COMPARING QUANTITIES 8

WHAT WE HAVE LEARNT ....

1. Write the following ratios in the simplest form:

(a) 40 cm to 3 m (b) 20 minutes to 1 hour

(c) 10 cm to 8 mm (d) 65 paise to ₹ 65.

Solution: (a) 2:15 (b) 1:3

(c) 25:2 (d) 1:100

2. Divide ₹ 405 between Sameer and Madhu in the ratio 1 : 2.

Solution: ₹ 135 and ₹ 270

3. Check whether 3, 12, 36, 72 are in proportion or not.

Answer: NO

4. Find x in the following proportions :

(a) 4 : x :: 8 : 16 (b) x : 15 :: 12 : 18

Solution, (a) $\frac{4}{x} = \frac{8}{16} \Rightarrow 8x = 4 \times 16$

$\Rightarrow x = \frac{4 \times 16^{2}}{8} = 8$

(b) $\frac{x}{15} = \frac{12}{18} \Rightarrow 18x = 12 \times 15$

$\Rightarrow x = \frac{^{2}12 \times 15^{5}}{18_{3}} = 10$

5. If 6, 18, 54 are in continued proportion, then find the mean proportion between 6 and 54.

Solution: 6 : 18 = 18 : 54

Mean proportion = 18

6. A man saves ₹ 8250 in 1 year. If he saves equal amount every month, find his saving in 8 months.

Solution: Saving in 1 year = ₹ 8250

∴ Saving in 1 month = ₹ 687.5

∴ Saving in 8 months = ₹ 687.5 × 8

= ₹ 5,500

EXERCISE 8.1

1. Jatin gets a salary of ₹ 40,000 a month and spends ₹ 30,000. His wife gets a salary of ₹ 35,000 and spends ₹ 15,000 a month. Find the ratio of : (i) Jatin's salary : Wife's salary (ii) Jatin's savings : Wife's savings (iii) Total salary : Total Expenditure.

Solution:

(i) Jatin's salary : Wife's salary

= ₹ 40,000 : ₹ 35,000

= 40 : 35 = 8 : 7

(ii) Jatin's savings : Wife's savings

= (40000 − 30000) : (35000 − 15000)

= ₹ 10000 : ₹ 20000

= 1 : 2

(iii) Total salary = ₹ 40000 + ₹ 35000

= ₹ 75,000

Total Expenditure = ₹ 30000 + ₹ 15000

= ₹ 45000

∴ Total salary : Total Expenditure

= ₹ 75000 : ₹ 45000

$= 75 : 45$

$= 5 : 3$

2. 200 g coffee costs ₹ 36 and 250 g tea costs ₹ 40. Find the ratio of price of tea to coffee.

Solution :

Cost of 250g Tea = ₹ 40

∴ Cost of 1kg Tea = ₹ 40 × 4 = ₹ 160

Cost of 200g coffee = ₹ 36

∴ cost of 1 kg coffee = ₹ 36 × 5 = ₹ 180

∴ price of Tea : price of Coffee = ₹ 160 : ₹ 180

$= 16 : 18$

$= 8 : 9$

3. Mrs. Chatterjee divides ₹ 2,40,000 between her two daughters in the ratio 3 : 5. How much does each daughter get?

Solution : Sum of ratio terms = 3 + 5 = 8

∴ Amount for 1st daughter = $\frac{3}{8}$ × ₹ 2,40,000

= 3 × ₹ 30,000

= ₹ 90,000

∴ Amount for 2nd Daughter = $\frac{5}{8}$ × ₹ 2,40,000

= 5 × ₹ 30,000

= ₹ 150,000

4. A school has a total strength of 2,450 students and 980 of these are boys. Find the ratio of girls to boys.

Solution : Total strength = 2,450

No. of Boys = 980

∴ No. of Girls = 2,450 − 980 = 1,470.

∴ Ratio of Girls to Boys

$= 1470 : 980$

$= \frac{1470}{980}$ $\quad 147 \div 3$

$\quad 980 \quad 98 \div 4 \; 2$

$= 3 : 2$

5. Monu walks 12 km in 4 hours and Tony walks 12.5 km in 5 hours. Find the ratio of their speeds.

Solution : Monu walks 12 km in 4 hours.

∴ Monu walks $\frac{12}{4}$ km in 1 hour.

Tony walks 12.5 km in 5 hours.

∴ Tony walks $\frac{12.5}{5}$ km in 1 hour.

∴ Ratio of their speeds $= \frac{12}{4}$ km : $\frac{12.5}{5}$ km

$= 3$ km : 2.5 km.

$= 6$ km : 5 km

6. The length and breadth of a rectangular playground are 110 m and 90 m. Find the ratio of : (i) length to perimeter (ii) perimeter to breadth (iii) length to breadth.

Solution :

Length $= 110$m

Breadth $= 90$m

∴ perimeter $= 2(L+B) = 2(110+90)$

$= 2(200) = 400$ m

(i) Length : Perimeter $= 110$m : 400m $= 11 : 40$

(ii) Perimeter : Breadth $= 400$m : 90m $= 40 : 9$

iii) Length : Breadth = 110m : 90m

= 11 : 9

7. **The ratio of sale of sweaters on a particular day to the next day is 3 : 4. If 560 sweaters were sold in total on those 2 days, how many were sold on each day?**

Solution: Sum of ratio terms = 3+4 = 7

∴ Sweaters sold on 1st day = $\frac{3}{7} \times 560$

= $3 \times 80 = 240$

∴ Sweaters sold on 2nd day = $\frac{4}{7} \times 560$

= $4 \times 80 = 320$

8. **The profits of a company are shared among three partners A, B and C in the ratio 2 : 2 :3.**

If A gets ₹ 14,000 as his share, find the total profit of the company and the shares of B and C.

[Hots]

Solution: Suppose Total profit = ₹ x

Sum of ratio terms = 2+2+3 = 7

∴ Share of A = $\frac{2}{7} \times x$ = ₹ 14,000 (given)

∴ $2x = 7 \times 14000$

∴ $x = \frac{7 \times 14000}{2} = 7 \times 7000$

= ₹ 49,000

∴ Total profit = ₹ 49,000

∴ Share of B = $\frac{2}{7} \times$ ₹ 49,000 = $2 \times 7,000$

= ₹ 14,000

$\therefore$ share of C $= \frac{3}{7} \times ₹\ 49,000$

$= 3 \times ₹\ 7,000$

$= ₹\ 21,000$

9. **The collections of tickets for three different shows (1st show, 2nd show, 3rd show) of circus on a particular day are in the ratio 2 : 4 : 5. If the 2nd show collection is ₹ 15,000, find the total collection and collection of the remaining two shows.**

Solution: suppose total collection $= ₹\ x$

Sum of the ratio terms $= 2 + 4 + 5 = 11$

$\therefore$ 2nd show collection $= \frac{4}{11} \times x = ₹\ 15,000$ (given)

$\therefore \quad 4x = 11 \times ₹\ 15,000$

$\therefore \quad x = \frac{11 \times 15000^{3750}}{4}$

$= ₹\ 41,250$ (Total collection)

$\therefore$ 1st show collection $= \frac{2}{11} \times ₹\ 41,250$

$= 2 \times ₹\ 3750$

$= ₹\ 7,500.$

$\therefore$ 3rd show collection $= \frac{5}{11} \times x$

$= \frac{5}{11} \times ₹\ 41,250$

$= 5 \times ₹\ 3750$

$= ₹\ 18,750$

10. Compare the following ratios :

(i) **2 : 3 or 4 : 7** (ii) **11 : 15 or 14 : 25**

(iii) **15 : 27 or 2 : 9** (iv) **108 : 63 or 18 : 21**

Solution : (i) 2 : 3 means $\frac{2}{3}$

4 : 7 means $\frac{4}{7}$

LCM of 3 and 7 is 21

$\therefore \frac{2}{3} = \frac{2 \times 7}{3 \times 7} = \frac{14}{21}$

$\frac{4}{7} = \frac{4 \times 3}{7 \times 3} = \frac{12}{21}$

Since $\frac{14}{21} > \frac{12}{21}$, $\frac{2}{3} > \frac{4}{7}$

2 : 3 is greater than 4 : 7.

(ii) 11 : 15 means $\frac{11}{15}$

14 : 25 means $\frac{14}{25}$

LCM (of 15 and 25) = $5 \times 3 \times 5$

$= 75$

5	15, 25
3	3, 5
5	1, 5
	1, 1

$\therefore \frac{11}{15} = \frac{11 \times 5}{15 \times 5} = \frac{55}{75}$

$\frac{14}{25} = \frac{14 \times 3}{25 \times 3} = \frac{42}{75}$

Since $\frac{55}{75} > \frac{42}{75} \Rightarrow \frac{11}{15} > \frac{14}{25}$

11 : 15 is greater than 14 : 25

iii, 15:27 means $\frac{15}{27}$

2:9 means $\frac{2}{9}$

LCM of 27 and 9 = 27

$\therefore \frac{15}{27} = \frac{15}{27}$

$\frac{2}{9} = \frac{2 \times 3}{9 \times 3} = \frac{6}{27}$

Since $\frac{15}{27} > \frac{6}{27} \Rightarrow \frac{15}{27} > \frac{2}{9}$

$\therefore$ 15:27 is greater than 2:9

iv, 108:63 means $\frac{108}{63}$

18:21 means $\frac{18}{21}$

LCM of 63 and 21 = 63

$\therefore \frac{108}{63} = \frac{108}{63}$

$\frac{18}{21} = \frac{18 \times 3}{21 \times 3} = \frac{54}{63}$

Since $\frac{108}{63} > \frac{54}{63} \Rightarrow \frac{108}{63} > \frac{18}{21}$

108:63 is greater than 18:21

11. Divide ₹ 360 in the ratio 7 : 8.

Solution:

Sum of ratio terms = 7+8 = 15

1^{st} part $= \frac{7}{15} \times 360$

$= 7 \times 24$

$= 168$

$\therefore$ 1^{st} part = ₹ 168

2^{nd} part $= \frac{8}{15} \times$ ₹ 360

$= 8 \times$ ₹ 24

$=$ ₹ 192

12. Divide ₹ 440 in the ratio $\frac{1}{5} : \frac{1}{6}$. [Hots]

Solution: LCM of 5 and 6 = 30

$\therefore \frac{1}{5} : \frac{1}{6} = (\frac{1}{5} \times 30) : (\frac{1}{6} \times 30) = 6 : 5$

$\therefore$ Sum of the ratio terms = 6+5 = 11

$\therefore$ 1^{st} part $= \frac{6}{11} \times$ ₹ 440

$= 6 \times$ ₹ 40 = ₹ 240

2^{nd} part $= \frac{5}{11} \times$ ₹ 440

$= 5 \times$ ₹ 40 = ₹ 200

13. Divide ₹ 560 in the ratio 1 : 3 : 4.

Sum of the ratio terms = 1+3+4 = 8

$\therefore$ 1st part $= \frac{1}{8} \times ₹560$

$= 1 \times ₹70$

$= ₹70$

2nd part $= \frac{3}{8} \times ₹560$

$= 3 \times ₹70$

$= ₹210$

3rd part $= \frac{4}{8} \times ₹560$

$= 4 \times ₹70$

$= ₹280$

14. The sides of a triangle are in the ratio 4 : 5 : 2. Find the sides of the triangle, if its perimeter is 660 cm.

Solution: Sum of the ratio terms $= 4+5+2$

$= 11$

Perimeter $= 660$ cm

$\therefore$ 1st side $= \frac{4}{11} \times 660$ cm

$= 4 \times 60$ cm $= 240$ cm.

2nd side $= \frac{5}{11} \times 660$ cm

$= 5 \times 60$ cm $= 300$ cm.

3rd side $= \frac{2}{11} \times 660$ cm

$= 2 \times 60$ cm $= 120$ cm.

15. The boys and the girls in a school are in the ratio 6 : 5. If total strength of the school be 880, find the number of boys and girls.

Solution: Sum of the ratio terms $= 6+5 = 11$

Total Strength = 880

$\therefore$ No. of Boys $= \frac{6}{11} \times 880$

$= 6 \times 80 = 480$

$\therefore$ No. of Girls $= \frac{5}{11} \times 880$

$= 5 \times 80 = 400.$

16. The ratio of monthly income to the savings of a family is 7 : 2. If the savings be ₹ 500, find the income and expenditure.

Solution: let INCOME be $7x$

and SAVINGS be $2x$

$\therefore 2x = ₹500$

$\therefore x = \frac{500}{2} = 250$

$\therefore 7x = 7 \times 250 = 1750$

$\therefore$ Income $= ₹ 1750$

Savings $= ₹ 500$

$\therefore$ Expenditure = Income − Savings

$= ₹1750 - ₹500$

$= ₹ 1250$

17. The ratio of zinc and copper in an alloy is 7 : 9. If the weight of the copper in the alloy is 11.7kg, find the weight of the zinc in the alloy.

Solution: let weight of zinc be $7x$

and Weight of Copper be $9x$

Given Weight of Copper = 11.7 kg

$\therefore 9x = 11.7$

$\therefore \quad x = \frac{11.7}{9} = 1.3$

$\therefore$ Weight of zinc $= 7x$ kg

$= 7 \times 1.3$ kg

$= 9.1$ kg

18. Find the ratio of consonants to vowels in MATHEMATICS SUCCESS. [Hots]

Solution: Vowels in the given words are A, E, A, I, U, E

$\therefore$ No. of Vowels $= 6$

Consonants in the given words are M, T, H, M, T, C, S, S, C, C, S, S

$\therefore$ No. of Consonants $= 12$

$\therefore$ Ratio of Consonants to Vowels is $12 : 6 = 2 : 1$

EXERCISE 8.2

1. Are the following numbers in proportion?

(i) 3, 9, 8, 24 **(ii) 5, 15, 7, 21** **(iii) 14, 6, 5, 9** **(iv) 32, 26, 15, 25**

Solution: i) product of extremes $= 3 \times 24$

$= 72$

product of Means $= 9 \times 8 = 72$

$\therefore$ Product of extremes = product of means $= 72$

Thus, 3, 9, 8, 24 are in proportion.
∴ Ans: yes.

(ii) 5, 15, 7, 21

product of extremes = 5 × 21
= 105

product of Means = 15 × 7
= 105

∴ product of Extremes = product of Means = 105.

Thus, 5, 15, 7, 21 are in proportion.
∴ Ans: yes.

(iii) 14, 6, 5, 9

product of extremes = 14 × 9
= 126

product of Means = 6 × 5 = 30

∴ product of extremes ≠ product of Means.

∴ 14, 6, 5, 9 are not in proportion.
∴ Ans: No

(iv) 32, 26, 15, 25

product of Extremes = 32 × 25
= 800

product of Means = 26 × 15 = 390

∴ product of Extremes ≠ product of means.

$\therefore$ 32, 26, 15, 25 are not in proportion.
$\therefore$ Ans : No.

2. Find the value of x :

(i) 6 : 9 = x : 6 (ii) x : 15 = 6 : 45 (iii) 2 : 7 = 28 : x (iv) 32 : x = 36 : 18

Solution : i, $6 : 9 = x : 6$

$\Rightarrow 9x = 6 \times 6$

$\Rightarrow x = \frac{6 \times 6}{9} = 4$

ii, $x : 15 = 6 : 45$

$\Rightarrow 45 \times x = 15 \times 6$

$\Rightarrow x = \frac{15 \times 6}{45} = 2$

iii, $2 : 7 = 28 : x$

$\Rightarrow 2x = 7 \times 28$

$\Rightarrow x = \frac{7 \times 28}{2} = 7 \times 14$

$= 98$

iv, $32 : x = 36 : 18$

$\Rightarrow 36x = 32 \times 18$

$\Rightarrow x = \frac{32 \times 18}{36} = \frac{32}{2}$

$\Rightarrow x = 16$

3. Find the fourth proportional to :
(i) 19, 38, 11 (ii) 63, 105, 18 (iii) 36, 92, 45 (iv) 25, 15, 65

Solution : (i) Let the fourth proportional to 19, 38, 11 be x

Then $19 : 38 :: 11 : x$

$\Rightarrow 19 \times x = 38 \times 11$ (product of extremes = product of means)

$\Rightarrow x = \frac{38 \times 11}{19} = 2 \times 11 = 22$

(ii) let the fourth proportional to 63, 105, 18 be x.

Then $63 : 105 :: 18 : x$

$\Rightarrow 63 \times x = 105 \times 18$ (product of extremes = product of means).

$\Rightarrow x = \frac{105 \times 18}{63} = \frac{105 \times 2}{7} = 30$

(iii) let the fourth proportional to 36, 92, 45 be x

Then $36 : 92 :: 45 : x$

$\Rightarrow 36 \times x = 92 \times 45$ (product of extremes = product of means)

$\Rightarrow x = \frac{92 \times 45}{36} = \frac{92 \times 5}{4}$

$\Rightarrow x = \frac{\cancel{92}^{46} \times 5}{\cancel{2}} = \frac{\cancel{46}^{23} \times 5}{\cancel{2}_1}$

$= 23 \times 5 = 115$

∴ fourth proportional is 115

iv, let the fourth proportional to 25, 15, 65 be x

then $25 : 15 :: 65 : x$

$\Rightarrow 25 \times x = 15 \times 65$ (product of extremes = product of means).

$\Rightarrow x = \frac{\cancel{15}^{3} \times \cancel{65}^{13}}{\cancel{25}_{\cancel{5}_1}} = 3 \times 13$

$= 39$

∴ fourth proportional to 25, 15, 65 is 39.

4. The second, third and fourth terms of a proportion are 35, 48 and 60. Find the first term.

Solution: let the first term be x

then $x : 35 :: 48 : 60$

$\Rightarrow x \times 60 = 35 \times 48$ (product of extremes = product of means).

$\Rightarrow x = \frac{35 \times 48}{60} = \frac{\cancel{35}^{7} \times 4}{\cancel{5}_1} = 28$

∴ First term = 28

5. The first, second and fourth terms of a proportion are 32, 112 and 217 respectively. Find the third term.

let x be the third term.

Then, $32 : 112 :: x : 217$

$\Rightarrow 32 \times 217 = 112 \times x$ (product of extremes = product of means)

$\Rightarrow x = \frac{\cancel{32}^{2} \times 217}{\cancel{112}_{\cancel{16}_{1}}^{31}} = 2 \times 31$

$= 62$

∴ The third term is 62.

6. (i) Show that 16, 84, 441 are in proportion.
(ii) Find x, if 25, x, x, 49 are in proportion.
(iii) Find x, if x, 36, 27 are in proportion.

Solution : (i) If 16, 84, 441 are in proportion, then

$16 : 84 :: 84 : 441$

Then $16 \times 441 = 7056$

and $84 \times 84 = 7056$

∴ $16 \times 441 = 7056 = 84 \times 84$ (product of extremes = product of means)

∴ 16, 84, 441 are in proportion.

(ii) $25, x, x, 49$ are in proportion

$\Rightarrow 25 : x :: x : 49$

$\Rightarrow x \times x = 25 \times 49$ (product of means = product of extremes)

$\Rightarrow x^2 = 25 \times 49$

$\Rightarrow x = \sqrt{25 \times 49} = \sqrt{25} \times \sqrt{49}$

$= 5 \times 7 = 35$.

(iii) $x, 36, 27$ are in proportion

Then $x : 36 :: 36 : 27$

$\Rightarrow x \times 27 = 36 \times 36$ (product of extremes = product of means)

$\Rightarrow x = \frac{36 \times 36}{27} = \frac{36 \times 4}{3}$

$x = 12 \times 4 = 48$

7. Find the fourth proportional to 5, 7 and 25.

Solution: Let the fourth proportional be x, then

$5 : 7 :: 25 : x$

$\Rightarrow 5 \times x = 7 \times 25$ (product of extremes = product of means)

$\Rightarrow x = \frac{7 \times 25}{5} = 7 \times 5 = 35$

$\therefore$ fourth proportional is 35

8. Find the third proportional to 1 km, 250 m and 500 g. [Hots]

Solution: Let the third proportional be x. then

$1\text{ km} : 250\text{m} :: x : 500\text{g}$

$\Rightarrow \frac{1\text{ km}}{250\text{m}} = \frac{x}{500\text{g}}$

$\Rightarrow \frac{1000\text{m}}{250\text{m}} = \frac{x}{500\text{g}}$

$\Rightarrow 4 = \frac{x}{500\text{g}}$.

$\Rightarrow x = 4 \times 500\text{g} = 2000\text{g}$

$= 2\text{kg}$.

$\therefore$ third proportional is $x = 2\text{kg}$.

9. Find the mean proportion between 21 and 84.

Solution: let the mean proportion be x.

then, $21 : x :: x : 84$

$\Rightarrow 21 \times 84 = x \times x$ (product of extremes = product of means)

$\Rightarrow x^2 = 7 \times 3 \times 7 \times 3 \times 4$

$\Rightarrow x = \sqrt{7 \times 7 \times 3 \times 3 \times 2 \times 2}$

$= 7 \times 3 \times 2 = 42$

$\therefore$ mean proportional is $x = 42$

10. The lengths of 2 pillars are in the ratio 4 : 5. If the length of the longer pillar is 270 m, find the length of the other pillar. What is the difference in their heights?

Solution: Suppose the length of longer pillar $= 5x = 270$ m

Then $x = \frac{270}{5} = 54$ m

$\therefore$ Length of other pillar $= 4x$

$= 4 \times 54$ m

$= 216$ m

$\therefore$ Difference in their heights

$= 270 - 216$

$= 54$ m

11. The ratio of tea cups sold to coffee cups sold in a shop is 4 : 3. If 420 tea cups are sold in a day, how many coffee cups were sold?

Solution: Tea cups sold $= 4x = 420$

Then, $x = \frac{420}{4} = 105$

Then Coffee cups sold $= 3x$

$= 3 \times 105 = 315$

12. The length and breadth of a rectangle are in the ratio 4 : 1. Find the area of the rectangle, if the length is 64 m.

Solution: Suppose Length $= 4x = 64$ m

$\therefore x = \frac{64}{4} = 16$ m

$\therefore$ Breadth $= 1x = 16$ m

$\therefore$ Area of Recangle $= L \times B = 64\text{m} \times 16\text{m}$

$\therefore$ Area $= 1024\ m^2$

13. The ratio of brass and copper in an alloy is 3 : 5. If the weight of copper is 3.2 kg, find the weight of brass in the alloy.

Solution: Brass : Copper = 3 : 5

Suppose weight of Copper $= 5x$

$\therefore 5x = 3.2$ kg (given)

$\therefore x = \frac{3.2}{5}$ kg $= 0.64$ kg

$\therefore$ Weight of Brass $= 3x$

$= 3 \times 0.64$ kg

$= 1.92$ kg.

14. The ratio of cars to two wheelers in a city is 3 : 2. If there are 1,50,000 cars, find the number of two wheelers in the city.

Solution: cars : two wheelers = 3 : 2

Suppose cars $= 3x = 1,50,000$ (given)

Then $x = \frac{1,50,000}{3} = 50,000$

$\therefore$ No. of Two wheelers $= 2x$

$= 2 \times 50,000$

$= 1,00,000$

15. The ratio of income to savings of Rajeev is 9 : 1. Find his yearly income, if he is able to save ₹2600 per month.

Solution: Income : Savings = 9 : 1

Suppose Savings $= 1x =$ ₹ 2600 (given)

Then Income $= 9x = 9 \times 2600$

$=$ ₹ 23,400

$\therefore$ Yearly Income $= 12 \times 23,400$

$= ₹\ 2,80,800.$

16. In a school canteen, *samosas* and burgers are sold in the ratio 5 : 4. If 45 *samosas* are sold on a particular day, how many burgers were sold?

Solution : Samosas : Burgers $= 5 : 4$

Suppose No. of Samosas Sold $= 5x = 45$ (given)

$\therefore 5x = 45$ (Given)

$\Rightarrow x = \frac{45}{5} = 9$

$\therefore$ No. of Burgers Sold $= 4x$

$= 4 \times 9 = 36$

EXERCISE 8.3

1. Express the following per cents as fractions :

(i) 14% (ii) 0.02% (iii) 14.8% (iv) $3\frac{1}{4}$% (v) 12.5% (vi) 0.25%

Solution : (i) 14% means 14 out of 100

$\therefore 14\% = \frac{14}{100} = \frac{7}{50}$

(ii) $0.02\% = \frac{0.02}{100} = \frac{2}{10000} = \frac{1}{5000}$

(iii) $14.8\% = \frac{14.8}{100} = \frac{148}{1000} = \frac{37}{250}$

(iv) $3\frac{1}{4}\% = \frac{13}{4}\% = \frac{13}{400}$

(v) $12.5\% = \frac{12.5}{100} = \frac{125}{1000} = \frac{1}{8}$

(vi) $0.25\% = \frac{0.25}{100} = \frac{25}{10000} = \frac{1}{400}$

2. Express the following fractions as per cents :

(i) $\frac{3}{7}$ (ii) $\frac{3}{4}$ (iii) $\frac{11}{20}$ (iv) $1\frac{9}{11}$ (v) $\frac{6}{25}$ (vi) $\frac{23}{15}$

Solution : (i) $\frac{3}{7} = \frac{3}{7} \times \frac{100}{100}$

$= \frac{300}{7}\%$

$= 42\frac{6}{7}\%$

(ii) $\frac{3}{4} = \frac{3}{4} \times \frac{100}{100} = \frac{300}{4}\%$

$= 75\%$

(iii) $\frac{11}{20} = \frac{11}{20} \times \frac{100}{100} = \frac{1100}{20}\%$

$= 55\%$

(iv) $1\frac{9}{11} = \frac{20}{11} \times \frac{100}{100} = \frac{2000}{11}\%$

$= 181\frac{9}{11}\%$

(v) $\frac{6}{25} = \frac{6 \times 4}{25 \times 4} = \frac{24}{100} = 24\%$

(vi) $\frac{23}{15} = \frac{23}{15} \times \frac{100}{100} = \frac{2300}{15}\%$

$= \frac{460}{3}\%$

$= 153\frac{1}{3}\%$

3. Express the following per cents as decimals :

(i) 95% (ii) $2\frac{1}{4}\%$ (iii) $33\frac{1}{3}\%$ (iv) 0.125% (v) $14\frac{1}{5}\%$ (vi) 27.8%

Solution: (i) $95\% = \frac{95}{100} = 0.95$

(ii) $2\frac{1}{4}\% = 2.25\% = \frac{2.25}{100} = 0.0225$

(iii) $33\frac{1}{3}\% = 33.33\% = \frac{33.33}{100} = 0.3333$

(iv) $0.125\% = \frac{0.125}{100} = 0.00125$

(v) $14\frac{1}{5}\% = \frac{14.2}{100} = 0.142$

(vi) $27.8\% = \frac{27.8}{100} = 0.278$

4. Express the following decimals as per cents :

(i) 1.8 (ii) 0.004 (iii) 0.027 (iv) 1.06 (v) 0.0014 (vi) 1.05

Solution: (i) $1.8 = 1.8 \times 100\% = 180\%$

(ii) $0.004 = 0.004 \times 100\% = 0.4\%$

(iii) $0.027 = 0.027 \times 100\% = 2.7\%$

(iv) $1.06 = 1.06 \times 100\% = 106\%$

(v) $0.0014 = 0.0014 \times 100\% = 0.14\%$

(vi) $1.05 = 1.05 \times 100\% = 105\%$

5. Express the following per cents as ratios in simplest form :

(i) 45% (ii) 75% (iii) 0.2% (iv) $3\frac{1}{2}\%$ (v) $15\frac{1}{4}\%$ (vi) $25\frac{2}{5}\%$

Solution: (i) $45\% = \frac{45}{100} = \frac{9}{20} = 9:20$

(ii) $75\% = \frac{75}{100} = \frac{3}{4} = 3:4$

(iii) $0.2\% = \frac{0.2}{100} = \frac{2}{1000} = \frac{1}{500} = 1:500$

(iv) $3\frac{1}{2}\% = 3.5\% = \frac{3.5}{100} = \frac{35}{1000} = \frac{7}{200} = 7:200$

(v) $15\frac{1}{4}\% = 15.25\% = \frac{15.25}{100} = \frac{1525}{10000}$

$= \frac{61}{400} = 61:400$

(vi) $25\frac{2}{5}\% = 25.4\% = \frac{25.4}{100} = \frac{254}{1000}$

$= \frac{254}{1000} = \frac{127}{500} = 127:500.$

6. Express the following ratios as per cents :

(i) 1 : 4 (ii) 2 : 7 (iii) 11 : 15 (iv) 25 : 12 (v) 18 : 45 (vi) 5 : 4

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

(ii) $2:7 = \frac{2}{7} \times 100\% = \frac{200}{7}\%$

$= 28.57\%$

(iii) $11:15 = \frac{11}{15} \times 100\% = \frac{1100}{15}\% = \frac{220}{3}\%$

$= 73.33\%$

(iv) $25:12 = \frac{25}{12} \times 100\% = \frac{2500}{12}\%$

$= \frac{1250}{6}\% = \frac{625}{3}\%$

$= 208.33\%$

(v) $\frac{18}{45} = \frac{18}{45} \times 100\% = \frac{1800}{45}\%$

$= \frac{200}{5}\% = 40\%$

(vi) $5:4 = \frac{5}{4} \times 100\% = \frac{500}{4}\% = 125\%$

7. Find :

(i) 10% of 18,000 (ii) 4% of ₹ 52 (iii) $3\frac{2}{3}$% of 60 km

(iv) $4\frac{1}{5}$% of 700 *l* (v) 2.5% of 7000 kg (vi) 20% of 15 days

Solution : (i) 10% of 18,000 $= \frac{10}{100} \times 18,000$

$= 1800$

(ii) 4% of ₹ 52 $= \frac{4}{100} \times 52$

$= \frac{208}{100} = ₹ 2.08$

(iii) $3\frac{2}{3}$% of 60 kms $= \frac{11}{3}$% of 60 kms

$= \frac{11}{300} \times 60$ kms.

$= \frac{660}{300}$ kms

$= \frac{66}{30}$ kms.

$= \frac{22}{10}$ kms

$= 2.2$ kms.

(iv) $4\frac{1}{5}$% of 700 l $= \frac{21}{5}$% of 700 l

$= \frac{21}{500} \times 700$ l

$= \frac{147}{5}$ l.

$= 29.4$ l

(v) 2.5% of 7000 kg

$= \frac{2.5}{100} \times 7000$ kg

$= 25 \times 7$ kg

$= 175$ kg

(vi) 20% of 15 days $= \frac{20}{100} \times 15$ days.

$= \frac{1}{5} \times 15$ days

$= 3$ days.

8. What per cent of :

(i) **49 is 7?** (ii) **15 days is 6 hr?** (iii) **45 km is 15 m?**
(iv) **2 *l* is 125 ml?** (v) **₹ 10 is 50 paise?** (vi) **2 days is 12 min.?**

Solution: (i) Let x% of $49 = 7$

$\Rightarrow \frac{x}{100} \times 49 = 7$

$\Rightarrow x = \frac{7 \times 100}{49} = \frac{100}{7}$

$= 14\frac{2}{7} = 14.2857$

$\therefore$ 7 is $14\frac{2}{7}$% of 49

(ii) Let x% of 15 days $= 6$ hr

1 day $= 24$ hr
$\therefore$ 15 days $= 360$ hr

$\therefore \frac{x}{100} \times 360 \text{ hr} = 6 \text{ hr}$

$\therefore x = \frac{6 \times 100}{360}$

$\therefore x = \frac{100}{60} = \frac{10}{6} = \frac{5}{3} = 1\frac{2}{3}$

$\therefore$ 6 hr is $1\frac{2}{3}\%$ of 15 days.

(iii) 45 km is 15 m?

let $x\%$ of 45 km = 15 m

$\therefore \frac{x}{100} \times 45000 \text{ m} = 15 \text{ m}$

$\Rightarrow x = \frac{15 \times 100}{45000} = \frac{1}{30}$

$= 0.0333$

$\therefore$ 15 m is $\frac{1}{30}\%$ of 45 km

(iv) let $x\%$ of 2 l is 125 ml

$\therefore \frac{x}{100} \times 2 \times 1000 \text{ ml} = 125 \text{ ml}$

$\Rightarrow x = \frac{125 \times 100}{2 \times 1000} = \frac{125}{20}$

$= \frac{25}{4} = 6\frac{1}{4}$

$\therefore$ 125 ml is $6\frac{1}{4}\%$ of 2 l

(v) Let $x\%$ of ₹10 is 50 paise.

$\therefore \frac{x}{100} \times 1000 \text{ paise} = 50 \text{ paise}$

$\Rightarrow x = \frac{50 \times 100}{1000} = 5$

$\therefore$ 50 paise is 5% of ₹10

VI, Let x% of 2 days is 12 min

$\therefore \frac{x}{100} \times 2 \text{ days} = 12 \text{ min}$

1 day = 24 hr = 24 × 60 min

$\therefore$ 2 days = 2 × 24 × 60 min

= 2,880 min.

$\therefore \frac{x}{100} \times 2{,}880 \text{ min} = 12 \text{ min}.$

$\Rightarrow x = \frac{12 \times 100}{2{,}880}$

$= \frac{\cancel{120}^{\,30}}{\cancel{288}_{\,72}} = \frac{\cancel{30}^{\,15}}{\cancel{72}_{\,36}}$

$= \frac{\cancel{15}^{\,5}}{\cancel{36}_{\,12}} = \frac{5}{12}$

$\therefore$ 12 min is $\frac{5}{12}$% of 2 days.

9. Find :

(i) 26.4 kg is what per cent of 220 kg?

(ii) $\left(204\frac{3}{4}\right)$ m is what per cent of 1365 m?

(iii) ₹ 4 is what per cent of ₹ 200?

(iv) 45 marbles are what per cent of 150 marbles?

Solution: (i) let x% of 220 kg be 26.4 kg

$\therefore \frac{x}{100} \times 220 \text{ kg} = 26.4 \text{ kg}$

$\Rightarrow x = \frac{26.4 \times 100}{220}$

$= \frac{264}{22} = 12$

$\therefore$ 26.4 kg is 12% of 220 kg.

ii) let $x\%$ of 1365 m is $(204\frac{3}{4})$ m

$\therefore \frac{x}{100} \times 1365 = 204\frac{3}{4}$

$\Rightarrow x = \frac{819}{4} \times \frac{100}{1365}$ (273, 25, 1, 455)

$= \frac{273 \times 25}{455}$ (5, 91)

$= \frac{273 \times 5}{91}$ (3)

$= 15$

$\therefore (204\frac{3}{4})$ m is 15% of 1365 m

iii) let $x\%$ of ₹ 200 be ₹ 4

$\therefore \frac{x}{100} \times 200 = 4$

$\Rightarrow x = \frac{4}{2} = 2$

$\therefore$ ₹ 4 is 2% of ₹ 200.

iv) let $x\%$ of 150 marbles be 45 marbles.

$\therefore \frac{x}{100} \times 150 = 45$

$\Rightarrow x = \frac{45 \times 100}{150} = \frac{45 \times 2}{3}$

$= 15 \times 2 = 30$

$\therefore$ 45 marbles are 30% of 150 marbles.