CHAPTER 7

VII-MATHEMATICS-NCERT(2024-25)

7. COMPARING QUANTITIES (NOTES)

https://sureshmathsmaterial.com/

1. Comparing two quantities of the same kind by division is called 'Ratio'
2. The ratio of two numbers 'a' and 'b' is a÷b or $\frac{a}{b}$ and is denoted by a:b
3. **Percentage**: Percentages are numerators of fractions with denominator 100
4. A percentage is a number or ratio expressed as a fraction of 100
5. Per cent is derived from Latin word 'per centum' meaning 'per hundred'
6. Percent is represented by the symbol **%**

TRY THESE

1. **Find the Percentage of children of different heights for the following data.**

Height	Number of Children	In Fraction	In Percentage
110 cm	22	$\frac{22}{100}$	22%
120 cm	25	$\frac{25}{100}$	25%
128 cm	32	$\frac{32}{100}$	32%
130 cm	21	$\frac{21}{100}$	21%
Total	100		

2. **A shop has the following number of shoe pairs of different sizes.**

Size	Number of shoe pairs	In Fraction	In Percentage
2	20	$\frac{20}{100}$	20%
3	30	$\frac{30}{100}$	30%
4	28	$\frac{28}{100}$	28%
5	14	$\frac{14}{100}$	14%
6	8	$\frac{8}{100}$	8%
Total	100		

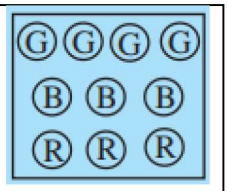
Percentages when total is not hundred

First we wright the fraction and next we multiply with 100 add % symbol.

TRY THESE

1. A collection of 10 chips with different colours is given. Fill the table and find the percentage of chips of each colour.

Colour	Number	Fraction	Denominator Hundred	In Percentage
Green	4	$\frac{4}{10}$	$\frac{4\times10}{10\times10}=\frac{40}{100}$	40%
Blue	3	$\frac{3}{10}$	$\frac{3\times10}{10\times10}=\frac{30}{100}$	30%
Red	3	$\frac{3}{10}$	$\frac{3\times10}{10\times10}=\frac{30}{100}$	30%
Total	10			



2. Mala has a collection of bangles. She has 20 gold bangles and 10 silver bangles. What is the percentage of bangles of each type? Can you put it in the tabular form as done in the above example?

Bangle	Number	Fraction	In Percentage
Gold bangles	20	$\frac{20}{30}$	$\frac{2}{3}\times100=\frac{200}{3}\%$
Silver bangles	10	$\frac{10}{30}$	$\frac{1}{3}\times100=\frac{100}{3}\%$
Total	30		

Converting Fractional Numbers to Percentage

Multiply the fraction by 100 and place the '%' symbol after it

Example1: Write $\frac{1}{3}$ as percent.

Sol: $\frac{1}{3}=\frac{1}{3}\times100\%=\frac{100}{3}\%=33\frac{1}{3}\%$

Example 2: Out of 25 children in a class, 15 are girls. What is the percentage of girls?

Sol: Number of children=25 , girls=15

$$\text{Fraction of girls}=\frac{15}{25}$$

$$\text{Percentage of girls}=\frac{15}{25}\times100\%=15\times4\%=60\%$$

Example 3: Convert $\frac{5}{4}$ to per cent.

Sol: $\frac{5}{4}=\frac{5}{4}\times100\%=5\times25\%=125\%$

Converting Decimals to Percentage

Example 4 :Convert the given decimals to per cents:

$(a)\mathbf{0.75} = \frac{75}{100} = 75\%$

$(b)\mathbf{0.09} = \frac{9}{100} = 9\%$

$(c)\mathbf{0.2} = \frac{2}{10} = \frac{20}{100} = 20\%$

TRY THESE

1. Convert the following to per cents:

$(a)\ \frac{\mathbf{12}}{\mathbf{16}} = \frac{12}{16} \times 100\% = 3 \times 25\% = 75\%$

$(b)\mathbf{3.5} = \frac{35}{10} = \frac{35}{10} \times 100\% = 350\%$

$(c)\ \frac{\mathbf{49}}{\mathbf{50}} = \frac{49}{50} \times 100\% = 49 \times 2\% = 98\%$

$(d)\ \frac{\mathbf{2}}{\mathbf{2}} = 1 \times 100\% = 100\%$

$(e)\mathbf{0.05} = \frac{5}{100} = 5\%$

2. (i) Out of 32 students, 8 are absent. What per cent of the students are absent?

Sol: *The* per cent of the students are absent $= \frac{8}{32} \times 100\% = 25\%$

(ii) There are 25 radios, 16 of them are out of order. What per cent of radios are out of order?

Sol: *The* per cent of radios are out of order $= \frac{16}{25} \times 100\% = 16 \times 4\% = 64\%$

(iii) A shop has 500 items, out of which 5 are defective. What per cent are defective?

Sol: *The percentage of defective items* $= \frac{5}{500} \times 100\% == 1\%$

(iv) There are 120 voters, 90 of them voted yes. What per cent voted yes?

Sol: *The percentage of* voted yes $= \frac{90}{120} \times 100\% = 3 \times 25\% = 75\%$

Converting Percentages to Fractions or Decimals

$(i)\ 1\% = \frac{1}{100} = 0.01$

$(ii)10\% = \frac{10}{100} = 0.10$

$(iii)25\% = \frac{25}{100} = 0.25$

$(iv)50\% = \frac{50}{100} = 0.50$

$(v)90\% = \frac{90}{100} = 0.90$

$(vi)125\% = \frac{125}{100} = 1.25$

$(vii)250\% = \frac{250}{100} = 2.50$

Parts always add to give a whole

All the parts that form the whole when added together gives the whole or 100%

TRY THESE

1. $35\% + 65\% = 100\%$, $64\% + 20\% + 16\% = 100\%$
   $45\% = 100\% - 55\%$, $70\% = 100\% - 30\%$

2. If 65% of students in a class have a bicycle, what per cent of the student do not have bicycles?

Sol: per cent of the student do not have bicycles=100%-65%=35%

3. We have a basket full of apples, oranges and mangoes. If 50% are apples, 30% are oranges, then what per cent are mangoes?

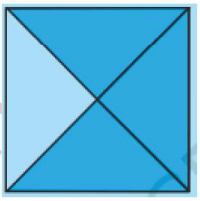
Example 5 :What per cent of the adjoining figure is shaded?

Sol: Half of the figure is shaded

$$\text{Per cent of the figure is shaded} = \frac{1}{2} \times 100\% = 50\%$$

TRY THESE

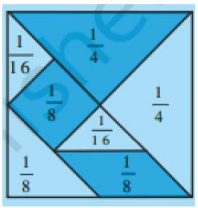
What per cent of these figures are shaded?



(i) Fraction of shaded $= \frac{3}{4}$

$$\text{Percentage of shaded} = \frac{3}{4} \times 100\% = 3 \times 25\% = 75\%$$

(ii) Fraction of shaded $= \frac{1}{4} + \frac{1}{8} + \frac{1}{8} = \frac{2}{8} + \frac{1}{8} + \frac{1}{8} = \frac{4}{8} = \frac{1}{2}$



$$\text{Percentage of shaded} = \frac{1}{2} \times 100\% = 50\%$$

USE OF PERCENTAGES

Example 6: A survey of 40 children showed that 25% liked playing football. How many children liked playing football?

Sol: Number of children playing football=25% of 40

$$= \frac{25}{100} \times 40 = \frac{1000}{100} = 10$$

TRY THESE

1. Find:

$$(a)\ 50\%\ of\ 164 = \frac{50}{100} \times 164 = 82$$

$$(b)\ 75\%\ of\ 12 = \frac{\cancel{75}^{3}}{\cancel{100}_{4_1}} \times \cancel{12}^{3} = 9$$

$$(iii)\ 12\frac{1}{2}\%\ of\ 64 = \frac{25}{2}\%\ of\ 64 = \frac{25}{2 \times 100} \times 64 = 8$$

2. 8% children of a class of 25 like getting wet in the rain. How many children like getting wet in the rain.

Sol: Number of children like getting wet in the rain $= 8\%\ of\ 25 = \frac{8}{100} \times 25 = 2$

Example 7: Rahul bought a sweater and saved ₹ 200 when a discount of 25% was given. What was the price of the sweater before the discount?

Sol: Let the price of sweater before the discount= x

$$25\%\ of\ x = 200$$

$$\frac{25}{100} \times x = 200$$

$$x = \frac{200 \times 100}{25} = 200 \times 4 = 800$$

1. 9 is 25% of what number?

Sol: 25% of the number = 9

$$\frac{25}{100} \times The\ number = 9$$

$$\text{The number} = \frac{9 \times 100}{25} = 9 \times 4 = 36$$

2. 75% of what number is 15?

Sol: 75% of the number = 15

$$\frac{75}{100} \times \text{The number} = 15$$

$$\text{The number} = \frac{15 \times 100}{75} = 5 \times 4 = 20$$

EXERCISE 7.1

1. Convert the given fractional numbers to per cents

$(a)\ \frac{1}{8} = \frac{1}{8} \times 100\% = \frac{25}{2}\% = 12.5\%$

$(b)\ \frac{5}{4} = \frac{5}{4} \times 100\% = 5 \times 25\% = 125\%$

$(c)\ \frac{3}{40} = \frac{3}{40} \times 100\% = \frac{15}{2}\% = 7.5\%$

$(d)\ \frac{2}{7} = \frac{2}{7} \times 100\% = \frac{200}{7}\% = 28\frac{4}{7}\%$

2. Convert the given decimal fractions to per cents.

$(a)\ 0.65 = \frac{65}{100} = 65\%$

$(b)\ 2.1 = \frac{21}{10} = \frac{210}{100} = 210\%$

$(c)\ 0.02 = \frac{2}{100} = 2\%$

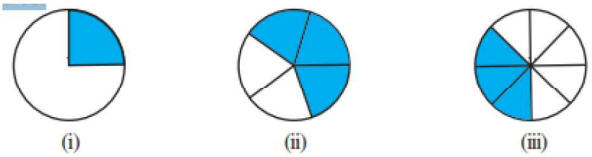
$(d)\ 12.35 = \frac{1235}{100} = 1235\%$

3. **Estimate what part of the figures is coloured and hence find the per cent which is coloured.**

$(i)\ \frac{1}{4} = \frac{1}{4} \times 100\% = 25\%$

$(ii)\ \frac{3}{5} = \frac{3}{5} \times 100\% = 3 \times 20\% = 60\%$

$(iii)\ \frac{3}{8} = \frac{3}{8} \times 100\% = \frac{75}{2}\% = 37.5\ \%$



4. Find:

$(a)\ 15\%\ of\ 250 = \frac{15}{100} \times 250 = \frac{75}{2} = 37.5$

$(b)\ 1\%\ of\ 1\ hour = \frac{1}{100} \times 60\ minutes = \frac{3}{5}\ minute. = \frac{3}{5} \times 60\ seconds = 36\ seconds$

$(c)\ 20\%\ of\ ₹\ 2500 = \frac{20}{100} \times 2500 = 20 \times 25 = ₹500$

$(d)\ 75\%\ of\ 1\ kg = \frac{75}{100} \times 1\ kg = 0.75\ kg = 0.75 \times 1000\ g = 750\ g$

5. Find the whole quantity if

(a) 5% of it is 600.

Sol: 5% of $x = 600$

$$\frac{5}{100} \times x = 600$$

$$x = \frac{600 \times 100}{5} = 600 \times 20 = 12000$$

(b) 12% of it is ₹ 1080.

Sol: 12% of $x = 1080$

$$\frac{12}{100} \times x = 1080$$

$$x = \frac{1080 \times 100}{12} = 90 \times 100 = 9000$$

(c) 40% of it is 500 km.

Sol: 40% of $x = 500$ km

$$\frac{40}{100} \times x = 500km$$

$$x = \frac{500 \times 100}{40} = 250 \times 5 = 1250\ km$$

(d) 70% of it is 14 minutes.

Sol: 70% of $x = 14$ minutes

$$\frac{70}{100} \times x = 14\ minutes$$

$$x = \frac{14 \times 100}{70} = 2 \times 10 = 20\ minutes$$

6. Convert given per cents to decimal fractions and also to fractions in simplest forms:

(a)**25%** $= \frac{25}{100} = 0.25 = \frac{1}{4}$

(b)**150%** $= \frac{150}{100} = 1.5 = \frac{3}{4}$

(c)**20%** $= \frac{20}{100} = 0.2 = \frac{1}{5}$

(d)**5%** $= \frac{5}{100} = 0.05 = \frac{1}{20}$

7. In a city, 30% are females, 40% are males and remaining are children. What per cent are children?

Sol: Percent of children $= 100\% - (30\% + 40\%) = 100\% - 70\% = 30\%$

8. Out of 15,000 voters in a constituency, 60% voted. Find the percentage of voters who did not vote. Can you now find how many actually did not vote?

Sol: Percentage of voted voters=60%

Percentage of voters who did not vote=100%-40%=60%

The number of voters who did not vote=40% of 15,000

$$= \frac{40}{\cancel{100}} \times 150\cancel{00} = 40 \times 150 = 6{,}000$$

9. Meeta saves ₹ 4000 from her salary. If this is 10% of her salary. What is her salary?

Sol: 10% of salary $=$ ₹ 4000

$$\frac{10}{100} \times \text{Salary} = ₹4000$$

$$\text{Salary} = \frac{4000 \times 10\cancel{0}}{10\cancel{0}} = 4000 \times 10 = 40000$$

10. A local cricket team played 20 matches in one season. It won 25% of them. How many matches did they win?

Sol: Number of matches won=25% of 20

$$= \frac{\cancel{25}^{1}}{\cancel{100}_{4}} \times \cancel{20}^{5} = 5$$

Ratios to Percents

Example 8: Reena's mother said, to make idlis, you must take two parts rice and one part urad dal. What percentage of such a mixture would be rice and what percentage would be urad dal?

Sol: Rice : Urad dal = 2 : 1.

Total parts=2+1=3

$$\text{Part of rice} = \frac{2}{3}, \text{Part of urad dal} = \frac{1}{3}$$

$$\text{Percentage of rice} = \frac{2}{3} \times 100\% = \frac{200}{3}\% = 66\frac{2}{3}\%$$

$$\text{Percentage of rice} = \frac{1}{3} \times 100\% = \frac{100}{3}\% = 33\frac{1}{3}\%$$

Example 9: If ₹ 250 is to be divided amongst Ravi, Raju and Roy, so that Ravi gets two parts, Raju three parts and Roy five parts. How much money will each get? What will it be in percentages?

Sol: Ravi: Raju:roy =2:3:5

Total parts=2+3+5=10

$$\text{Amount received by Ravi} = \frac{2}{10} \times ₹250 = 2 \times 25 = ₹50$$

$$\text{Amount received by Raju} = \frac{3}{10} \times ₹250 = 3 \times 25 = ₹75$$

$$\text{Amount received by Roy} = \frac{5}{10} \times ₹250 = 5 \times 25 = ₹125$$

$$\text{Percentage of money received by Ravi} = \frac{2}{10} \times 100\% = 20\%$$

$$\text{Percentage of money received by Raju} = \frac{3}{10} \times 100\% = 30\%$$

$$\text{Percentage of money received by Roy} = \frac{5}{10} \times 100\% = 50\%$$

TRY THESE

1. Divide 15 sweets between Manu and Sonu so that they get 20 % and 80 % of them respectively.

Sol: Total number of sweets=15

Sweets to be given to Manu = 20% of 15

$$= \frac{20}{100} \times 15 = 3$$

Sweets to be given to Sonu = 80% of 15

$$= \frac{80}{100} \times 15 = 4 \times 3 = 12$$

2. If angles of a triangle are in the ratio 2 : 3 : 4. Find the value of each angle.

Sol: Sum of angles in a triangle=180^0

The ratio of angles=2:3:4

Total parts=2+3+4=9

$$\text{First angle} = \frac{2}{9} \times 180^0 = 2 \times 20^0 = 40^0$$

$$\text{Second angle} = \frac{3}{9} \times 180^0 = 3 \times 20^0 = 60^0$$

$$\text{Third angle} = \frac{4}{9} \times 180^0 = 4 \times 20^0 = 80^0$$

Increase or Decrease as Per Cent

Example 10: A school team won 6 games this year against 4 games won last year. What is the per cent increase?

Sol: The increase in the number of wins (or amount of change) = 6 – 4 = 2.

$$\text{Percentage increase} = \frac{\text{amount of change}}{\text{original amount or base}} \times 100$$

$$= \frac{2}{4} \times 100 = 50$$

Example 11:The number of illiterate persons in a country decreased from 150 lakhs to 100 lakhs in 10 years. What is the percentage of decrease?

Sol: Original amount = the number of illiterate persons initially = 150 lakhs

Amount of change = decrease in the number of illiterate persons = 150 – 100 = 50 lakhs

$$\text{The percentage of decrease} = \frac{\text{amount of change}}{\text{original amount}} \times 100 = \frac{50}{150} \times 100 = \frac{100}{3} = 33\frac{1}{3}$$

TRY THESE

1. Find Percentage of increase or decrease:

(i) Price of shirt decreased from ₹ 280 to ₹ 210

Sol: Decrease=₹ 280- ₹ 210=₹ 70

$$\text{Percentage of decrease} = \frac{\text{Decrease}}{\text{Original price}} \times 100 = \frac{\cancel{70}^{1}}{\cancel{280}_{4}} \times \cancel{100}^{25} = 25\%$$

(ii) Marks in a test increased from 20 to 30.

Sol: Increase=30-20=10

$$\text{Percentage of increase} = \frac{\text{Increase}}{\text{Initial marks}} \times 100 = \frac{\cancel{10}^{1}}{\cancel{20}_{2}} \times \cancel{100}^{50} = 50\%$$

2. My mother says, in her childhood petrol was ₹ 1 a litre. It is ₹ 52 per litre today. By what Percentage has the price gone up?

Sol: $\text{Increase} = 52 - 1 = ₹51$

$$\text{Percentage increase in price} = \frac{\text{Increase}}{\text{Initial price}} \times 100 = \frac{51}{1} \times 100 = 5100\%$$

PRICES RELATED TO AN ITEM OR BUYING AND SELLING

The buying price of any item is known as its cost price(CP). The price at which you sell is known as the selling price (SP).

If $CP < SP$ then you made a profit $= SP - CP$

If $CP = SP$ then you are in a no profit no loss situation.

If $CP > SP$ then you have a loss $= CP - SP$.

$$\text{Profit percent} = \frac{\text{Profit}}{CP} \times 100$$

$$\text{Loss percent} = \frac{\text{Loss}}{CP} \times 100$$

Example 12: The cost of a flower vase is ₹ 120. If the shopkeeper sells it at a loss of 10%, find the price at which it is sold.

Sol: We are given that CP = ₹ 120 and Loss per cent = 10%

CP	SP
100	90
120	x

$100 \times x = 120 \times 90$

$$x = \frac{120 \times 90}{100} = 12 \times 9 = 108$$

SP of flower vase=₹ 108

(oR)

$$\text{Loss} = 10\% \; of \; 120 = \frac{10}{100} \times 120 = 12$$

$SP = CP - \text{Loss} = 120 - 12 = ₹108$

Example 13: Selling price of a toy car is ₹ 540. If the profit made by shopkeeper is 20%, what is the cost price of this toy?

Sol: SP = ₹ 540 and the Profit = 20%

CP	SP

100	120
x	540

$x \times 120 = 100 \times 540$

$$x = \frac{100 \times 540}{120} = 450$$

The cost price of this toy=₹450

TRY THESE

1. A shopkeeper bought a chair for ₹ 375 and sold it for ₹ 400. Find the gain Percentage.

Sol: C.P of chair=₹ 375, S.P of chair=₹400

Gain=S.P-C.P=₹400-₹375=₹25

$$\text{Gain Percentage} = \frac{Gain}{C.P} \times 100\% = \frac{25}{375} \times 100 = \frac{20}{3} = 6\frac{2}{3}\%$$

2. Cost of an item is ₹ 50. It was sold with a profit of 12%. Find the selling price.

Sol: C.P= ₹50 , Profit=12%

CP	SP
100	112
50	x

$x \times 100 = 50 \times 112$

$$x = \frac{50 \times 112}{100} = 56$$

Selling price=₹56

3. An article was sold for ₹ 250 with a profit of 5%. What was its cost price?

Sol: S.P=₹250 , profit = 5%.

CP	SP
100	105
x	250

$x \times 105 = 100 \times 250$

$$x = \frac{100 \times 250}{105} = \frac{5000}{21} = 238$$

4. An item was sold for ₹ 540 at a loss of 5%. What was its cost price?

Sol: S.P=₹540, loss=5%

CP	SP
100	95
x	540

$x \times 95 = 100 \times 540$

$$x = \frac{100 \times 540}{95} = \frac{20 \times 540}{19} = \frac{10800}{19} = 568.42$$

Cost price=₹568.42

CHARGE GIVEN ON BORROWED MONEY OR SIMPLE INTEREST

(i) The money you borrow is known as sum borrowed or principal(P)

(ii) The borrower has to pay some extra money is known as Interest(I)

(iii) Amount = Principal + Interest (or) A=P+I

(iv) Interest is generally given in per cent for a period of one year is known as rate of interest(R)

(v) Principal=P; Rate of interest=R; Time=T; Interest=I; Amount=A

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

(v) A=P+I

Example 14 :Anita takes a loan of ₹ 5,000 at 15% per year as rate of interest. Find the interest she has to pay at the end of one year.

Sol: P=₹5,000; R=15% ; T=1 year.

$$\text{Interest(I)} = \frac{P \times T \times R}{100} = \frac{5000 \times 1 \times 15}{100} = 50 \times 15 = ₹750$$

TRY THESE

1. **₹ 10,000 is invested at 5% interest rate p.a. Find the interest at the end of one year.**

Sol: P=₹10,000; R=5% ; T=1 year.

$$\text{Interest(I)} = \frac{P \times T \times R}{100} = \frac{10000 \times 1 \times 5}{100} = 1000 \times 5 = ₹5000$$

2. **₹ 3,500 is given at 7% p.a. rate of interest. Find the interest which will be received at the end of two years.**

Sol: P=₹3,500; R=7% ; T=2 year.

$$\text{Interest(I)} = \frac{P \times T \times R}{100} = \frac{3,500 \times 2 \times 7}{100} = 35 \times 14 = ₹490$$

3. **₹ 6,050 is borrowed at 6.5% rate of interest p.a.. Find the interest and the amount to be paid at the end of 3 years**

Sol: P=₹6,050; R=6.5% ; T=3 year.

$$\text{Interest(I)} = \frac{\text{P} \times \text{T} \times \text{R}}{100} = \frac{6{,}050 \times 3 \times 6.5}{100} = \frac{605 \times 3 \times 6.5}{10} = \frac{11797.5}{10} = ₹1179.75$$

$$\text{Amount}(A) = P + I = ₹6{,}050 + ₹1179.75 = ₹7229.75$$

4. ₹ 7,000 is borrowed at 3.5% rate of interest p.a. borrowed for 2 years. Find the amount to be paid at the end of the second year.

Sol: P=₹7,000; R=3.5% ; T=2 year.

$$\text{Interest(I)} = \frac{\text{P} \times \text{T} \times \text{R}}{100} = \frac{3{,}500 \times 2 \times 7}{100} = 35 \times 14 = ₹490$$

$$\text{Amount}(A) = P + I = ₹7{,}000 + ₹490 = ₹7{,}490$$

Example 15: If Manohar pays an interest of ₹ 750 for 2 years on a sum of ₹ 4,500, find the rate of interest.

Sol: $\text{I} = ₹750; \text{T} = 2\ years;\ \text{P} = ₹\ 4{,}500$

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

$$\frac{4500 \times 2 \times R}{100} = 750$$

$$\text{R} = \frac{\cancel{750}^{\cancel{50}^{25}}}{\cancel{45}_{3} \times \cancel{2}} = \frac{25}{3} = 8\frac{1}{3}\%$$

$$\text{Rate of interest} = 8\frac{1}{3}\%$$

TRY THESE

1. You have ₹ 2,400 in your account and the interest rate is 5%. After how many years would you earn ₹ 240 as interest.

Sol: $\text{I} = ₹240; \text{R} = 5\%;\ \text{P} = ₹\ 2{,}400$

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

$$\frac{2400 \times \text{T} \times 5}{100} = 240$$

$$\text{T} = \frac{240}{24 \times 5} = 2\ years$$

2. On a certain sum the interest paid after 3 years is ₹ 450 at 5% rate of interest per annum. Find the sum.

Sol: $\text{I} = ₹450; \text{T} = 3\ years;\ \text{R} = 5\%$

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

$$\frac{P \times 3 \times 5}{100} = 450$$

$$P = \frac{450 \times 100}{15} = 30 \times 100 = ₹3000$$

EXERCISE 7.2

1. Tell what is the profit or loss in the following transactions. Also find profit per cent or loss per cent in each case.

(a) Gardening shears bought for ₹ 250 and sold for ₹ 325.

Sol: CP= ₹250, SP=₹325

Since CP<SP, so there is a profit.

Profit=SP-CP=325-250=₹75

$$\text{Profit percent} = \frac{Proft}{CP} \times 100\% = \frac{75}{250} \times 100 = 3 \times 10 = 30\%$$

(b) A refrigerator bought for ₹ 12,000 and sold at ₹ 13,500.

Sol: CP= ₹12,000, SP=₹13,500

Since CP<SP, so there is a profit.

Profit=SP-CP=13,500-12000=₹1500

$$\text{Profit percent} = \frac{\text{Profit}}{\text{CP}} \times 100\% = \frac{1500}{12000} \times 100 = \frac{150}{12} = \frac{25}{2} = 12\frac{1}{2}\%$$

(c) A cupboard bought for ₹ 2,500 and sold at ₹ 3,000.

Sol: CP= ₹2500, SP=₹3000

Since CP<SP, so there is a profit.

Profit=SP-CP=3000-2500=500

$$\text{Profit percent} = \frac{\text{Proft}}{\text{CP}} \times 100\% = \frac{500}{2500} \times 100 = 20\%$$

(d) A skirt bought for ₹ 250 and sold at ₹ 150

Sol: CP= ₹250, SP=₹150

Since CP>SP, so there is loss.

Profit=CP-SP=250-150=100

$$\text{Loss percent} = \frac{\text{Loss}}{\text{CP}} \times 100\% = \frac{100}{250} \times 100 = 40\%$$

2. Convert each part of the ratio to percentage:

(a) 3 : 1

Sol: Total parts=3+1=4

$$\text{Percentage of first part} = \frac{3}{4} \times 100 = 3 \times 25 = 75\%$$

$$\text{Percentage of second part} = \frac{1}{4} \times 100 = 1 \times 25 = 25\%$$

(b) 2 : 3 : 5

Sol: Total parts=2+3+5=10

$$\text{Percentage of first part} = \frac{2}{10} \times 100 = 2 \times 10 = 20\%$$

$$\text{Percentage of second part} = \frac{3}{10} \times 100 = 3 \times 10 = 30\%$$

$$\text{Percentage of third part} = \frac{5}{10} \times 100 = 5 \times 10 = 50\%$$

(c) **1:4**

Sol: Total parts=1+4=5

$$\text{Percentage of first part} = \frac{1}{5} \times 100 = 1 \times 20 = 20\%$$

$$\text{Percentage of second part} = \frac{4}{5} \times 100 = 4 \times 20 = 80\%$$

(d) **1 : 2 : 5**

Sol: Total parts=1+2+5=8

$$\text{Percentage of first part} = \frac{1}{8} \times 100 = \frac{25}{2} = 12.5\%$$

$$\text{Percentage of second part} = \frac{2}{8} \times 100 = 1 \times 25 = 25\%$$

$$\text{Percentage of third part} = \frac{5}{8} \times 100 = \frac{125}{2} = 62.5\%$$

3. The population of a city decreased from 25,000 to 24,500. Find the percentage decrease.

Sol: Decrease in papulation=25000-24500=500

$$\text{The percentage decrease} = \frac{\text{Decrease in papulation}}{\text{Initial papulation}} \times 100 = \frac{500}{25000} \times 100 = 2\%$$

4. Arun bought a car for ₹ 3,50,000. The next year, the price went upto ₹ 3,70,000. What was the Percentage of price increase?

Sol: Increase in price=3,70,000-3,50,000=₹20,000

$$\text{Percentage of price increase} = \frac{\text{Increase in price}}{\text{Initial price}} \times 100 = \frac{20000}{350000} \times 100 = \frac{200}{35} = \frac{40}{7} = 5\frac{5}{7}\%$$

5. I buy a T.V. for ₹ 10,000 and sell it at a profit of 20%. How much money do I get for it?

Sol: CP of T.V=₹10,000 , Profit percentage=20%

$$\text{Profit} = 20\% \text{ of } 10{,}000 = \frac{20}{100} \times 10000 = 20 \times 100 = ₹2000$$

SP = CP+Profit=10,000+2,000=₹12,000

(or)

CP	SP
100	120
10,000	x

$x \times 100 = 10{,}000 \times 120$

$$x = \frac{10{,}000 \times 120}{100} = 100 \times 120 = 12000$$

SP of T.V= ₹12,000

6. Juhi sells a washing machine for ₹ 13,500. She loses 20% in the bargain. What was the price at which she bought it?

Sol: SP=₹13,500, loss=20%

CP	SP
100	80
x	13,500

$x \times 80 = 100 \times 13{,}500$

$$x = \frac{100 \times 13500}{80} = 16875$$

CP of washing machine=₹16,875

7. (i) Chalk contains calcium, carbon and oxygen in the ratio 10:3:12. Find the percentage of carbon in chalk.

Sol: Total parts $= 10 + 3 + 12 = 25$

The percentage of carbon in chalk $= \frac{3}{25} \times 100 = 3 \times 4 = 12\%$

(ii) If in a stick of chalk, carbon is 3g, what is the weight of the chalk stick?

Sol: 12% of weight of Stick=3g

$$\frac{12}{100} \times \text{weight of Stick} = 3 \text{ g}$$

$$\text{weight of Stick} = \frac{3 \times 100}{12} = 25g$$

8. Amina buys a book for ₹ 275 and sells it at a loss of 15%. How much does she sell it for?

Sol: CP of book=₹275, loss=15%

CP	SP
100	85
275	x

$x \times 100 = 275 \times 85$

$$x = \frac{275 \times 85}{100} = \frac{23375}{100} = 233.75$$

SP of book=₹ 233.75

9. Find the amount to be paid at the end of 3 years in each case: (a) Principal = ₹ 1,200 at 12% p.a.

Sol: P=₹1,200, T=3 y, R=12%

$$\text{Interest(I)} = \frac{\text{P} \times \text{T} \times \text{R}}{100} = \frac{1200 \times 3 \times 12}{100} = 12 \times 36 = ₹432$$

$$\text{Amount} = \text{P} + \text{I} = 1200 + 432 = ₹1632$$

(b) Principal = ₹ 7,500 at 5% p.a.

Sol: P=7,500, T=3y, R=5%

$$\text{Interest(I)} = \frac{\text{P} \times \text{T} \times \text{R}}{100} = \frac{7500 \times 3 \times 5}{100} = 75 \times 15 = ₹1125$$

$$\text{Amount} = \text{P} + \text{I} = 7,500 + 1125 = ₹8625$$

10. What rate gives ₹ 280 as interest on a sum of ₹ 56,000 in 2 years?

Sol: P=₹56,000, T=2y, I=₹ 280 ,R=?

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

$$\frac{56000 \times 2 \times R}{100} = 280$$

$$\text{R} = \frac{280}{560 \times 2} = \frac{1}{4} = 0.25\ \%$$

11. If Meena gives an interest of ₹ 45 for one year at 9% rate p.a.. What is the sum she has borrowed?

Sol: P=?, T=1y, I=₹ 45 ,R=9%

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

$$\frac{P \times 1 \times 9}{100} = 45$$

$$P = \frac{45 \times 100}{9} = 500$$

The sum Meena has borrowed=₹500