underline{\underline{3:5}}$

Q.8 Find the ratio of a number of vowels in word MISSISSIPPI to no. of consonants in simplest form.

No. of vowels in word MISSISSIPPI
= 4 (I, I, I, I)

No. of consonants in word MISSISSIPPI
= 7 (M S S S S P P)

$$\frac{\text{Ratio of vowels}}{\text{Ratio of consonants}} = \frac{4}{7} = 4:7$$

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

Ans:- Suppose total profit is X.

$$\begin{aligned} \text{Rehna receives 25\% of } X &= \frac{25}{100} \times X \\ &= \frac{X}{4} \end{aligned}$$

From give condition,

$$\frac{X}{4} = 2080$$

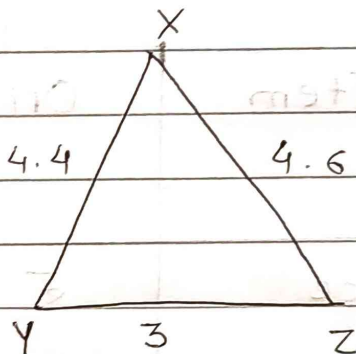
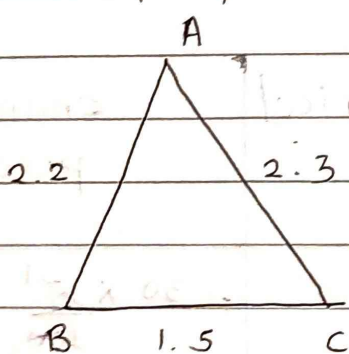
$$X = 4 \times 2080$$

$$X = \underline{\underline{₹ 8320}}$$

∴ Total profit is ₹ 8320.

Q10 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. Find the ratio AB:XY, BC:YZ, AC:XZ. Are the lengths of corresponding sides of $\triangle ABC$ & $\triangle XYZ$ are in proportion?

Ans:-



$$\frac{AB}{XY} = \frac{2.2}{4.4} = \frac{1}{2} ; \frac{BC}{YZ} = \frac{1.5}{3} = \frac{1}{2}$$

$$\frac{AC}{XZ} = \frac{2.3}{4.6} = \frac{1}{2}$$

$$\therefore \frac{AB}{XY} = \frac{BC}{YZ} = \frac{AC}{XZ}$$

∴ The corresponding sides of both triangles are in proportion.

$$\triangle ABC \sim \triangle XYZ$$

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

AAS:-

Item	Original price/ kg	changed price
1) Rice	₹ 30	$30 \times \frac{5}{100} = 1.5$ $\therefore 30 - 1.5 = \underline{\underline{₹ 28.5}}$
2) Jam	₹ 100	$100 \times \frac{8}{100} = 8$ $\therefore 100 - 8 = \underline{\underline{₹ 98}}$

3) Apples	₹ 280	$\frac{280 \times 8}{100} = \frac{224}{5} = 22.4$ $\therefore 280 - 22.4 = \underline{\underline{₹ 257.6}}$
4) Oil	₹ 120	$\frac{120 \times 10}{100} = 12$ $\therefore 120 + 12 = \underline{\underline{₹ 132}}$
5) Dal	₹ 80	$\frac{80 \times 10}{100} = 8$ $\therefore 80 + 8 = \underline{\underline{₹ 88}}$

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

- Find the decrease in enrolment.
- How many members are enrolled during this year?

Ans:- No. of persons are enrolled in last year = 2075

Present year no. of persons are enrolled = 4% less than previous year

a) Decrease in enrolment = 4% of 2075

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

$$= \frac{4}{100} \times 2075 = \frac{415}{5}$$

$$= \underline{\underline{83}}$$

b) No. of member are enrolled this year

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

$$= 2075 - 83 \text{ (From (a))}$$

$$= \underline{\underline{1992}}$$

13 A Farmer obtained a yielding of 1270 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?

Ans:- Last year yielding the bags of cotton = 1720

If she expects 20% to be more then

$$= 20\% \text{ of } 1720$$

$$= \frac{20}{100} \times 1720$$

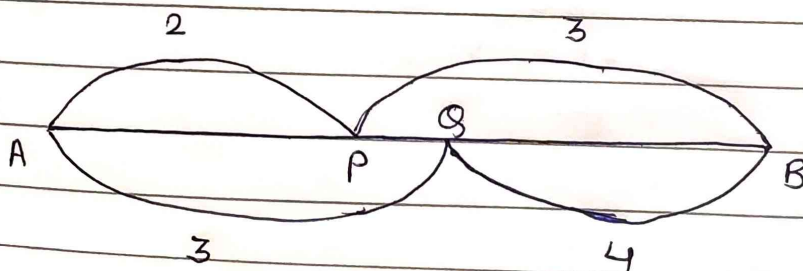
$$= \frac{1}{5} \times 1720$$

$$= \underline{344} \text{ bags}$$

She expect this year = $1720 + 344$
= 2064 bags.

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

Ans:-



Suppose the length of line segment
 $AB = X$

P divides AB in the ratio 2:3

$$\text{Length of AP} = \frac{2X}{2+3} = \frac{2X}{5}$$

$$\begin{aligned}\text{Length of PB} &= AB - AP \\ &= X - \frac{2X}{5}\end{aligned}$$

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

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

Q divides AB in the ratio 3:4

$$\text{Length of AQ} = \frac{3X}{3+4} = \frac{3X}{7}$$

$$\begin{aligned}\text{Length of QB} &= AB - AQ \\ &= X - \frac{3X}{7}\end{aligned}$$

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

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

$$\begin{aligned} \text{Length of } PQ &= AQ - AP \\ &= \frac{3x}{7} - \frac{2x}{5} \end{aligned}$$

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

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

$$PQ = 2 \text{ (given)}$$

$$2 = \frac{x}{35}$$

$$x = 35 \times 2$$

$$x = \underline{\underline{70}}$$

∴ 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, the number will be increased by 125%. Estimate the no. of Internet users worldwide in 2022.

Ans:- In 2012, Internet users in the year is 36.4 crores.

In next ten years, number will be increased by 125%.

In 2022, x no. of internet users

$$x = 36.4 + 125\% \text{ of } 36.4$$

$$= 36.4 + \frac{125}{100} \times 36.4$$

$$= 36.4 + \frac{5}{4} \times 36.4$$

$$= 36.4 + 5 \times 9.1$$

$$= 36.4 + 45.5$$

$$= \underline{81.9} \text{ Crores}$$

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

Ans: Current house rent = ₹ 2500

At the end of each year, owner increases rent by 5%, so rent of house after 2 years

$$= 2500 \left[1 + \frac{5}{100} \right]^2$$

$$= 2500 \left[1 + \frac{1}{20} \right]^2$$

$$= 2500 \left[\frac{20+1}{20} \right]^2$$

$$= 2500 \times \left(\frac{21}{20} \right)^2 = 2500 \times \frac{21}{20} \times \frac{21}{20}$$

$$= \frac{25 \times 21 \times 21}{4}$$

$$= \frac{25 \times 441}{4} = \frac{11025}{4}$$

$$= 2756.25$$

Q 3 On Monday, the value of a company's shares was ₹ 7.50. The price increased by 6% on Tuesday, decreased by 1.5% on Wednesday & decreased by 2% on Thursday. Find the

Value of each share when trade opened on Friday.

Ans: On Monday, value of company shares is RS 7.50.

Value on Monday = ₹ 7.50

6% of increase = 6% of 7.50

$$= \frac{6}{100} \times \frac{750}{100}$$

$$= \frac{6^3}{100} \times 1.5$$

$$= \underline{0.45}$$

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

$$= 7.50 + 0.45$$

$$= \underline{7.95}$$

To find value of company's shares on Wednesday,

Value on Tuesday = ₹ 7.95

$$1.5\% \text{ of decrease} = 1.5\% \text{ of } 7.95$$

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

$$= \underline{0.11925}$$

$$\text{Value on Wednesday} = \text{Value on Tuesday} -$$

$$\text{Value on decrease percentage}$$

$$= 7.95 - 0.11925$$

$$= \underline{7.83075}$$

$$\text{Value on Thursday} = 7.83075$$

$$2\% \text{ of decrease} = 2\% \text{ of } 7.83075$$

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

$$= \underline{0.156}$$

$$\text{Value on Thursday} = \text{Value on Wednesday}$$

$$- \text{Value on decrease percentage}$$

$$= 7.83075 - 0.156$$

$$= \underline{7.674}$$

The Value of share opened on Friday is equal to Thursday's closing price.

\therefore The opening value of share on Friday is ₹ 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% & copied her drawing. What will be the dimensions of the copy of the drawing be?

Ans:- Length of copy = 2 cm
Breadth of copy = 4 cm

IF length increase in 150%, then
its measure = 150% of 2 cm
$$= \frac{150}{100} \times 2$$

$$= 1.5 \times 2$$

$$= \underline{3 \text{ cm}}$$

IF the breadth increase in 150%, then its measure = 150% of 4

$$= \frac{150}{100} \times 4$$

$$= 1.5 \times 4$$

$$= \underline{6 \text{ cm}}$$

∴ Length - 3 cm ; Breadth - 6 cm

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

Ans:- Printed price of a book = ₹ 150

Discount = 15 %

Discount = 15 % of 150

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

$$= \frac{3}{2} \times 15 = \frac{45}{2}$$

$$= 22.5$$

The cost price of a book = 150 - 22.5
= ₹ 127.50

Q. 6 The marked price of an gift item is ₹ 176 & sold it for ₹ 165. Find the discount percentage.

Ans:- Given :- Marked price = 176

Selling price = 165

Discount = 176 - 165 = ₹ 11

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

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

$$= \frac{1100}{176}$$

$$= \underline{\underline{6.25\%}}$$

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

Ans:- Given :- No. of bulbs purchased = 200
Cost price of 1 bulb = ₹ 10

Total cost price = No. of bulbs purchased
× cost price of 1 bulb

$$= 200 \times 10$$

$$\text{CP} = \underline{\underline{2000}}$$

No. of bulbs fused = 5

No. of bulbs sold = No. of bulbs purchased
- No. of fused bulbs

$$= 200 - 5$$

$$= \underline{\underline{195}}$$

Selling price of one bulb = 12

Total selling price (SP) = No. of bulbs sold
× selling price of bulb
= 195 × 12

$$\underline{\underline{SP}} = \underline{\underline{2340}}$$

$SP > CP$ (selling price is greater than
cost price)

∴ He has a profit.

$$\begin{aligned} \text{Profit} &= SP - CP \\ &= 2340 - 2000 \\ &= \underline{\underline{340}} \end{aligned}$$

$$\begin{aligned} \text{Gain percentage} &= \frac{\text{Profit/gain}}{CP} \times 100 \\ &= \frac{340}{2000} \times 100 \\ &= \underline{\underline{17\%}} \end{aligned}$$

∴ Gain percentage = 17%

Q 8 Complete the following table with appropriate entries

S.No	Cost Price	Expenses	Selling Price	Profit	Loss	Profit Percentage	Loss Percentage
1.	₹ 750	₹ 50	₹ 880	₹ 80		10%	
2.	₹ 4500	₹ 500	₹ 4000		₹ 1000		20%
3.	₹ 46000	₹ 4000	₹ 60000	₹ 10000		20%	
4.	₹ 300	₹ 50	₹ 392	₹ 42		12%	
5.	₹ 330	₹ 20	₹ 315		₹ 35		10%

Q.9 A table was sold for ₹ 2142 at a gain of 5%. At what price should it be sold to gain 10%.

Ans: S.P of a table = ₹ 2142

Profit = 5%.

$$\begin{aligned} \text{C.P} &= \frac{100 \times \text{S.P}}{100 + \text{gain}} = \frac{100 \times 2142}{100 + 5} \\ &= \frac{100 \times 2142}{105} \end{aligned}$$

$$= \frac{100 \times 102}{5}$$

$$= 20 \times 102$$

$$\text{C.P} = \underline{2040}$$

$$\text{S.P} = \text{C.P} \left[1 + \frac{\text{gain}\%}{100} \right]$$

$$= 2040 \left[1 + \frac{10}{100} \right]$$

$$= 2040 \times \left[\frac{100 + 10}{100} \right]$$

$$= 2040 \times \frac{110}{100}$$

$$= 204 \times 11 = \underline{2244}$$

∴ The selling price is ₹ 2244

Q.10 Gopi sold a watch to Ibrahim at 10% & Ibrahim sold it to John at a loss of 5%. If John paid ₹ 1330 then find how much did Gopi sold it.

Ans: Suppose x is the amount Gopi sold to Ibrahim at 5% loss.

$$SP = CP - \frac{5}{100} \times CP$$

$$= \cancel{CP} - \frac{5CP}{100}$$

$$SP = \frac{100CP - 5CP}{100}$$

$$SP = \frac{95}{100} CP$$

$$SP = \frac{95}{100} X$$

John paid at ₹ 1330

$$\frac{95}{100} X = 1330$$

$$X = \frac{1330 \times 100}{95}$$

$$x = \frac{70}{19} \times 20$$

$$x = 70 \times 20$$

$$x = \underline{\underline{1400}}$$

∴ Gopi sold for ₹ 1400

Q 11 Madhu & kavitha purchased a new house for ₹ 320000. Due to some economic problems they sold house for ₹ 2,80,000. Find a) The loss incurred b) The loss percentage.

Ans:- Given data :-

$$CP = ₹ 320,000$$

$$SP = ₹ 2,80,000$$

$$\text{Loss} = CP - SP = 320000 - 280000$$

$$\text{Loss} = \underline{\underline{40000}}$$

$$\text{Percent loss} = \frac{\text{Loss}}{C.P} \times 100$$

$$= \frac{40000 \times 100}{320000} = \frac{4 \times 100}{32} = \frac{1}{8} \times 100$$

$$= \frac{100}{8} = \underline{\underline{12.5\%}}$$

∴ Loss is ₹ 40000 & loss percentage is 12.5 %.

Q.12 A pre owned car show-room owner bought a second hand car for ₹ 150000. He spent ₹ 20000 on repairs & painting then sold for it for ₹ 2,00,000. Find whether he gets profit or loss. If so what percent?

Ans :- Cost of car = ₹ 150000

Repair & painting cost = ₹ 20000

$$\begin{aligned}\text{Total C.P} &= 150000 + 20000 \\ &= 170000\end{aligned}$$

$$\text{SP} = ₹ 200000$$

Profit is done because SP is more than CP.

$$\begin{aligned}\text{Profit} &= \text{SP} - \text{CP} \\ &= 200000 - 170000 \\ &= 30000\end{aligned}$$

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

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

$$= \frac{300}{17}$$

$$= \underline{\underline{17.64}} \%$$

13 Lalitha took a parcel from a hotel to celebrate her birthday with her friend. It was billed with ₹ 1450 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.

Ans:- Given :-

$$\text{Total cost} = ₹ 1450$$

$$\text{discount} = 8 \%$$

$$\text{Amount need to paid} = \text{Total cost} - \text{Discount}$$

$$= 1450 - 8\% \text{ of total cost}$$

$$= 1450 - \frac{84}{100} \times 1450$$

$$= 1450 - \frac{4}{5} \times 145$$

$$\begin{aligned}
 &= 1490 - 4 \times 29 \\
 &= 1450 - 116 \\
 &= \underline{1334}
 \end{aligned}$$

∴ Lalitha has to pay ₹ 1334.

Q.14 IF GST is included in the price, find the actual price of each of the following.

S.No	Item	GST %	Bill amount (₹)	Original Price
i)	Diamond	1%	₹ 10100	9999
ii)	Pressure Cooker	5%	₹ 3360	2793
iii)	Face Powder	29.5%	₹ 256	195.80

i) Diamond :

$$\text{Bill amount} = ₹ 10100$$

$$\text{GST} = 1\%$$

$$\begin{aligned}
 \text{Original price} &= \text{Bill amount} - \text{GST} \times \text{Bill} \\
 &= 10100 - 1\% \times 10100 \\
 &= 10100 - \frac{1}{100} \times 10100
 \end{aligned}$$

$$\begin{aligned}
 &= 10100 - 1 \times 101 \\
 &= 10100 - 101 \\
 &= \underline{\underline{9999}}
 \end{aligned}$$

ii) Pressure Cooker

$$\text{Bill amount} = 2940$$

$$\text{GST} = 5\%$$

$$\text{Original Price} = \text{Bill amount} - \text{GST} \times \text{Bill A.}$$

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

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

$$= 2940 - \frac{2940}{20}$$

$$= 2940 - 147$$

$$= \underline{\underline{2793}}$$

iii) Face Powder

$$\text{Bill amount} = ₹ 229, \text{ GST} = 14.5\%$$

$$\text{Original price} = \text{Bill amount} - \text{GST} \times \text{Bill A}$$

$$= 229 - \frac{2.9}{100} \times 229$$

$$= 229 - 33.205$$

$$= \underline{\underline{195.79}}$$

Q.15 A cellphone company fixed the price of cellphone as ₹ 4500. A dealer purchased a cell phone on which he paid 12% GST additionally. How much did the dealer paid as GST? What is the purchase price of Cellphone?

Ans: Given :-

$$\text{Price} = ₹ 4500$$

$$\text{GST} = 12\%$$

$$\text{GST} = \frac{12}{100} \times 4500$$

$$= 12 \times 45$$

$$\text{GST} = ₹ \underline{540}$$

Total price of cell phone

$$= \text{Price} + \text{GST}$$

$$= 4500 + 540$$

$$= \underline{\underline{5040}}$$

∴ The purchase price of cellphone is ₹ 5040

Q. 16 A Super Bazar prices an item in rupees & 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'.

Ans: Suppose initial amount is x .

$$\text{Final amount} = n$$

$$\begin{aligned} \text{Final amount} &= \text{Initial amount} + \text{tax} \\ n &= x + \left(\frac{4}{100} x \right) \end{aligned}$$

$$n = x + \frac{4x}{100}$$

$$n = \frac{100x + 4x}{100}$$

$$n = \frac{104x}{100}$$

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

$$26x = 25n$$

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

$\therefore n$ is the factor of 26.

Factor of 26 = 1, 2, 13, 26

But x must be a nonrecurring decimal so smallest value of n is 13.

Exercise 5:3

Q 1. Sudhakar borrow ₹ 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?

Ans- Given :-

$$P = ₹ 15000$$

$$r = 9\%$$

$$t = 8 \text{ years}$$

$$S.I = ?$$

$$S.I = \frac{P \times r \times t}{100} = \frac{15000 \times 9 \times 8}{100}$$

$$= 150 \times 9 \times 8$$

$$= 150 \times 72$$

$$S.I = \underline{\underline{10800}}$$

$$\text{Total amount} = S.I + P$$

$$= 10800 + 15000$$

$$= \underline{\underline{25800}}$$

$$\text{Monthly payment} = \frac{25800 + 2150}{8 \times 12}$$

$$= \underline{\underline{268.75}}$$

∴ Monthly payment is ₹ 268.75.

Q.2 A TV was bought at price of ₹21000. After 1 year the value of the TV was depreciated by 5%. Find the value of TV after 1 year.

Ans:- Given:-

$$\text{Cost} = ₹ 21000$$

$$\text{Depreciation} = 5\%$$

Value of TV after 1 year

$$= \text{Cost} - \text{Depreciation}$$

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

$$= 21000 - 1050$$

$$= ₹ 19950$$

∴ Value after 1 year is ₹ 19950.

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

Ans:- Given :-

$$\text{Principal} = ₹ 8000$$

$$\text{Rate} = 5\%$$

Time = 2 years

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

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

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

$$= 8000 \times \left(\frac{105}{100} \right)^2$$

$$= 8000 \times \frac{105}{100} \times \frac{105}{100}$$

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

$$= 80 \times 441$$

$$= 20 \times 441$$

$$\text{Amount} = \underline{\underline{8820}}$$

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

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

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

$$= 8000 \times \left(\frac{105}{100} \right)^2 - 8000$$

$$= \frac{8000 \times 105}{100} \times \frac{105}{100} - 8000$$

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

$$= \frac{80 \times 441}{4} - 8000$$

$$= 20 \times 441 - 8000$$

$$= 8820 - 8000$$

$$= \underline{\underline{820}}$$

\therefore Compound Interest is ₹ 820.

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

For 1st year :-

$$P = ₹ 6500$$

$$R = 5\%$$

$$\begin{aligned} \text{Interest on first year} &= \frac{5\%}{100} \text{ of } 6500 \\ &= \frac{5}{100} \times 6500 \end{aligned}$$

$$= \underline{\underline{325}}$$

of five years b) Her equal monthly repayments.

Ans: a) Given :-

$$P = ₹ 47000$$

$$T = 5$$

$$R = 17\%$$

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

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

$$I = 470 \times 5 \times 17$$

$$I = ₹ 39950$$

$$\begin{aligned} \text{Amount at the end of 5 years} &= \text{Principal} + \text{interest} \\ &= 47000 + 39950 \\ &= \underline{86950} \end{aligned}$$

b)

$$\begin{aligned} \text{Monthly repayment} &= \frac{\text{amount}}{\text{no. of months}} \\ &= \frac{86950}{5 \times 12} \\ &= \underline{1449.17} \end{aligned}$$

∴ Prathibha's monthly repayment is ₹ 1449.17.

Q 6 The population of Hyderabad was 6809000 in the year 2011. If it increases at a rate of 4.7% per annum. What will be the population at the end of the year 2015.

Ans:- Given :-

The population (P) = ₹ 6809000

Time period (n) = 2015 - 2011
= 4

Rate of interest (R) = 4.7%.

$$\begin{aligned}\text{Population at 2015} &= P \left(1 + \frac{R}{100}\right)^n \\ &= 6809000 \left(1 + \frac{4.7}{100}\right)^4 \\ &= 6809000 \times \left(\frac{100 + 4.7}{100}\right)^4 \\ &= 6809000 \times \left(\frac{104.7}{100}\right)^4 \\ &= 6809000 \times (1.047)^4 \\ &= 6809000 \times 1.047 \times 1.047 \times 1.047 \\ &\quad \times 1.047 \\ &= 81821994\end{aligned}$$

∴ The population of Hyderabad at end of 2015 is 8,18,21,994.

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

Ans: Given :-

$$P = ₹ 10000$$

$$R = 8.5\%$$

$$T = 1 \text{ year } 3 \text{ months}$$

$$= 1 \times \frac{3}{12} = 1 \times \frac{1}{4}$$

$$= 1\frac{1}{4} \text{ years}$$

Compound interest for $1\frac{1}{4}$ years

= Compound interest for 1 year
+ simple interest for next
 $\frac{1}{4}$ years

Compound interest for 1 year

$$P = ₹ 10,000.$$

$$R = 8 \frac{1}{2} \% = \frac{17}{2} \%$$

$$T = 1 \text{ year}$$

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

$$= 10000 \left(1 + \frac{\frac{17}{2}}{100} \right)^1$$

$$= 10000 \left(1 + \frac{17}{2 \times 100} \right)$$

$$= 10000 \times \left(\frac{1 + 17}{200} \right)$$

$$= 10000 \times \left(\frac{200 + 17}{200} \right)$$

$$= \overset{50}{\cancel{10000}} \times \frac{217}{\cancel{200}}$$

$$= 50 \times 217$$

$$= \underline{\underline{10850}}$$

Since,

$$\text{Amount} = \text{Principal} + \text{Interest}$$

$$10850 = 10000 + \text{Interest}$$

$$\text{Interest} = 10850 - 10000$$

$$\text{Interest} = \underline{850}$$

Simple Interest for $\frac{1}{4}$ next year

$$P = 10850$$

$$R = \frac{17}{2} \%$$

$$T = \frac{1}{4} \text{ year}$$

$$SI = \frac{P \times R \times T}{100} = \frac{10850 \times \frac{17}{2} \times \frac{1}{4}}{100}$$

$$= \frac{10850 \times 17}{2 \times 4 \times 100}$$

$$= \frac{1085 \times 17}{80}$$

$$= \frac{18445}{80}$$

$$= \underline{\underline{230.56}}$$

$$CI = 850 + 230.56$$

$$= 1080.56$$

\therefore Compound interest after $1\frac{1}{4}$

years is ₹ 1080.56

8. Arif took a loan of ₹ 80000 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 & compounded half yearly.

Ans: • Compounded annually :-

$$P = ₹ 80000$$

$$R = 10\% \text{ P.a}$$

$$T = 1\frac{1}{2} \text{ years} \Rightarrow n = 1 + \frac{1}{2}$$

Amount for 1st year,

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

$$= 80000 \left[1 + \frac{10}{100} \right]^1$$

$$= 80000 \times \left[\frac{100 + 10}{100} \right]^1$$

$$= 80000 \times \frac{110}{100}$$
$$= \underline{\underline{88000}}$$

SI on ₹ 88000 for next 1/2 year

$$= \frac{4400}{88000} \times \frac{100}{100} \times \frac{1}{2}$$
$$= \underline{\underline{4400}}$$

$$\text{Amount} = ₹ 88000 + ₹ 4400$$
$$= ₹ 92400$$

• Compounded half yearly :-

$$P = ₹ 80000$$

$$R = 10\% \text{ p.a} = 5\% \text{ per half year}$$

$$T = 1 \frac{1}{2} \text{ years} \therefore n = 3$$

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

$$A = 80000 \left[1 + \frac{5}{100} \right]^3$$

$$= 80000 \left[\frac{100+5}{100} \right]^3$$

$$= 80000 \times \left(\frac{105}{100} \right)^3$$

$$= \frac{80000 \times 105 \times 105 \times 105}{100 \times 100 \times 100}$$

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

$$= \frac{10}{80} \times 21 \times 21 \times 21$$

$$= 10 \times 441 \times 21$$

$$= \underline{\underline{₹ 92610}}$$

∴ Difference between two amounts

$$= 92610 - 92400$$

$$= \underline{\underline{210}}$$

9. I borrowed ₹ 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?

Ans:- Given :-

$$\text{Principal (P)} = ₹ 12,000$$

$$\text{Time (T)} = 2 \text{ years}$$

$$\text{Rate (R)} = 6\% \text{ P.a}$$

$$\text{Amount} = ?$$

$$\text{Simple Interest} = ?$$

$$SI = \frac{P \times R \times T}{100} = \frac{12000 \times 6 \times 2}{100}$$

$$= 120 \times 12$$

$$= \underline{1440}$$

$$\text{Amount (A)} = P + SI$$

$$= 12000 + 1440$$

$$= \underline{13440}$$

Compound Interest = ?

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

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

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

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

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

$$= \frac{24}{5} \times 53 \times 53 - 12000$$

$$= \frac{24 \times 53 \times 53}{5} - 12000$$

$$= 13,483.20 - 12000$$

$$= 1483.20$$

Difference between CI & SI is

$$= CI - SI = 1483.20 - 1440$$

$$= \underline{\underline{43.20}}$$

\therefore Extra amount I have to pay is ₹ 43.20

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.

Given :-

Initial count of bacteria = 506000

Rate is increasing at 2.5% per hour.

Compound Rate = 2.5

Amount = ?

P = 5,06,000

R = 2.5%

N = 2 hours

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

$$= 5,06,000 \left(\frac{1 + 2.5}{100} \right)^2$$

$$= 5,06,000 \times \left(\frac{1 + 25}{10 \times 100} \right)^2$$

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

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

$$= 506000 \times \left(\frac{1025}{1000} \right)^2$$

$$= 506000 \times \frac{1025}{1000} \times \frac{1025}{1000}$$

$$= \overset{253}{\cancel{506000}} \times \frac{205}{\cancel{200}} \times \frac{205}{\cancel{200}}$$

$$= \frac{253 \times 205 \times 205}{10}$$

$$= \underline{\underline{531616.25}}$$

\therefore The number of bacteria cannot be in decimals.

\therefore Count of bacteria at the end of 2 hours is 531616.

11. Kamala borrowed ₹ 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 & 4 months to clear the loan?

Ans: Given :-

$$\text{Principal (P)} = ₹ 26400$$

$$\text{Rate (R)} = 15\% \text{ per annum}$$

$$\text{No. of years (n)} = 2 \frac{4}{12} = 2 \frac{1}{3} \text{ years}$$

Interest for 2 years,

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

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

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

$$= 26400 \times \left(\frac{115}{100} \right)^2$$

$$= 26400 \times \frac{115}{100} \times \frac{115}{100}$$

$$= 264 \times 529$$

$$= \underline{\underline{34914}}$$

Interest for $\frac{1}{3}$ years,

$$S.I = \frac{P \times R \times T}{100}$$

$$= \frac{34914 \times 15 \times \frac{1}{3}}{100}$$

$$= \frac{34914 \times 15 \times 1}{100 \times 3}$$

$$= \frac{34914}{20}$$

$$= 1745.70$$

\therefore Total amount she paid at the end of 2 years & 4 months is = $34914 + 17.45.70$

$$= \underline{\underline{\text{₹ } 36,659.70}}$$

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

ANS:- For Bharathi,

$$P = 12500$$

$$R = 12\%$$

$$T = 3$$

$$\begin{aligned} SI &= \frac{P \times R \times T}{100} = \frac{12500 \times 12 \times 3}{100} \\ &= 125 \times 36 \\ &= \underline{44500} \end{aligned}$$

For Madhuri,

$$P = 12500$$

$$R = 10\% \text{ compounded annually}$$

$$T = 3$$

$$CI = P \left(1 + \frac{R}{100} \right)^T - P$$

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

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

$$= 12500 \times \left(\frac{110}{100} \right)^3 - 12500$$

$$= \frac{12500}{100} \times \frac{110}{100} \times \frac{110}{100} \times \frac{110}{100} - 12500$$

$$= \frac{125 \times 11 \times 11 \times 11}{10} - 12500$$

$$= \frac{125 \times 1331}{10} - 12500$$

$$= \frac{166375}{10} - 12500$$

$$= 16637.5 - 12500$$

$$= 4137.5$$

Comparing interests of Bharathi & Madhuri,

$$= 4500 - 4137.5$$

$$= 362.5$$

\therefore Bharathi pays more interest & it is ₹ 362.5.

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

Ans:- Given :-

$$\text{Principal (P)} = 10000$$

$$\text{Depreciation (R)} = 5\%$$

$$\text{Time (n)} = 1 \text{ year}$$

$$A = ?$$

$$A = P \left[1 - \frac{R}{100} \right]^n$$

$$= 10000 \left[1 - \frac{5}{100} \right]^1$$

$$= 10000 \left[\frac{100 - 5}{100} \right]$$

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

$$= 100 \times 95$$

$$= \underline{\underline{9500}}$$

∴ Value after 1 year is ₹ 9500

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

Ans:- Given :-

Present population (P) = 12 lakh

Rate of interest (R) = 4 %

Time (n) = 2 years

Population after 2 years = ?

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

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

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

$$= 1200000 \times \left(\frac{104}{100} \right)^2$$

$$= 1200000 \times \frac{104 \times 104}{100 \times 100}$$

$$= 120 \times 104 \times 104$$

$$= \underline{\underline{1297920}}$$

∴ The population after 2 years is 1297920.

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

Ans:- Given :-

Principal (P) = 1000

Rate of interest (R) = 10 %

Time period (n) = 1 year

Rate of interest for quarterly (R)

$$= \frac{10}{4} = \frac{5}{2} \%$$

Amount (A) = ?

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

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

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

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

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

$$\begin{aligned} &= 1000 \times \frac{102.5}{100} \times \frac{102.5}{100} \times \frac{102.5}{100} \times \frac{102.5}{100} \\ &= 1000 \times 1.025 \times 1.025 \times 1.025 \times 1.025 \\ &= 1000 \times 1.10381 \\ &= 1103.81 \end{aligned}$$

$$\begin{aligned} \text{Interest} &= A - P \\ &= 1103.81 - 1000 \\ &= 103.81 \end{aligned}$$

\therefore Compound Interest is ₹ 103.81