

Exercise 6.1

Question 1.

Express the following ratios in simplest form:

(i) $\frac{1}{6}:\frac{1}{9}$

(ii) $4\frac{1}{2}:1\frac{1}{8}$

(iii) $\frac{1}{5}:\frac{1}{10}:\frac{1}{15}$

Solution:

(i) $\frac{1}{6}:\frac{1}{9}$

Given ratio : $\frac{1}{6}:\frac{1}{9}$

$$= \frac{1}{6} \div \frac{1}{9}$$

$$= \frac{1}{6} \times \frac{9}{1}$$

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

(ii) $4\frac{1}{2}:1\frac{1}{8}$

Given ratio = $\frac{9}{2}:\frac{9}{8} = \frac{9}{2} \div \frac{9}{8}$

$$= \frac{9}{2} \times \frac{8}{9} \quad \text{[Dividing by 2]}$$

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

(iii) $\frac{1}{5}:\frac{1}{10}:\frac{1}{15}$

Taking L.C.M. of 5, 10 and 15

L.C.M. of 5, 10 and 15

$$\begin{array}{r} 5 \mid 5 - 10 - 15 \\ \hline 1 - 2 - 3 \end{array}$$

L.C.M. = $5 \times 2 \times 3 = 30$

Question 2.

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

(i) ₹ 5 to 50 paise

(ii) 3 km to 300 m

(iii) 9 m to 27 cm

(iv) 15 kg to 210 g

(v) 25 minutes to 1.5 hours

(vi) 30 days to 36 hours

Solution:

(i) ₹ 5 to 50 paise

$$= 500 \text{ paise} : 50 \text{ paise}$$

$$= 10 : 1 \text{ (Dividing by 50)}$$

(ii) 3 km to 300 m

$$= 3000 \text{ m to } 300 \text{ m}$$

$$= 10 : 1 \text{ (Dividing by 300)}$$

(iii) 9 m to 27 cm

$$= 9 \times 100 \text{ cm} : 27 \text{ cm}$$

$$= 900 : 27 \text{ (Dividing by 9)}$$

(iv) 15 kg to 210 g

$$= 15 \times 1000 \text{ g} : 210 \text{ g}$$

$$= 15000 : 210$$

$$= 500 : 7 \text{ (Dividing by 30)}$$

(v) 25 minutes to 1.5 hours

$$= 25 \text{ minutes to } \frac{3}{2} \times 60$$

$$= 25 : 90$$

$$= 5 : 18$$

(vi) 30 days to 36 hours

$$= 30 \times 24 \text{ hours to } 36 \text{ hours}$$

$$= 720 : 36$$

$$= 20 : 1 \text{ (Dividing by 36)}$$

Question 3.

If $A : B = 3 : 4$ and $B : C = 8 : 9$, then find $A : C$.

Solution:

$$A : B = 3 : 4 \text{ and } B : C = 8 : 9$$

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

$$= \frac{1}{5} \times 30 : \frac{1}{10} \times 30 : \frac{1}{15} \times 30$$

$$= 6 : 3 : 2$$

Question 4.

If $A : B = 5 : 8$ and $B : C = 18 : 25$, then find $A : B : C$.

Solution:

$$A : B = 5 : 8 \text{ and } B : C = 18 : 25$$

Here, In $A : B$, $B = 8$

and In $B : C$, $B = 18$

LCM of 8, 18 is 72

$$\frac{A}{B} = \frac{5}{8} = \frac{5 \times 9}{8 \times 9} = \frac{45}{72}$$

$$\frac{B}{C} = \frac{18}{25} = \frac{18 \times 4}{25 \times 4} = \frac{72}{100}$$

$$A : B : C = 45 : 72 : 100$$

Question 5.

If $3A = 2B = 5C$, then find $A : B : C$.

Solution:

$$\text{Let } 3A = 2B = 5C = 1$$

$$\text{Then } A = \frac{1}{3}, B = \frac{1}{2}, C = \frac{1}{5}$$

$$\therefore A : B : C = \frac{1}{3} : \frac{1}{2} : \frac{1}{5}$$

$$= \frac{10:15:6}{30} = 10 : 15 : 6$$

Question 6.

Out of daily income of ₹ 120, a labourer spends ₹ 90 on food and shelter and

saves the rest. Find the ratio of his

(i) spending to income

(ii) saving to income

(iii) saving to spending.

Solution:

Daily income = ₹ 120

Expenditure = ₹ 90

Savings = ₹ 120 – ₹ 90 = ₹ 30

(i) Ratio between spending to income

= 90 : 120

= 3 : 4 (Dividing by 30)

(ii) Ratio between saving to income

= 30 : 120

= 1 : 4 (Dividing by 30)

(iii) Ratio between saving to spending

= 30 : 90

= 1 : 3 (Dividing by 30)

Question 7.

5 grams of an alloy contains 334 grams copper and the rest is a nickel. Find the ratio by weight of nickel to copper.

Solution:

Total weight of an alloy = 5 gms

3 15

Weight of copper = $3\frac{3}{4}$ gms = $\frac{15}{4}$ gms

Weight of nickel = Total weight of alloy – weight of copper

$$\begin{aligned} &= \frac{5}{1} \text{ gms} - \frac{15}{4} \text{ gms} \\ &= \frac{(4 \times 5) \text{ gms} - (1 \times 15) \text{ gms}}{4} \\ &= \frac{20 \text{ gms} - 15 \text{ gms}}{4} \end{aligned}$$

$$\text{Weight of nickel} = \frac{5}{4} \text{ gms}$$

Ratio of weight of nickel to weight of copper

Weight of nickel : Weight of copper

$$\frac{5}{4} \text{ gms} : \frac{15}{4} \text{ gms}$$

$$= \frac{5}{4} \div \frac{15}{4}$$

$$= \frac{5}{4} \times \frac{4}{15} \quad \text{[Cancelling 4 by 4]}$$

$$= \frac{5}{1} \times \frac{1}{15} \quad \text{[Dividing both by 5]}$$

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

Question 8.

A pole of height 3 meters is struck by a speeding car and breaks into two pieces such that the first piece is $\frac{1}{2}$ of the second. Find the length of both pieces.

Solution:

Total height of pole = 3 metres

Let length of 2nd piece = x

Length of 1st piece = $\frac{1}{2}x$

Ratio of lengths of two parts = $\frac{1}{2}x : 1x$

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

Taking L.C.M. of 2 and 1

$$= \left(\frac{1}{2} \times 2\right) : \left(\frac{1}{1} \times 2\right)$$

$$= 1 : 2$$

Sum of terms of ratio = $1 + 2 = 3$

\therefore Length of 1st part = $\frac{1}{3}$ of 3 m

$$= \left(\frac{1}{3} \times 3\right) \text{ m} = 1 \text{ m}$$

Length of 2nd part = $\frac{2}{3}$ of 3 m

$$= \left(\frac{2}{3} \times 3\right) \text{ m} = 2 \text{ m}$$

Length of 1st part = 1 m

Length of 2nd part = 2m

Question 9.

Heights of Anshul and Dhruv are 1.04 m and 78 cm respectively. Divide 35 sweets between them in the ratio of their heights.

Solution:

Height of Anshul : Height of Dhruv

1.4 m : 78 cm

(1.04×100) cm : 78 cm

= 104 : 78

= $\frac{104}{78}$ (Dividing both by 2)

= $\frac{52}{39}$ (Dividing both by 13)

= $\frac{4}{3}$

= 4 : 3

Ratio of heights of Anshul and Dhruv is 4 : 3

Thus, we are to divide 35 sweets in the ratio 4 : 3

Sum of the terms of the ratios = $4 + 3 = 7$

Share of Anshul = $\frac{4}{7}$ of 35 sweets

= $\frac{4}{7} \times 35$

= 20 sweets

Share of Dhruv = $\frac{3}{7}$ of 35 sweets

= $\frac{3}{7} \times 35$

= 15 sweets

Question 10.

₹ 180 are to be divided among three children in the ratio 13:14:16 Find the share of each child.

Solution:

First we will simplify the given ratio

Given ratio $\frac{1}{3} : \frac{1}{4} : \frac{1}{6}$

Taking L.C.M. of 3, 4 and 6

L.C.M. of 3, 4 and 6 = 12

$$\begin{array}{r|l} 3 & 3 - 4 - 6 \\ \hline 2 & 1 - 4 - 2 \\ \hline & 1 - 2 - 1 \end{array}$$

$$\text{L.C.M.} = 3 \times 2 \times 2 = 12$$

$$\frac{1}{3} \times 12 : \frac{1}{4} \times 12 : \frac{1}{6} \times 12 = 4 : 3 : 2$$

Thus, we are to divide ₹180 in the ratio 4 : 3 : 2.

Sum of the terms of the ratio

$$= 4 + 3 + 2 = 9.$$

∴ Share of first child = $\frac{4}{9}$ of ₹180

$$= ₹\left(\frac{4}{9} \times 180\right) \quad [\text{Dividing both by 9}]$$

$$= ₹80$$

Share of second child = $\frac{3}{9}$ of ₹180

$$= ₹\left(\frac{3}{9} \times 180\right) = ₹60$$

Share of third child = $\frac{2}{9}$ of ₹180

$$= ₹\left(\frac{2}{9} \times 180\right) = ₹40$$

Question 11.

A natural number has been divided into two parts in the ratio 7 : 11. If the difference between the two parts is 20, find the number and the two parts.

Solution:

Let the first part = $7x$

Second part = $11x$

According to given statement,

$$11x - 7x = 20$$

$$\Rightarrow 4x = 20$$

$$\Rightarrow x = 5$$

First part = $7x = 7 \times 5 = 35$

Second part = $11x = 11 \times 5 = 55$

and number will be $35 + 55 = 90$

Question 12.

A certain sum of money has been divided into two parts in the ratio 9 : 13. If the second part is ₹ 260, find the total amount.

Solution:

Let the total amount = ₹ x

The amount has been divided into two parts in the ratio 9 : 13.

Sum of the terms of the ratio = $9 + 13 = 22$

First part = $\frac{9}{22}$ of total amount

Second part = $\frac{13}{22}$ of total amount

According to given statement

$$\frac{13}{22} \text{ of } x = ₹260 \Rightarrow \frac{13}{22} \times x = ₹260$$

$$\Rightarrow x = ₹ \frac{260 \times 22}{13} \Rightarrow x = ₹20 \times 22$$

$$\therefore x = ₹440$$

Question 13.

The ratio of the present ages of Anjali and Ashu is 2 : 3. Five years hence, the ratio of their ages will be 3 : 4. Find their present ages.

Solution:

Ratio of present ages of Anjali and Ashu = 2 : 3

Let age of Anjali = $2x$

and age of Ashu = $3x$

5 years hence,

Age of Anjali = $2x + 5$

and age of Ashu = $3x + 5$

$$\frac{2x+5}{3x+5} = \frac{3}{4}$$

$$9x + 15 = 8x + 20$$

$$9x - 8x = 20 - 15$$

$$x = 5$$

Present age of Anjali = $2x = 2 \times 5 = 10$ years

and age of Ashu = $3x = 3 \times 5 = 15$ years

Question 14.

The present ages of A and B are in the ratio 5 : 6. Three years ago, their ages were in the ratio 4 : 5. find their present ages.

Solution:

Ratio of the present age of A and B = 5 : 6

Let age of A = $5x$

and age of b = $6x$

3 years ago,

Age of A was = $5x - 3$

and age of B was = $6x - 3$

$$\frac{5x-3}{6x-3} = \frac{4}{5}$$

$$\Rightarrow 25x - 15 = 24x - 12$$

$$\Rightarrow 25x - 24x = -12 + 15$$

$$\Rightarrow x = 3$$

Present age of A = $5x = 5 \times 3 = 15$ years

and age of B = $6x = 6 \times 3 = 18$ years

Question 15.

Two numbers are in the ratio 5 : 6. When 2 is added to first and 3 is added to the second, they are in the ratio 4 : 5. Find the numbers.

Solution:

Ratio in two numbers = 5 : 6

Let first number = $5x$

Then second number = $6x$

Adding 2 in the first and 3 in the second

$$A = 5x + 2$$

$$B = 6x + 3$$

$$\frac{5x+2}{6x+3} = \frac{4}{5}$$

$$25x + 10 = 24x + 12$$

$$25x - 24x = 12 - 10$$

$$x = 2$$

$$\text{First number} = 5x = 5 \times 2 = 10$$

$$\text{and second} = 6x = 6 \times 2 = 12$$

Question 16.

The ratio of number of boys to the number of girls in a school of 1430 students is 7 : 6. If 26 new girls are admitted in the school, find how many new boys may be admitted so that the ratio of number of boys to the number of girls may change to 8 : 7.

Solution:

Number of students = 1430

Ratio in number of boys and girls = 7 : 6

Let number of boys = $7x$ and of girls = $6x$

$$7x + 6x = 1430$$

$$\Rightarrow 13x = 1430$$

$$\Rightarrow x = 110$$

Number of boys = $7x = 7 \times 110 = 770$

and number of girls = $6x = 6 \times 110 = 660$

Now adding 26 new girls, the number of girls will be = $660 + 26 = 686$

Let new boys be added = y

The number of boys = $770 + y$

Now new ratio = 8 : 7

$$\frac{770+y}{686} = \frac{8}{7}$$

$$5390 + 7y = 5488$$

$$7y = 5488 - 5390 = 98$$

$$y = 14$$

Number of new boys admitted = 14

Question 17.

Which ratio is greater?

(i) 5 : 6 or 6 : 7

(ii) 13 : 24 or 17 : 32

Solution:

(i) 5 : 6 or 6 : 7

$$5 : 6 = \frac{5}{6} \text{ and } 6 : 7 = \frac{6}{7}$$

Converting them into equivalent fraction by taking L.C.M. of 6 and 7 = 42

$$\frac{5}{6} = \frac{5 \times 7}{6 \times 7} = \frac{35}{42} \text{ and}$$

$$\frac{6}{7} = \frac{6 \times 6}{7 \times 6} = \frac{36}{42}$$

$$\text{As } 36 > 35 \therefore \frac{36}{42} > \frac{35}{42}$$

$$\Rightarrow \frac{6}{7} > \frac{5}{6}$$

Hence 6 : 7 is the greater ratio.

(ii) 13 : 24 or 17 : 32

$$13 : 24 = \frac{13}{24} \text{ and } 17 : 32 = \frac{17}{32}$$

Converting them into equivalent fraction by taking L.C.M. of 24 and 32 = 96

$$\frac{13}{24} = \frac{13 \times 4}{24 \times 4} = \frac{52}{96} \text{ and}$$

$$\frac{17}{32} = \frac{17 \times 3}{32 \times 3} = \frac{51}{96}$$

$$\begin{array}{r|l} 2 & 24 - 32 \\ \hline 2 & 12 - 16 \\ \hline 2 & 6 - 8 \\ \hline 2 & 3 - 4 \\ \hline & 3 - 2 \end{array}$$

$$\text{L.C.M.} = 2 \times 2 \times 2 \times 2 \times 3 \times 2 = 96$$

As $52 > 51$

$$\therefore \frac{52}{96} > \frac{51}{96}$$

$$\Rightarrow \frac{13}{24} > \frac{17}{32}$$

$\therefore 13 : 24$ is the greater ratio.