Chapter 8

Ratio and Proportion

Exercise 8.1

Question 1.

Express the following ratios in simplest form:

(i) 20 :40

(ii) 40:20

(iii) 81:108

(iv) 98 : 63

Solution:

(i) $20 : 40 = \frac{20}{40} = \frac{1}{2} = 1 : 2$

(ii) $40 : 20 = \frac{40}{20} = \frac{2}{1} = 2:1$

(iii) $81 : 108 = \frac{81}{108} = \frac{9}{12} = \frac{3}{4} = 3:4$

(iv) $98 : 63 = \frac{98}{63} = \frac{14}{9} = 14:9$

Question 2.

Fill in the missing numbers in the following equivalent ratios:

(i) $\frac{14}{21} = \frac{\ldots\ldots}{3} = \frac{6}{\ldots\ldots}$

(ii) $\frac{15}{18} = \frac{....}{6} = \frac{10}{....} = \frac{.....}{30}$

Solution:

(i) $\frac{14}{21} = \frac{.....}{3} = \frac{6}{.....}$

$= \frac{14}{21} = \frac{2}{3} = \frac{6}{9}$

$\left(\because \frac{14 \div 7}{21 \div 7} = \frac{2}{3} \ and \ \frac{2 \times 3}{3 \times 3} = \frac{6}{9}\right)$

(ii) $\frac{15}{18} = \frac{....}{6} = \frac{10}{....} = \frac{.....}{30}$

$= \frac{15}{18} = \frac{5}{6} = \frac{10}{12} = \frac{25}{30}$

$\left(\because \frac{15 \div 3}{18 \div 3} = \frac{5}{6}, \quad \frac{5 \times 2}{6 \times 2} = \frac{10}{12} \ and \ \frac{5 \times 5}{6 \times 5} = \frac{25}{30}\right)$

Question 3.

Find the ratio of each of the following in simplest form:

(i) 2.1m to 1.2m

(ii) 91 cm to 1.04 m

(iii) 3.5kg to 250gm

(iv) 60 paise to 4 rupees

(v) 1 minute to 15 seconds

(vi) 15mm to 2cm

Solution:

(i) 2.1 m : 1.2 m =

$\frac{2.1}{1.2} = \frac{21}{12} \times \frac{10}{10} = \frac{7}{4} = 7:4$

(ii) 91cm: 1.04cm or 1.04×100 or 104cm

91cm :104cm = $\frac{91}{104} = 7 : 8$

(iii) 3.5kg: 250gm or $3.5 \times 1000gm : 250gm$

$= \frac{3500}{250} = \frac{14}{1} = 14: 1$

(iv) 60 paise : 4 rupees

1 rupees = 100 paise

∴ 60 paise

$\frac{60}{100} = ₹\frac{3}{5}$

$\frac{3}{5}$ rupees : 4 rupees

$\frac{\frac{3}{5}}{\frac{4}{1}} = \frac{3}{5} \times \frac{1}{4} = \frac{3}{20} = 3:20$

(v) 1 minute : 15 seconds

60 seconds = 1 minute

1 minute : 15 seconds

$\frac{15}{60} = \frac{1}{4}$ min

$\Longrightarrow$ 1 min : $\frac{1}{4}$ min.

$\frac{1}{\frac{1}{4}} = \frac{1 \times 4}{1} = \frac{4}{1} = 4:1$

(vi) 15mm : 20cm

10 mm = 1cm

15mm. = $\frac{15}{10}$ cm

$\frac{\frac{15}{10}}{\frac{2}{1}} = \frac{15}{10} \times \frac{1}{2} = \frac{3}{4} = 3:4$

Question 4.

The length and the breadth of a rectangular park are 125m and 60 m respectively. What is the ratio of the length to the breadth of the park?

Solution:

Length of rectangular park = 125m

Breadth of rectangular park = 60m

∴ Ratio of the length to the breadth of park is

$\frac{125}{60} = \frac{25}{12} = 25: 12$

Question 5.

The population of village is 4800. If the numbers of females is 2160, find the ratio of males to that of females.

Solution:

Population of village = 4800

No. of females = 2160

No. of males = 4800 – 2160 = 2640

No. of males : No. of femaless

2640 : 2160

$\frac{2640}{2160} = \frac{264}{216} = \frac{11}{9} = 11:9$

Question 6.

In a class, there are 30 boys and 25 girls. Find the ratio of the numbers of

(i) boys to that of girls.

(ii) girls to that of total number of students

(iii) boys to that of total numbers of students.

Solution:

Boys = 30, girls = 25

Total students = 30 + 25 = 55

(i) boys : girls ⇒ 30 : 25 ⇒ $\frac{30}{25} = \frac{6}{5}$ = 6 : 5

(ii) girls : Total No. of students

30 : 55 ⇒ $\frac{30}{55} = \frac{6}{11}$ = 6 : 11

Question 7.

In a year, Reena earns ₹ 1,50,000 and saves ₹50,000. Find the ratio of

(i) money she earns to the money she saves.

(ii) money that she saves to the money she spends.

Solution:

(i) Ratio of money that Reena earns to the money she saves

$= \frac{1,50,000}{50,000} = \frac{1,50,000 \div 50,000}{50,000 \div 50,000}$

[HCF = (1,50,000, 50, 000) = 50,000]

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

(ii) Money that she spends

= ₹ 1,50,000 - ₹50,000 = ₹1,00,000

∴ Ratio of money she saves to the money she spends

$= \frac{50,000}{1,00,000} = \frac{50,000 \div 50,000}{1,00,000 \div 50,000}$

[HCF (50,000, 1,00,000) = 50,000]

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

Question 8.

The monthly expenses of a student have increased from ₹350 to ₹500.

Find the ratio of

(i) increase in expenses and original expenses.

(ii) Original expenses to increased expenses.

(iii) increased expenses to increased in expenses.

Solution:

Original exp. = ₹350

Increased exp. = ₹500

Increased in exp. = 500 – 350 = ₹150

(i) increased in exp : Original exp.

$150 : 350 \implies \frac{150}{350} = \frac{15}{35} = \frac{3}{7}$ =3:7

(ii) Original exp. : Increased exp.

$350 : 500 \implies \frac{350}{500} = \frac{35}{50} = \frac{7}{10}$ = 7 : 10

(iii) Increased exp : Increase in exp.

$500 : 150 \Longrightarrow \frac{500}{150} = \frac{50}{15} = \frac{10}{3} = 10:3$

Question 9.

Mr Mahajan and his wife are both school teachers and earn ₹ 20900 and ₹ 18700 per month respectively. Find the ratio of

(i) Mr Mahajan's income to his wife's income

(ii) Mrs Mahajan's income to the total income of both.

Solution:

(i) Ratio in Mr Mahajan's income and his wife

= 20900 : 18700

$= \frac{20900}{18700} = \frac{19}{17} = 19 : 17$

(ii) Mrs Mahajan's income to the total income of both.

Earning of Mrs Mahajan's = ₹ 20900

and his wife = ₹ 18700

Total income = ₹ 39,600

Mrs Mahajan's income to the total income of both.

$\frac{18700}{39600} = \frac{17}{36} = 17 : 36$

Question 10.

Out of 30 Students in a class, 6 like football, 12 like cricket and remaining like tennis. Find the ratio of

(a) Number of students liking football to number of students liking tennis.

(b) Number of students liking cricket to total number of students.

Solution:

(a) Number of students liking tennis

= 30 – (6 + 12) = 30 – 18 = 12

∴ Ratio of number of students liking football to number of students liking tennis.

$= \frac{6}{12} = \frac{6 \div 6}{12 \div 6}$ [H.C.F. (6,12) =6]

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

(b) Number of students liking cricket to total number of students

$= \frac{12}{30} = \frac{12 \div 6}{30 \div 6}$ [H.C.F. (12,30) =6]

$= \frac{2}{5}$ = 2:5

Question 11.

Divide ₹560 between Ramu and Munni in the ratio 3: 2.

Solution:

Total amount = ₹560

Ratio in Ramu and Munni = 3 :2

Sum of ratios = 3 + 2 = 5

Ramu shares = $₹\frac{560\times3}{5}$ = ₹336

Munni Shares = $₹\frac{560\times2}{5}$ = ₹224

Question 12.

Two people invested ₹15000 and ₹25000 respectively to start a business. They decided to share the profits in the ratio of their investments. If their profit is ₹12,000, how much does each get?

Solution:

Total investment = 15000 + 25000 = 40000

Investment of 1st person = $\frac{15000}{40000} = \frac{3}{8}$

Investment of 2nd person = $1 - \frac{3}{8} = \frac{5}{8}$

Total profit = ₹12,000

Profit of 1st person = $\frac{3}{8} \times$ ₹12,000 = ₹4500

Profit of 2nd person = ₹12,000 - ₹4500 = ₹7500

Question 13:

The ratio of Ankur's money to Roma's moey is 9:11. if Ankur has ₹540, how much money does Roma have ?

Solution:

Ratio of Ankur's two Roma's money = 9 :11

Ankur has money = ₹540

Let Roma's have = x

9 :11 :: 540 : x

$\Rightarrow \frac{9}{11} = \frac{540}{x}$

$\Rightarrow x = \frac{540 \times 11}{9}$

∴ Roma's have = ₹660.

Question 14.

The ratio of weights of tin and zinc in on alloy is 2:5. How much zinc is there in 31.5g of alloy?

Solution :

Ratio of weight = 2 : 5

Sum of ratio = 2 + 5 = 7

Total weight of alloy =31.5g

Part of zinc = $31.5 \times \frac{5}{7} = \frac{315}{10} \times \frac{5}{7} = \frac{45}{2}$

= 22.5 gm

Exercise 8.2

Question 1.

Check whether the given two ratios form a proportion or not:

(i) 4 :6 and 12 : 18

(ii) 15 : 45 and 40 : 120

(iii) 14 : 4 and 18 : 6

(iv) 12 : 18 and 28 : 12

Solution:

4 : 6 and 12 : 18

$\frac{4}{6}$ and $\frac{12}{18} = \frac{2}{3}$ and $\frac{2}{3}$

= 2 : 3 and 2 : 3 Yes.

(ii) 15:45 and 40 :120

$\frac{15}{45}$ and $\frac{40}{120}$

$= \frac{1}{3}$ and $\frac{1}{3}$ Yes.

(iii) 14 : 4 and 18 : 6

$\frac{14}{4}$ and $\frac{18}{16} = \frac{7}{2}$ and $\frac{3}{1}$

= 7 : 2 and 3 : 1 No.

(iv) 12:18 and 28:12

$\frac{12}{18}$ and $\frac{28}{12}$

= $\frac{2}{3}$ and $\frac{7}{3}$ No.

Question 2.

Write true (T) or False (F) against each of the following statements:

(i) 16 : 24 = 20 : 30

(ii) 16 : 24 = 30 : 20

(iii) 21 : 6 :: 35 : 10

(iv) 5.2 : 3.9 :: 3 : 4

Solution:

(i) 16 : 24 = 20 : 30

2 : 3 = 2 : 3 True

(ii) 16 : 24 = 30 : 20

2 : 3 = 3 : 2 False

(iii) 21 : 6 :: 35 : 10

7 : 2 = 7 : 2 True

(iv) 5.2 : 3.9 :: 3 : 4

$\frac{5.2}{3.9} = \frac{5.2 \times 10}{3.9 \times 10} = \frac{52}{39}$

$= \frac{52 \div 13}{39 \div 13} = \frac{4}{3}$

= 4 : 3

$\because$ 4 : 3 $\neq$ 3 : 4

5.2 : 3 : 9 :: 3:4 False

Question 3.

Find which of the following are in proportion:

(i) 12, 16, 6, 8

(ii) 2, 3, 4, 5

(iii) 18, 10, 9, 5

(iv) 18, 9, 10, 5

Solution:

(i) 12, 16, 6, 8

12 : 16 :: 6 : 8

$\Rightarrow \frac{12}{16} = \frac{6}{8}$

$12 \times 8 = 16 \times 6 \Rightarrow 96 = 96$

$\therefore$ 12 : 16 :: 6 : 8 are in proportion

(ii) 2, 3, 4, 5

2 : 3 :: 4 : 5

$\Rightarrow \frac{2}{3} = \frac{4}{5}$

$2 \times 5 = 3 \times 4 \Rightarrow 10 = 12$ not in proportion

(iii) 18, 10, 9, 5

18 : 10 :: 9 : 5

$\Rightarrow \frac{18}{10} = \frac{9}{5}$

$\therefore$ $18 \times 5 = 10 \times 9 \Rightarrow 90 = 90$

$\therefore$ 18 : 10 :: 9 : 5 are in proportion

(iv) 18, 9, 10, 5

18 : 9 :: 10 : 5

$\Rightarrow \frac{18}{9} = \frac{10}{5}$

$18 \times 5 = 9 \times 10$

$\Rightarrow$ 90 = 90

$\therefore$ 18 : 9 :: 10 : 5 are in proportion

Question 4.

Are the following statements true ?

(i) 39kg : 36 kg = 26 men : 24 men

(ii) 45 km : 60 km = 12 hours : 15 hours

(iii) 40 people : 200 people = ₹1000 : ₹5000

(iv) 7.5 litres : 15 litres = 15 children : 30 children

Solution:

(i) 39kg : 36 kg = 26 men : 24 men

we have; 39: 36 = $\frac{39}{36}$ = $\frac{13}{12}$

And, 26:24 = $\frac{26}{24}$ = $\frac{13}{12}$

∴ 39 : 36 = 26 : 24

So, the given statement is true.

(ii) 45km : 60 km = 12 hours : 15 hours

We have, 45 : 60 = $\frac{45}{60}$ =$\frac{3}{4}$

And, 12 : 15 = $\frac{12}{15}$ = $\frac{4}{5}$

∴ 45 : 60 ≠ 12 : 15

So, the given statement is false.

(iii) 40 people : 200 people = ₹1000 : ₹5000

We have, 40:200 $= \frac{40}{200} = \frac{20}{100} = \frac{1}{5}$

And, 1000 : 5000 $= \frac{1000}{5000} = \frac{1}{5}$

∴ 40 : 200 = 1000 : 5000

So, the given statement is true.

(iv) 7.5 litres : 1.5 litres = 15 children : 30 children

We have, 7.5 : 15 $= \frac{7.5}{15} = \frac{2.5}{5}$

$= \frac{2.5}{5\times10} = \frac{25}{50} = \frac{1}{2}$

And, 15: 30 $= \frac{15}{30} = \frac{1}{2}$

∴ 7. 5 : 1.5 = 15 : 30

So, the given statement is true.

Question 5.

Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms when the ratios form a proportion.

(i) 25 cm : 1m and ₹40 : ₹160

(ii) 39 litres : 65 litres and 6 bottles : 10 bottles

(iii) 2kg : 80 kg and 30 sec : 5 minutes

(iv) 200 g : 2.5 kg and ₹4 : ₹50

Solution:

(i) $\because$ 1 m = 100 cm

$\therefore$ 25 cm : 1m = 25cm : 100 cm

$= \frac{25}{100} = \frac{25 \div 25}{100 \div 25}$ [H.C.F. of 25, 100 =25]

$= \frac{1}{4} =$ 1 :4

₹40 : ₹160 $= \frac{40}{160} = \frac{40 \div 40}{160 \div 40}$

[H.C.F. of 40, 160 =40]

$= \frac{1}{4} =$ 1 :4

Since, the two ratio are equal, therefore, the given ration form a proportion. Middle terms are 1m and ₹40. Extreme terms are 25 cm and ₹160 .

(ii) 39 litre : 65 litre = $\frac{39}{65} = \frac{39 \div 13}{65 \div 3}$

[H.C.F. of 39, 65 =13]

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

6 bottle : 10 bottle $= \frac{6}{10} = \frac{6 \div 2}{10 \div 2}$

[H.C.F. of 6, 10 =2]

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

Since the two ratios are equal, therefore, the given ratios form a proportion. Middle terms are 65 litres and 6 bottle. Extreme terms are 39 litres and 10 bottle.

(iii) 2kg : 80 kg = $\frac{2}{80} = \frac{2 \div 2}{80 \div 2}$

[H.C.F. of 2, 80 = 2]

$= \frac{1}{40} = 1: 40$

30 sec : 5 min. = 30 sec : 5 × 60 sec.

$= \frac{30}{300} = \frac{30 \div 30}{300 \div 30}$

[H.C.F. of 2, 80 = 2]

$= \frac{1}{40} = 1: 40$

30 sec : 5 min. = 30 sec : 5× 60 sec.

$= \frac{30}{300} = \frac{30 \div 30}{300 \div 30}$

[H.C.F. of 30, 300 = 30]

$= \frac{1}{10} = 1 : 10$

Since the two ratios are not equal, therefore, the given ratios do not form a proportion.

(iv) 2.5 kg = $2.5 \times 1000g$ = 2500 g

∴ 200 g : 2.5kg = 200 g : 2500 g

Since the two ratios are not equal, therefore, the given ratios do not form a proportion.

(iv) 2.5 kg = 2.5 × 1000 g = 2500 g

∴ 200 g : 2.5 kg = 200 g : 2500 g

$= \frac{200}{2500} = \frac{200 \div 100}{2500 \div 100}$

[H.C.F. of 200, 2500 = 100]

$= \frac{2}{25} = 2 : 25$

₹ 4 : ₹50 $= \frac{4}{50} = \frac{4 \div 2}{50 \div 2}$

[H.C.F. of 4, 50 = 2]

$= \frac{2}{25} = 2 : 25$

Since, the two ratios are equal, therefore the given ratios form a proportion. Middle term are 2.5 kg and ₹4. Extreme terms are 200g and ₹50.

Exercise 8.3

Question 1.

If the cost of 9m cloth is ₹378, find the cost of 4m cloth.

Solution:

∵ Cost of 9m of cloth = ₹378

∴ Cost of 1m of cloth = $₹\frac{378}{9} = ₹42$

∴ Cost of 4m cloth = ₹42 × 4 = ₹168

Question 2

The weight of 36 books in 12kg. What is weight of 75 such books ?

Solution:

∵ Weight of 36 books = 12kg

∴ Weight of 1 book = $\frac{128}{36}$kg = 13kg

∴ Weight of 75 books = 13 × 75 = 25kg

Question 3.

Five pens cost ₹115. How many pens can you buy in ₹207 ?

Solution:

₹115 is cost of 5 pens 5

₹1 is cost of = $\frac{5}{115}$ pens

∴ ₹207 is cost of

$= \frac{207 \times 5}{115} = \frac{207}{23} = 9$ pens

Question 4.

A car consumes 8 litres of petrol in covering a distance of 100 km. How many kilometres will it travel in 26 litres of petrol ?

Solution:

8 litre of petrol consumes for = 100km

Then 26 litre of petrol consumes for

$\frac{26 \times 100}{8} = \frac{1300}{4} = 325$km

Question 5.

A truck requires 108 litres of diesel for covering a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km ?

Solution :

∵ Diesel required for covering a distance of 594 km = 108 litres

∴ Diesel required for covering a distance of 1 km = $\frac{108}{594}$ litre

∴ Diesel required for covering a distance of 1650 km

$= \frac{108}{594} \times 1650\ litres$

$= \frac{2}{11} \times 1650 = 2 \times 150 = 300$ litres

Hence, 300 litres of diesel will be required by the truck to cover a distance of 1650km.

Question 6.

A transport company charges ₹ 5400 to carry 80 quintals of weight. What will it charge to carry 126 quintals of weight (same distance) ?

Solution:

Charges of 80 quintals of weight = ₹ 5400

$\therefore$ Charges of 1 quintal $= ₹ \frac{5400}{80}$

and charges of 126 quinrtals

$= ₹ \frac{5400 \times 126}{80} = \frac{135 \times 126}{2}$

$= 135 \times 63 =$ ₹8505

Question 7.

42 metres of cloth is required to make 20 shirts of the same size. How much cloth will be required to make 36 shirts of that size ?

Solution:

For 20 shirts cloth required = 42m

$\therefore$ Cloth required for making 1 shirt $= \frac{42}{20} m$

$\therefore$ For 36 shirts cloth required will be

$= \frac{42 \times 36}{20} = \frac{18 \times 42}{10} = \frac{176}{10} = 75.6m$

Question 8.

Cost of 5kg of rice is ₹107.50.

(i) What will be the cost of 8kg of rice?

(ii) What quantity of rice can be purchased in ₹64.5?

Solution:

(i) Cost of 5kg of rice = ₹107.50.

∴ Cost of 1kg of rice = $\frac{₹107.50}{5} = 21.5$

∴ Cost of 8 kg of rice = $₹21.5 \times 8 = ₹172$

(ii) ∵ In ₹107.50, the quantity of rice that can be purchased = 5kg

∴ In ₹1, the quantity of rice that can be phased = $\frac{5}{107.50} \times 54.5kg$

∴ In ₹64.5, the quantity of rice that can be purchased = $\frac{5}{107.50} \times 54.5$

$= \frac{5}{10750} \times 100 \times \frac{545}{10} = 3kg$

Question 9.

Cost of 4 dozen bananas is ₹180. How many bananas can bbe purchased for ₹37.50 ?

Solution:

1 dozen contains = 12 items

∴ 4 dozen contains = 12 × 4 items = 48 items

Cost of 4 dozen bananas = ₹180.

That means cost of 48 bananas = ₹180

∴ Number of bananas that can be purchased for ₹1 = $\frac{48}{180}$

∴ Number of bananas that can be purchased for ₹37.50

= $\frac{48}{180} \times 37.50 = \frac{48}{180} \times \frac{3750}{100} = 10$

Question 10.

Aman purchases 12 pens for ₹156 and Payush buys 9 pens for ₹108. Can you say who got the pens cheaper ?

Solution:

For Aman

∵ Cost of 12 pens = ₹156

∴ Cost of 1 pen = ₹$\frac{156}{12}$ = ₹13

For payush

∵ Cost of 9 pens = ₹108

∴ Cost of 1 pen = ₹$\frac{108}{9}$ = ₹12

So, Payush got the pens cheaper.

Question 11.

Rohit made 42 runs in 6 overs and Virat made 63 runs in 7 overs. Who made more runs per over ?

Solution:

For Rohit

∵ Runs made in 6 overs = 42

∴ Runs made per over = $\frac{42}{6} = 7$

For Virat

∵ Runs made in 7 overs = 63

∴ Runs made per over = $\frac{63}{7} = 9$

So, Virat made more runs per over.

Question 12.

A bus travels 160km in 4 hours and a train travels 320 km in 5 hours at uniform speeds, then find the ratio of the distance travelled by them in one hour.

Solution:

A bus travel in 4 hours = 160km

∴ Distance covered by bus in 1 hour

= $\frac{160}{4} = 40km$

A train travel in 5 hours = 320km

∴ Distance covered by train in 1 hour

= $\frac{320}{5} km = 64km$

Ratio in their speed = 40 : 64 = 5 : 8

Exercise 8.4

Question 1:

Find the value of:

(i) 18% of ₹450

(ii) 14% of 162/3 kg

(iii) 273/4% of ₹1200

(iv) 5/8% of 600m

(v) 61/6% of 1 hour 20 minutes

(vi) 0.6% of 5 km

Solution:

(i) 18% of ₹450

$= ₹\left(\frac{18}{100} \times 450\right) = ₹\left(\frac{8}{5} \times 45\right)$

$= ₹ (8 \times 9) = ₹81$

(ii) 14% of $16\frac{2}{3}$ kg

$= \text{kg}\left(\frac{14}{100} \times \frac{50}{3}\right) = \frac{7}{3} = 2\frac{1}{3}\text{ kg}$

(iii) $27\frac{3}{4}$ % of ₹1200

$= ₹\left(\frac{111}{4\times100} \times 1200\right) = \frac{133200}{400} = ₹333$

(iv) $\frac{5}{8}$% of 600 m

= m $\left(\frac{5}{8\times100}\times 600\right)$ = $\frac{3000}{800}$ = 3.75 m

(v) $6\frac{1}{6}$% of 1 hour 20 minutes

1 hour 20 minutes = 80 minutes

= $\left(\frac{37}{6\times100}\times 80\right)$ min. = 5 minutes

(vi) 0.6% of 5 km

5 km = 5000 metres

= $\left(\frac{6}{10\times100}\times 5000\right)$ metres = 30 metres

Question 2.

In a class of 60 student, 45% are girls, Find the number of boys in the class.

Solution:

Toal student = 60

% of girls = 45%

No. of boys = ?

No. of girls =

$= 60 \times \frac{45}{100} = \frac{6 \times 45}{10} = 27$ girls

No. of boys = Total students – No. of girls = 60 – 27 = 33 boys

Question 3.

Mr. Malkani saves 22% of his salary every month. If his salary is ₹12750 per month, what is his expenditure ?

Solution :

Total salary = ₹12750

Saving = 22%

∴ Total Savings = 22% of ₹12750

$= ₹12750 \times \frac{22}{100} = ₹2805$

∴ Total expenditure = $₹12750 - ₹2805 = ₹9945\backslash$

= ₹ 12750 × 22100 = ₹2805

∴ Total expenditure = ₹ 12750 – ₹2805 = ₹9945

Question 4.

On a rainy day, 94% of the students were present in a school, if the number of students absent on that day was 174, find the total strength of the school.

Solution:

Total % age of students = 100

Student present = 94%

Students absent = (100- 94) = 6%

Let, the total number of students in school = x

= 6% of $x = 174 \Rightarrow \frac{6}{100} \times x = 174$

= x = $174 \times \frac{100}{6} \Rightarrow x = 29 \times 2900$

∴ Total strength of the school = 2900

Exercise 8.5

Question 1.

The speed of a car is $105\frac{1}{5}$ km/h, find the distance covered by it in $3\frac{3}{5}$ hours.

Solution:

Speed of a car = $105\frac{1}{5}$ km/h

Distance covered by car in = $3\frac{3}{5}\,hours$

= Speed × time

= $\left(105\frac{1}{5} \times 3\frac{3}{5}\right) km$

= $\left[\frac{526}{5} \times \frac{18}{5}\right] km$

= $\frac{9468}{25}$km= $378\frac{18}{25}$ km

Question 2.

If the speed of car is 50.4 km/h. find the distance covered in 3.5 hours.

Solurion:

Speed of a car = 50.4km/h

=∴ Distance covered in 3.6hours

= Speed × Time

= (50.4 × 3.6) km/h

= 181.44km

Question 3.

If a car covers a distance of 201.25 km in 3.5 hours, find the speed of the car.

Solution:

Distance covered by the car = 201.25 km

and time consumed by car = 3.5 hours

∴ The speed of car = $\frac{Distance}{time}$

= $\frac{201.25}{3.5}\frac{km}{h} = 57.5km/h$

Objective Types Questions

Mental maths

Question 1.

Fill in the blanks:

(i) In the ratio 3:5. the first term is …… and second term is ……..

(ii) In a ratio, the first term is also called …… and second term is also called……..

(iii) if two terms of a ratio have no common factor (except 1), then the ratio is sadi to be in……

(iv) To simplify a ratio, we divide the two terms by their……..

(v) The simplest form of the ratio 8 : 12 is……..

(vi) 90 cm : 1.5 m = …….

(vii) Method of comparison of two quantities of the same kind (in same units) by division is known as……..

(viii) When two ratios are equal, they are said to be in…….

(ix) When four quantities are in proportion, then the product of …… is equal to product of middle terms.

(x) 4.5 omo is equal to……

Solution:

(i) In the ratio 3:5, the first term is 3 and second term is 5.

(ii) In a ratio, the first term is also called antecedent and second term is also called consequent.

(iii) If two terms of a ratio have no common factor (except 1), then the ratio is said to be in simplest form.

(iv) To simplify a ratio, we divide the two terms by their H.C.F.

(v) The simplest form of the ratio 8 :12 is 2 : 3.

(vi) 90 cm : 1.5m = 3 :5.

(vii) Method of comparison of two quantities of the same kind (in same units) by division isknown as ratio.

(viii) when two ratios are equal, they are said to be in proportion.

(ix) When four quantites are in proportion, then the product of extreme terms is equal to product of middle terms.

(x) 4.5 of ₹40 is equal to ₹1.80.

Question 2.

State whether the following statements are true (T) or False (F):

(i) Ratio exists only between two qunatities of the same kind.

(ii) Ratio has no units.

(iii) If a b, then ≠ the ratio a: bis diferent from the ratio b : a.

(iv) If we multiply or divide both terms of a ratio by the same non-zero number, then the ratio remains the same.

(v) The ratio a :b is sadi to be in simplest form if HCF of a and b is 1.

(vi) In some situations, comparison of two quantities (of same kind) by

difference does not make much sense.

Solution:

(i) Ratio exists only between two quantites of the same kind. **True**

(ii) Ratio has no units. **True**

(iii) If a≠b. then the ratio a:b is different from the ratio b:a. **True**

(iv) If we multiply or divide both terms of a ratio by the same non-zero number, then the ratio remains the same. **True**

(v) The ratio a:bis said to be in simplest form if HCF of a and b is 1.

(vi) In some situations, comparison of two quantities (of same kind) by difference does not make much sense. **True**

Multiple Choice Questions

Choose the correct answer from the given four options (3 to 18):

Question 3.

A ratio equivalent to 5:7 is

(a) 10 : 21

(b) 15 : 14

(c) 20 : 28

(d) 25 : 49

Solution:

5 : 7

$\Rightarrow \frac{5}{7} \times \frac{4}{4} = \frac{20}{28} = 20:28\ (c)$

Question 4.

The ratio 384 : 480 in the simplest form is

(a) 2 : 5

(b) 3 : 5

(c) 5 : 4

(d) 4 : 5

Solution:

384 : 480

Dividing by 96, we get

$= \frac{384}{96} : \frac{480}{96} \Rightarrow 4 : 5(d)$

Question 5.

The ratio of 20 minutes to 1 hour is

(a) 20 :1

(b) 1 : 3

(c) 1 : 4

(d) 2 : 5

Solution:

20 min : 1 hour

20 min : 60 minutes

= 20 : 60

Divide both terms by

$= \frac{20}{20} : \frac{60}{20} = 1 : 3$

$\Rightarrow$ 1 : 3 (b)

Question 6.

The ratio of 150g to 2kg is

(a) 75 : 1

(b) 40 : 3

(c) 3 : 40

(d) 3 : 200

Solution:

We have, 150g to 2kg

$= 150g : 2 \times 1000g$

$= 150g : 2000g$

Divide both terms by 50

$= \frac{150}{50} : \frac{2000}{50}$

= 3 : 40 (c)

Question 7.

In a class of 40 students, 25 students play cricket and the remaining play tennsi. The ratio of number of students playing crickets to the number of students playing tennis is

(a) 5 : 8

(b) 5 : 3

(c) 3 : 5

(d) 8 : 5

Solution:

Total number of students = 40

Student play cricket = 25

Student play tennis = 40 – 25 = 15

Number of students : Number of students

play cricket play tennis

= 25 : 15

Divide both terms by 5

$= \frac{25}{5} : \frac{15}{5}$

= 5 : 3 (b)

Question 8.

Two numbers are in the ratio 3 : 5. If the sum of numbers is 144, then the smaller number is

(a) 54

(b) 72

(c) 90

(d) 48

Solution:

Let any number = x

Firsst number : Second number

3 : 5

Sum of the numbers = 144

$\Rightarrow 3x + 5x = 144$

$\Rightarrow \ 8x = 144$

$\Rightarrow x = \frac{144}{8} = 18$

First number = $3 \times 18 = 54$

Second number = $5 \times 18 = 90$

$\therefore$ The smallest number = 54(a)

Question 9.

The ratio of number of girls to the number of boys in a class is 5: 4. If there are 25 girls in the class, then the number of boys in the class is

(a) 15

(b) 20

(c) 30

(d) 40

Solution:

Let the number of boys in the class = x

According to question,

Girls : Boys = 5 : 4

25 : x = 5 : 4

$\frac{25}{x} = \frac{5}{4}$

$x = \frac{25 \times 4}{5}$ = 20

Hence number of boys = 20(b)

Question 10.

The ratio of the number of sides of a square and the number of edges of a cube is

(a) 1 : 2

(b) 1 : 3

(c) 1 : 4

(d) 2 : 3

Solution:

Number of sides of square = 4

Edges of cube = 12

∴ Ratio = 4 : 12

⇒ 1 : 3 (b)

Question 11.

In shelf, the books with green cover and that with brown cover are in the ratio 2:3. If there are 18 books with green cover, then the number of books with brown cover is

(a) 12

(b) 24

(c) 27

(d) 36

Solution:

Let the brown covered books = x

and green covered books = 18

Green covered books : Brown covered books

= 2 : 3

⇒ 18 : x = 2 : 3

$\Rightarrow \frac{18}{x} = \frac{2}{3}$

$\Rightarrow x = \frac{18\times3}{2} = 9 \times 3 \Rightarrow x = 27(c)$

Question 12.

In a box, the ratio of the number of red marbles to that of blue marbles is 4:&. Which of the following could be the total number of marbles in the box?

(a) 14

(b) 21

(c) 22

(d) 28

Solution:

The ratio of red marbles to blue marbles = 4:7

⇒ So total marbles can be

$4x + 7x = y$

$11x = y$

y should be a multiple of 11

∴ Total number of marble in the box are 22(c)

Question 13.

If a,b,c and d are in proportion, then

(a) ab = cd

(b) ad = be

(c) ac = bd

(d) none of these

Solution:

a, b, c and d are in proportion, then

$\Rightarrow ab = cd$

$\therefore ad = be(b)$

Question 14.

If the weight of 5 bags of rice is 272 kg, then the weight of 1 bag of rice is

(a) 50.4 kg

(b) 54.4kg

(c) 54.004 kg

(d) 54.04kg

Solution:

Weight of 5 bags of rice = 272kg

Weight of 1 bag of rice = $\frac{272}{5}\ kg$

= 54.4kg (b)

Question 15.

If 7 pencils cost ₹35, then the cost of one dozen pencils is

(a) ₹60

(b) ₹70

(c) ₹30

(d) ₹5

Solution:

7 pencils cost = ₹35

1 dozen = 12 pencils

Cost of 1 pencil = ₹$\frac{35}{7}$

∴ Cost of 12 pencils (1 dozen) = $\frac{35}{7} \times 12$

= ₹60(a)

Question 16:

The ratio 2:3 expressed as percentage is

(a) 40%

(b) 60%

(c) $66\frac{2}{3}\%$

(d) $33\frac{1}{3}\%$

Solution:

Given, 2 : 3 = $\frac{2}{3}$

= $\left(\frac{2}{3} \times 100\right)\% = \frac{200}{3} = 66\frac{2}{3}\%$ (c)

Question 17.

0.025 when expressed as percentage is

(a) 250%

(b) 25%

(c) 4%

(d) 2.5%

Solution:

0.025 = $\frac{25}{1000} \times 100 = 2.5\%\ (d)$

Question 18.

In a class, 45% of the students are girls, if there are 18 girls in the class, then the total number of students in the class is

(a) 44

(b) 40

(c) 36

(d) 30

Solution:

% of girls in class = 45%
Total number of girls in class = 18

Let total students = x

As per question,

45% of x = 18

$\frac{45}{100}x = 18$

$$x = \frac{18 \times 100}{45}$$

∴ Total students = 40 students (b)

Value Based Questions

Question 1.

Students of a colong decided to go to an old age home in their vicinity to wish Happy New year and get blessings from old people.

They carried the following items with them:

Bonquets 63, New Year Cards 70 and Chocolates bars 140. Answer the following questions :

(i) What is the ratio of number of bouquets to the number of chocolate bars ?

(ii) What is the ratio of number of cards to the number of sum of all items ?

Solution:

(i) Number of bouquets = 63
Number of Chocolates = 140

∴ Ratio of bouquets to number of chocolate bars.
63 : 140 = 9 : 20

(ii) Total number of cards = 70

Sum of all items = 63 + 70 + 140 = 273

∴ Ratio = 70 : 273 = 10 : 39

Higher Order Thinking Skills (HOTS)

Question 1.

Divide ₹6000 among Irfan. Nagma and Ishan in the raito 3 : 5 : 7.

Solution :

Total amount = ₹6000

Ratio in Irfan, Nagma and Ishan = 3 : 5 : 7

Sum of ratios = 3 + 5 + 7 = 15

∴ Irfan's share = $₹\frac{6000\times3}{15} = ₹1200$

∴ Nagma's share = $₹\frac{6000\times5}{15} = ₹2000$

∴ Ishan's share = $₹\frac{6000\times7}{15} = ₹2800$

Question 2.

Sapna weights 54kg on earth and 9kg on moon. If a monkey weights 3.5 kg on moon, then how much will it weigh on the earth ?

Solution :

Sapna weight on earth : Sapna weight on moon =monkey weight on earth : Monkey weight on moon

= 54 : 9 = $x : 3 : 5$

= $x = \frac{54\times3.5}{9} =$ 21kg

Question 3.

If 5 men can do a certain construction work in 14 days, then how long will 7 men take to complete the same construction work ?

Solution:

5 men can do construction on work in = 14 days

1 man can do construction work in = 14×5 days

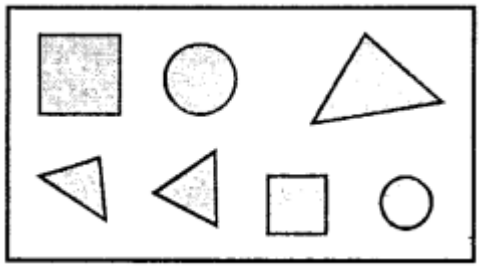
7 men can do construction work in

$= \frac{14 \times 5}{7} = 10$ days

Check Your Progress

Question 1.

From the given figure, find the ratio of



(i) Number of triangles to the number of circles inside the rectangle.

(ii) Numer of squares to the number of all the figures inside the rectangle.

(iii) Number of circles to the number of remaining figures inside the rectangle.

Solution:

Number of triangles = 3

Number of rectangles = 2

Number of circles = 2

(i) 3 : 2

(ii) 2 : 7

(iii) 2 : 5

Question 2.

The length of a pencil is 16 cm and its diameter is 6mm. What is the ratio of the diameter of the pencil to that of its length?

Solution:

Length of a pencil = 16 cm = 16cm $\times 10 = 160mm$

Diameter of the pencil = 6mm

Ratio of the diameter of the pencil to that of its length = 6 : 160 = 3 : 180

Question 3.

A certain club has 100 members, out of which 25 play tennis, 28 play badminton, 12 play chess and the rest do not play any game. Find the ratio of number of members who play

(i) badminton to the number of those who play chess.

(ii) badminton to the number of those who do not play any game.

(iii) tennis to the number of those who do not play any game.

(iv) tennis to the number of those who play either badminton or chess.

Solution:

Total number of members = 100

Members who plays tennis = 25

Members who plays badminton = 28

Members who plays chess = 12

Members who play nothing = 100 – (25 + 28 + 12)

= 35

(i) 28 : 12 = 7 : 3

(ii) 28 : 35 = 4 : 5

(iii) 25 : 28 = 5 : 7

(iv) 25 : 40 = 5 : 8

Question 4.

Do the ratios 15 cm to 3m and 25 seconds to 3 minute from a proportion ?

Solution:

Given, first ratio = 15cm : 3m

= 15cm : 300 cm

= 1 : 20

and second ratio = 25 seconds : 3 minutes

= 25 seconds : 3 × 60 seconds

= 25 : 180 = 1 : 6

No, they do not form proportion.

Question 5.

Divide ₹500 among Suresh and Awanti in the ratio 3 :7.

Solution:

Total amount = ₹500

Ratio = 3 : 7

Sum of ratios = 3 + 7 = 10

Suresh shares = ₹500 × 310 = ₹150

Awanti shares = ₹500 × 710 = ₹350

Question 6.

The ratio of the number of girls to that of boys in a school is 9 :11. If the number of boys in the school is 2035, find:

(i) the number of girls in the school,

(ii) the number of students in the school.

Solution:

Let the number of girls = x

Girls : Boys = 9 : 11

No. of boys = 2035

$x : 2035 = 9 : 11$

$\Rightarrow \frac{x}{2035} = \frac{9}{11} \Rightarrow 11 \times x = 9 \times 2035$

$\Rightarrow x = \frac{9 \times 2035}{11} = 9 \times 185 \Rightarrow x = 1665$

No. of girls = 1665.

(ii) Total students in school = No. of boys + No. of girls

2035 + 1665 = 3700

Question 7.

The ratio of income to expenditur of a family is 7 : 6. Find the savings if the income of family is ₹42000.

Solution:

Ratio in income and expenditure = 7 : 6

Total income = ₹42000

Let expenditure = x, then

7 : 6 :: 42000 : x

$\Rightarrow x = \frac{6 \times 42000}{7}$ = ₹36000

Now,

Income = ₹42000

Expenditure = ₹36000

∴ Savings = Income – Expenditure

= ₹ (42000-36000) = ₹6000

Question 8.

An employee earns ₹72,000 in 3 months.

(i) How much does he earn in 7 months.

(ii) In how many months will he earn ₹3,60,000 ?

Solution:

(i) ∵ Earning in 3 months = ₹72,000

∴ Earning in 1 month = ₹ $\frac{72,000}{3}$ = 24000

Earning in 7 months $= ₹24000 \times 7$

$= ₹1,68,000$

(ii) ₹24000 is earned in = 1 month

₹1 is earned is = $\frac{1}{24000}$

₹3,60,000 is earned in

= $\left(\frac{1}{24000} \times 3,60,000\right)$ months

= $\frac{360}{24}$ months = 15 months

Question 9.

A train travels 110 km in 2 hours and a car travels 245 km in 312 hours. What is the ratio of the speed of the train to that of the car?

Solution:

A train travels in 2 hours = 110km

It will cover in 1 hour = $\frac{110}{2} = 55km$

A car travel in $\frac{7}{2}$ hours = 245 km

∴ It will cover in 1 hour = $\frac{2 \times 245}{7} = 70km$

Ratios in their speed = 55 : 70 = 11 : 14