

Ratio and Proportion (Including Sharing in a Ratio)

POINTS TO REMEMBER

1. Ratio

A ratio is a method to compare two quantities of the same kind with same unit; by dividing the first quantity by the second. The symbol (:) is used for ratio between two quantities e.g. $a : b$.

Note:

- (i) A ratio is a pure number and has no unit.
- (ii) A ratio must always be expressed in its lowest terms in simplest form.
- (iii) If each term of a ratio is multiplied or divided by the same number or quantity, the ratio remains the same.

2. Proportion :

Proportion is equality of two ratios : e.g. $a : b = c : d$

i.e. Ratio between first and second is equal to ratio between third and fourth term.

(ii) a and d are called extreme terms and b and c are called mean terms
and $a \times d = b \times c$

(iii) Fourth term is called fourth proportional.

3. Continued Proportion

Three quantities are called in continued proportion if the ratio between first and second is equal to the ratio between second and third i. e.

a, b, c are in continued proportion if $a : b = b : c$

b the middle term is called the mean proportional between a and c and c , the third term is called the third proportional to a and b .

EXERCISE 6 (A)

Question 1.

Express each of the given ratio in its simplest form :

(i) $22 : 66$ (ii) $1.5 : 2.5$ (iii) $6\frac{1}{4} : 12\frac{1}{2}$

(iv) $40 \text{ kg} : 1 \text{ quintal}$ (v) $10 \text{ paise} : ₹ 1$

(vi) $200 \text{ m} : 5 \text{ km}$ (vii) $3 \text{ hours} : 1 \text{ day}$

(viii) $6 \text{ months} : 1\frac{1}{3} \text{ years}$ (ix) $1\frac{1}{3} : 2\frac{1}{4} : 2\frac{1}{2}$

Answer:

$$(i) 22 : 66 = \frac{22}{66} = \frac{22 \div 22}{66 \div 22} = \frac{1}{3}$$

(HCF of 22 and 66 = 22)

$$= 1 : 3$$

$$(ii) 1.5 : 2.5 = \frac{1.5}{2.5} = \frac{15}{25} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$$

(HCF of 15, 25 = 5)

$$= 3 : 5$$

$$(iii) 6\frac{1}{4} : 12\frac{1}{2} = \frac{25}{4} : \frac{25}{2} = \frac{25}{4} \times \frac{2}{25}$$

$$= \frac{2}{4} = \frac{1}{2} = 1 : 2$$

$$(iv) 40 \text{ kg} : 1 \text{ quintal} = 40 \text{ kg} : 100 \text{ kg}$$

(1 quintal = 100 kg)

$$= \frac{40}{100} = \frac{40 \div 20}{100 \div 20} = \frac{2}{5}$$

(HCF of 40, 100 = 20)

$$= 2 : 5$$

$$(v) 10 \text{ paise} : 1 \text{ rupee} = 10 \text{ paise} : 100 \text{ paise}$$

(1 Re = 100 Paise)

$$= \frac{10}{100} = \frac{1}{10} = 1 : 10$$

$$(vi) 200 \text{ m} : 5 \text{ km} = 200 \text{ m} : 5000 \text{ m}$$

(1 km = 1000 m)

$$= \frac{200}{5000} = \frac{200 \div 200}{5000 \div 200} \text{ (HCF of 200, 5000 = 200)}$$

$$= \frac{1}{25} = 1 : 25$$

$$(vii) \text{ 3 hours : 1 day = 3 hours : 24 hours} \quad (1 \text{ day} = 24 \text{ hours})$$

$$= \frac{3}{24} = \frac{1}{8} = 1 : 8$$

$$(viii) \text{ 6 months : } 1\frac{1}{3} \text{ years} = 6 \text{ months : } \frac{4}{3} \times 12 \text{ months}$$

$$= 6 \text{ months : 16 months}$$

$$= \frac{6}{16} = \frac{6 \div 2}{16 \div 2} = \frac{3}{8} = 3 : 8$$

$$(ix) \text{ } 1\frac{1}{3} : 2\frac{1}{4} : 2\frac{1}{2} = \frac{4}{3} : \frac{9}{4} : \frac{5}{2}$$

$$= \frac{16:27:30}{12} \quad (\text{LCM of 3, 4, 2} = 12)$$

$$= 16 : 27 : 30$$

Question 2.

Divide 64 cm long string into two parts in the ratio 5 : 3.

Answer:

Sum of ratios = 5 + 3 = 8

$\therefore$ first part = $\frac{5}{8}$ of 64 cm = 40 cm

Second part = $\frac{3}{8}$ of 64 cm = 24 cm

Question 3.

Rs. 720 is divided between x and y in the ratio 4:5. How many rupees will each get?

Answer:

Sol. Total amount = Rs. 720 Ratio between x, y = 4 : 5

Sum of ratios = 4 + 5 = 9

x's share = $\frac{4}{9}$ of Rs. 720 = Rs. 320

y's share = $\frac{5}{9}$ of Rs. 720 = Rs. 400

Question 4.

The angles of a triangle are in the ratio 3 : 2 : 7. Find each angle.

Answer:

Ratio in angles of a triangle = 3:2:7

Sum of ratios = 3 + 2 + 7 = 12

Sum of angles of a triangle = 180°

$\therefore$ First angle = $\frac{3}{12} \times 180^\circ = 45^\circ$

Second angle = $\frac{2}{12} \times 180^\circ = 30^\circ$

Third angle = $\frac{7}{12} \times 180^\circ = 105^\circ$

Question 5.

A rectangular field is 100 m by 80 m. Find the ratio of

(i) length to its breadth

(ii) breadth to its perimeter.

Answer:

Length of field (l) = 100 m

Breadth (b) = 80 m

$\therefore$ Perimeter = $2(l + b) = 2(100 + 80) \text{ m} = 2 \times 180 = 360 \text{ m}$

(i) Ratio between length and breadth

= $100 : 80 = 5 : 4$

(Dividing by 20, the HCF of 100 and 80)

(ii) Ratio between breadth and its perimeter

= $80 : 360 = 2 : 9$

(Dividing by 40, the HCF of 80 and 360)

Question 6.

The sum of three numbers, whose ratios are $3\frac{1}{3} : 4\frac{1}{5} : 6\frac{1}{8}$ is 4917. Find the numbers.

Answer:

Sum of three numbers = 4917

Ratio between them = $3\frac{1}{3} : 4\frac{1}{5} : 6\frac{1}{8}$

= $\frac{10}{3} : \frac{21}{5} : \frac{49}{8}$

= $\frac{400:504:735}{120}$ (LCM of 3, 5, 8 = 120)

= $400 : 504 : 735$

Sum of ratio's = $400 + 504 + 735 = 1639$

$\therefore$ First number = $\frac{400}{1639}$ of 4917 = 1200

Second number = $\frac{504}{1639}$ of 4917 = 1512

and third number = $\frac{735}{1639}$ of 4917
= 2205

Question 7.

The ratio between two quantities is 3 : 4 the first is Rs. 810, find the second.

Answer:

Ratio between two quantities = 3 : 4

Sum of ratio = 3+4 = 7

∴ Second quantity = Rs. $\frac{810 \times 4}{3}$

= Rs. 270 x 4 = Rs. 1080

Question 8.

Two numbers are in the ratio 5 : 7. Their difference is 10. Find the numbers.

Answer:

Ratio between two numbers = 5:7

Difference = 7-5 = 2

If difference is 2, then first number = 5

and if difference is 10, then first number

= $\frac{5}{2} \times 10 = 25$

and second number = $\frac{7}{2} \times 10 = 35$

Question 9.

Two numbers are in the ratio 10 : 11. Their sum is 168. Find the numbers.

Answer:

Ratio between two numbers = 10 : 11

Sum of ratios = 10 + 11 = 21

Total sum = 168

∴ first number = $\frac{168}{21} \times 10 = 80$

Second number = $\frac{168}{21} \times 11 = 88$ Ans.

Question 10.

A line is divided in two parts in the ratio 2.5 : 1.3. If the smaller one is 35T cm, find the length of the line.

Answer:

Ratio between two parts of a line

= 2.5 : 1.3 = 25 : 13

Sum of ratios = 25 + 13 = 38

Length of smaller part = 35.1 cm

Now length of line = $\frac{38}{13} \times 35.1$ cm

= 38 x 2.7 cm = 102.6 cm

Question 11.

In a class, the ratio of boys to the girls is 7:8. What part of the whole class are girls.

Answer:

Ratio between boys and girls = 7:8

Sum of ratios = $7 + 8 = 15$

$\therefore$ Girls are $\frac{8}{15}$ of the whole class.

Question 12.

The population of a town is ' 50,000, out of which males are $\frac{1}{3}$ of the whole population. Find the number of females. Also, find the ratio of the number of females to the whole population.

Answer:

Total population = 180,000

Population of males = $\frac{1}{3}$ of 180,000 = 60,000

$\therefore$ Population of females = $180,000 - 60,000 = 120,000$

Ratio of females to whole population

= $120,000 : 180,000 = 2:3$

Question 13.

Ten gram of an alloy of metals A and B contains 7.5 gm of metal A and the rest is metal B. Find the ratio between :

(i) the weights of metals A and B in the alloy.

(ii) the weight of metal B and the weight of the alloy.

Answer:

Total weight of A and B metals = 10 gm A's weight = 7.5 gm B's weight = $10 - 7.5 = 2.5$ gm

(i) Ratio between A and B = $7.5 : 2.5$

= $\frac{75}{10} : \frac{25}{10} = 3:1$

(ii) Ratio between B and total alloy

= $2.5 : 10 = \frac{25}{10} : 10$

$\Rightarrow 25 : 100 = 1 : 4$

Question 14.

The ages of two boys A and B are 6 years 8 months and 7 years 4 months respectively. Divide Rs. 3,150 in the ratio of their ages.

Answer:

A's age = 6 years 8 months

$$= 6 \times 12 + 8 = 72 + 8 = 80 \text{ months}$$

B's age = 7 years 4 months = $7 \times 12 + 4 = 84 + 4 = 88$ months

$$\therefore \text{Ratio between them} = 80 : 88 = 10 : 11$$

Amount = Rs. 3150

$$\text{Sum of ratios} = 10 + 11 = 21$$

$$\therefore \text{A's share} = \frac{3150 \times 10}{21} = 1500 = \text{Rs. 1500}$$

$$\text{B's share} = \frac{3150 \times 11}{21} = 1650 = \text{Rs. 1650}$$

Question 15.

Three persons start a business and spend Rs. 25,000; Rs. 15,000 and Rs. 40,000 respectively. Find the share of each out of a profit of Rs. 14,400 in a year.

Answer:

A's investment = Rs. 25000

B's investment = Rs. 15000

C's investment = Rs. 40000

$\therefore$ Ratio between their investment

$$= 25000 : 15000 : 40000$$

$$= 5 : 3 : 8$$

$$\text{Sum of ratios} = 5 + 3 + 8 = 16 \text{ Total profit} = ₹ 14400$$

$$\therefore \text{A's share} = \frac{14400}{16} \times 5 = ₹ 4500$$

$$\text{B's share} = \frac{14400}{16} \times 3 = ₹ 2700$$

$$\text{C's share} = \frac{14400}{16} \times 8 = ₹ 7200$$

Question 16.

A plot of land, 600 sq m in area, is divided between two persons such that the first person gets three-fifth of what the second gets. Find the share of each.

Answer:

Area of plot of land = 600 sq. meter

Let second's share = x

Then first share = $\frac{3}{5}x$

∴ Ratio between them

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

$$\Rightarrow \frac{3}{5} : 1 = 3 : 5$$

Sum of ratios = $3 + 5 = 8$

$$\begin{aligned}\therefore \text{Share of first person} &= \frac{600}{8} \times 3 \\ &= 225 \text{ sq. m}\end{aligned}$$

$$\text{and second share} = \frac{600}{8} \times 5 = 375 \text{ sq. m}$$

Question 17.

Two poles of different heights are standing vertically on a horizontal field. At a particular time, the ratio between the lengths of their shadows is 2 : 3. If the height of the smaller pole is 7.5 m, find the height of the other pole.

Answer:

Ratio between the shadows of two poles

$$= 2 : 3$$

∴ Height of smaller pole = 7.5 m

$$\begin{aligned}\text{Height of taller pole} &= \frac{7.5 \times 3}{2} \\ &= \frac{22.5}{2} = 11.25 \text{ m}\end{aligned}$$

Question 18.

Two numbers are in the ratio 4 : 7. If their L.C.M. is 168, find the numbers.

Answer:

Given, Ratio in two numbers = 4:7

and their L.C.M. = 168

Let first number = $4x$

and second number = $7x$

Now, L.C.M. of $4x$ and $7x$

$$= 4 \times 7 \times x = 28x$$

$$\therefore 28x = 168$$

$$x = \frac{168}{28}$$

$$x = 6$$

$$\therefore \text{Required numbers} = 4x \text{ and } 7x = 4 \times 6 = 24 \text{ and } 7 \times 6 = 42$$

Question 19.

is divided between A and B in such a way that A gets half of B. Find :

(i) the ratio between the shares of A and B.

(ii) the share of A and the share of B.

Answer:

Total amount to be divided between A and B = ₹300

(i) A gets half of B

$$\begin{aligned} \text{Hence, ratio between A and B} &= \frac{1}{2} \\ &= 1 : 2 \end{aligned}$$

(ii) Sum of ratios = $1 + 2 = 3$

$$\therefore \text{A's shares} = \frac{300 \times 1}{3} = ₹100$$

$$\therefore \text{B's shares} = \frac{300 \times 2}{3} = ₹200$$

Question 20.

The ratio between two numbers is 5 : 9. Find the numbers, if their H.C.F. is 16.

Answer:

Let the first number be $5x$ and second number be $9x$

H.C.F. of $5x$ and $9x$ = Largest number common to $5x$ and $9x = x$

Given H.C.F. = 16 $\Rightarrow x = 16$

$\therefore$ Required numbers = $5x$ and $9x = 5 \times 16$ and $9 \times 16 = 80$ and 144

Question 21.

A bag contains ₹ 1,600 in the form of ₹10 and ₹20 notes. If the ratio between the numbers of ₹10 and ₹20 notes is 2 : 3; find the total number of notes in all.

Answer:

Total amount in the bag = 1600

It contains notes in the denomination of ₹10 and 20

Ratio between the number of ₹10 and 20 notes is = 2 : 3

Let number of ₹10 note = x

and number of ₹20 notes = y

According to condition,

$$10x + 20y = 1600 \quad \dots(i)$$

$$\text{and } x = \frac{2}{3}y \quad \dots(ii)$$

Now, substitute the value of x in eq. (i)

$$10 \times \frac{2}{3}y + 20y = 1600$$

$$\Rightarrow \frac{20}{3}y + 20y = 1600$$

$$\Rightarrow \frac{20+60}{3}y = 1600$$

$$\Rightarrow \frac{80}{3}y = 1600$$

$$\Rightarrow y = \frac{1600 \times 3}{80}$$

$$\therefore y = 60$$

Now, substitute the value of y in eq. (ii), we get

$$x = \frac{2}{3} \times 60 = 40$$

Total number of notes in all = $x + y$

$$= 60 + 40 = 100 \text{ notes}$$

Question 22.

The ratio between the prices of a scooter and a refrigerator is 4 : 1. If the scooter costs ₹45,000 more than the refrigerator, find the price of the refrigerator.

Answer:

Ratio between the prices of scooter and a refrigerator = 4:1

Cost price of scooter = ₹45,000

Let the cost of scooter = $4x$

Cost of refrigerator = $1x$

According to condition,

Cost of scooter > Cost of refrigerator

$$\Rightarrow 4x - 1x = 45000$$

$$\Rightarrow 3x = 45000$$

$$x = \frac{45000}{3}$$

$$\Rightarrow x = ₹15000$$

∴ Price of refrigerator = ₹15000

EXERCISE 6 (B)**Question 1.**

Check whether the following quantities form a proportion or not ?

(i) $3x$, $7x$, 24 and 56

(ii) 0.8, 3, 2.4 and 9

(iii) $1\frac{1}{2}$, $3\frac{1}{4}$, $4\frac{1}{2}$ and $9\frac{3}{4}$

(iv) 0.4, 0.5, 2.9 and 3.5

(v) $2\frac{1}{2}$, $5\frac{1}{2}$, 3.0 and 6.0

Answer:

(i) $3x$, $7x$, 24 and 56

If these are in proportion, then

$$3x \times 56 = 7x \times 24$$

$$\Rightarrow 168x = 168x$$

which is true.

Hence $3x$, $7x$, 24 and 56 are in proportion.

(ii) 0.8, 3, 2.4 and 9 are in proportion

$$\text{if } 0.8 \times 9 = 3 \times 2.4$$

$$\Rightarrow 7.2 = 7.2$$

which is true

Hence 0.8, 3, 2.4 and 9 are in proportion.

(iii) $1\frac{1}{2}$, $3\frac{1}{4}$, $4\frac{1}{2}$ and $9\frac{3}{4}$ are in proportion

$$\text{if } 1\frac{1}{2} \times 9\frac{3}{4} = 3\frac{1}{4} \times 4\frac{1}{2}$$

$$\Rightarrow \frac{3}{2} \times \frac{39}{4} = \frac{13}{4} \times \frac{9}{2}$$

$$\Rightarrow \frac{117}{8} = \frac{117}{8} \text{ which is true.}$$

Hence $1\frac{1}{2}$, $3\frac{1}{4}$, $4\frac{1}{2}$ and $9\frac{3}{4}$ are in proportion.

(iv) 0.4, 0.5, 2.9 and 3.5 are in proportion

$$\text{if } 0.4 \times 3.5 = 0.5 \times 2.9$$

$$\Rightarrow 1.40 = 1.45$$

which is not true

Hence 0.4, 0.5, 2.9 and 3.5 are not in proportion.

(v) $2\frac{1}{2}$, $5\frac{1}{2}$, 3.0 and 6.0 are in proportion

$$\text{if } 2\frac{1}{2} \times 6.0 = 5\frac{1}{2} \times 3.0$$

$$\Rightarrow \frac{5}{2} \times 6.0 = \frac{11}{2} \times 3.0 \Rightarrow \frac{30}{2} = \frac{33}{2}$$

which is not true.

Hence $2\frac{1}{2}$, $5\frac{1}{2}$, 3.0 and 6.0 are not in proportion

Question 2.

Find the fourth proportional of

(i) 3, 12 and 4 (ii) 5, 9 and 45

(iii) 2.1, 1.5 and 8.4 (iv) $\frac{1}{3}$, $\frac{2}{5}$ and 8.4

(v) 4 hours 40 minutes, 1 hour 10 minutes and 16 hours.

Answer:

(i) 4th proportional to 3, 12 and 4

$$= \frac{12 \times 4}{3} = 16$$

(ii) Fourth proportional to 5, 9 and 45

$$= \frac{9 \times 45}{5} = 81$$

(iii) Fourth proportional to 2.1, 1.5 and 8.4

$$= \frac{1.5 \times 8.4}{2.1} = 1.5 \times 4 = 6.0$$

(iv) Fourth proportional to $\frac{1}{3}$, $\frac{2}{5}$ and 8.4

$$= \frac{\frac{2}{5} \times 8.4}{\frac{1}{3}} = \frac{2}{5} \times 8.4 \times \frac{3}{1}$$

$$= \frac{2 \times 84 \times 3}{5 \times 10 \times 1} = \frac{252}{25} = 10.08$$

(v) Fourth proportional to 4 hours 40 minutes, 1 hour 10 minutes and 16 hours

$$4 \text{ hours } 40 \text{ minutes} = 4 \times 60 + 40$$

$$= 240 + 40 = 280$$

$$1 \text{ hour } 10 \text{ minutes} = 1 \times 60 + 10$$

$$= 60 + 10 = 70 \text{ minutes}$$

$$16 \text{ hours} = 16 \times 60 = 960 \text{ minutes}$$

$$\therefore \text{Fourth proportional} = \frac{70 \times 960}{280}$$

$$= 240 \text{ minutes} = \frac{240}{60} = 4 \text{ hours}$$

Question 3.

Find the third proportional of

(i) 27 and 9 (ii) 2 m 40cm and 40cm

(iii) 1.8 and 0.6 (iv) $\frac{1}{7}$ and $\frac{3}{14}$

(v) 1.6 and 0.8

Answer:

(i) Third proportional to 27 and 9

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

(ii) Third proportional to 2 m 40 cm and 40 cm
or 240 cm and 40 cm

$$= \frac{40 \times 40}{240} = \frac{20}{3} = 6\frac{2}{3} \text{ cm}$$

(iii) Third proportional to 1.8 and 0.6

$$= \frac{0.6 \times 0.6}{1.8} = \frac{0.36}{1.8} = \frac{36}{180}$$

$$= \frac{1}{5} = 0.2$$

(iv) Third proportional to $\frac{1}{7}$ and $\frac{3}{14}$

$$= \frac{\frac{3}{14} \times \frac{3}{14}}{\frac{1}{7}} = \frac{9}{196} \times \frac{7}{1} = \frac{9}{28}$$

(v) Third proportional to 1.6 and 0.8

$$= \frac{0.8 \times 0.8}{1.6} = \frac{0.64}{1.6}$$

$$= \frac{64}{160} = \frac{2}{5} = 0.4$$

Question 4.

Find the mean proportional between

- (i) 16 and 4 (ii) 3 and 27
(iii) 0.9 and 2.5 (iv) 0.6 and 9.6
(v) $\frac{1}{4}$ and $\frac{1}{16}$

Answer:

(i) Mean proportional between 16 and 4

$$= \sqrt{16 \times 4} = \sqrt{64} = 8$$

(ii) Mean proportional between 3 and 27

$$= \sqrt{3 \times 27} = \sqrt{81} = 9$$

(iii) Mean proportional between 0.9 and 2.5

$$\begin{aligned} &= \sqrt{0.9 \times 2.5} \\ &= \sqrt{\frac{9}{10} \times \frac{25}{10}} = \sqrt{\frac{225}{100}} = \frac{15}{10} \\ &= 1.5 \end{aligned}$$

(iv) Mean proportional between 0.6 and 9.6

$$\begin{aligned} &= \sqrt{0.6 \times 9.6} = \sqrt{\frac{6}{10} \times \frac{96}{10}} \\ &= \sqrt{\frac{576}{100}} = \frac{24}{10} = 2.4 \end{aligned}$$

(v) Mean proportional between $\frac{1}{4}$ and $\frac{1}{16}$

$$= \sqrt{\frac{1}{4} \times \frac{1}{16}} = \sqrt{\frac{1}{64}} = \frac{1}{8}$$

Question 5.

(i) If $A : B = 3 : 5$ and $B : C = 4 : 7$, find
 $A : B : C$

(ii) If $x : y = 2 : 3$ and $y : z = 5 : 7$, find $x : y : z$

(iii) If $m : n = 4 : 9$ and $n : s = 3 : 7$, find $m : s$

(iv) If $P : Q = \frac{1}{2} : \frac{1}{3}$ and $Q : R = 1\frac{1}{2} : 1\frac{1}{3}$, find
 $P : R$.

(v) If $a : b = 1.5 : 3.5$ and $b : c = 5 : 6$, find $a : c$.

(vi) If $1\frac{1}{4} : 2\frac{1}{3} = p : q$ and $q : r = 4\frac{1}{2} : 5\frac{1}{4}$,
 find $p : r$

Answer:

(i) $A : B = 3 : 5$

$$= \frac{3}{5} : 1 \quad (\text{Dividing by } 5)$$

and $B : C = 4 : 7$

$$= 1 : \frac{7}{4} \quad (\text{Dividing by } 4)$$

$$\therefore A : B : C = \frac{3}{5} : 1 : \frac{7}{4}$$

$$= 12 : 20 : 35$$

(Multiplying by $5 \times 4 = 20$)

(ii) $x : y = 2 : 3$

$$= \frac{2}{3} : 1 \quad (\text{Dividing by } 3)$$

$y : z = 5 : 7$

$$= 1 : \frac{7}{5} \quad (\text{Dividing by } 5)$$

$$\therefore x : y : z = \frac{2}{3} : 1 : \frac{7}{5}$$

$$= 10 : 15 : 21$$

(Multiplying by $3 \times 5 = 15$)

(iii) $m : n = 4 : 9$

$$\frac{m}{n} = \frac{4}{9}$$

and $n : s = 3 : 7$

$$\therefore \frac{n}{s} = \frac{3}{7}$$

$$\therefore \frac{m}{n} \times \frac{n}{s} = \frac{4}{9} \times \frac{3}{7}$$

$$\frac{m}{s} = \frac{4}{21}$$

$$\Rightarrow m : s = 4 : 21$$

$$(iv) P : Q = \frac{1}{2} : \frac{1}{3}$$

$$\therefore \frac{P}{Q} = \frac{1}{2} \times \frac{3}{1} = \frac{3}{2}$$

$$\text{and } Q : R = 1\frac{1}{2} : 1\frac{1}{3} = \frac{3}{2} : \frac{4}{3}$$

$$\therefore \frac{Q}{R} = \frac{3}{2} \times \frac{3}{4} = \frac{9}{8}$$

$$\text{Now } \frac{P}{Q} \times \frac{Q}{R} = \frac{3}{2} \times \frac{9}{8}$$

$$\Rightarrow \frac{P}{R} = \frac{27}{16}$$

$$\therefore P : R = 27 : 16$$

$$(v) a : b = 1.5 : 3.5$$

$$\frac{a}{b} = \frac{1.5}{3.5} = \frac{15}{35} = \frac{3}{7}$$

$$b : c = 5 : 6$$

$$\therefore \frac{b}{c} = \frac{5}{6}$$

$$\text{Now } \frac{a}{b} \times \frac{b}{c} = \frac{3}{7} \times \frac{5}{6} = \frac{5}{14}$$

$$\therefore \frac{a}{c} = \frac{5}{14}$$

$$\Rightarrow a : c = 5 : 14$$

$$(vi) p : q = 1\frac{1}{4} : 2\frac{1}{3} = \frac{5}{4} : \frac{7}{3}$$

$$(vi) p : q = 1\frac{1}{4} : 2\frac{1}{3} = \frac{5}{4} : \frac{7}{3}$$

$$\frac{p}{q} = \frac{5}{4} \times \frac{3}{7} = \frac{15}{28}$$

$$q : r = 4\frac{1}{2} : 5\frac{1}{4} = \frac{9}{2} : \frac{21}{4}$$

$$\frac{q}{r} = \frac{9}{2} \times \frac{4}{21} = \frac{6}{7}$$

$$\therefore \frac{p}{q} \times \frac{q}{r} = \frac{15}{28} \times \frac{6}{7}$$

$$\Rightarrow \frac{p}{r} = \frac{45}{98}$$

$$\therefore p : r = 45 : 98$$

Question 6.

If $x : y = 5 : 4$ and $2 : x = 3 : 8$, find the value of y .

Answer:

$$x : y = 5 : 4$$

$$\text{and } 2 : x = 3 : 8$$

$$\text{Then, } \frac{x}{y} = \frac{5}{4} \quad \dots(i)$$

$$\text{and } \frac{2}{x} = \frac{3}{8} \quad \dots(ii)$$

$$\Rightarrow x = \frac{2 \times 8}{3} = \frac{16}{3}$$

Now put the value of x in eq. (i)

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

$$y = x \times \frac{4}{5}$$

$$y = \frac{16}{3} \times \frac{4}{5} = \frac{64}{15}$$

Question 7.

Find the value of x , when $2.5 : 4 = x : 7.5$.

Answer:

$$2.5 : 4 :: x : 7.5$$

$$4 \times x = 2.5 \times 7.5$$

$$x = \frac{2.5 \times 7.5}{4}$$

$$x = \frac{25 \times 75}{4 \times 100}$$

$$x = \frac{75}{16} = 4 \frac{11}{16}$$

Question 8.

Show that 2, 12 and 72 are in continued proportion.

Answer:

Three numbers a , b and c are in continued proportion if, $a : b :: b : c$

The numbers are 2, 12 and 72

$$\frac{a}{b} = \frac{2}{12} = \frac{1}{6}$$

$$\frac{b}{c} = \frac{12}{72} = \frac{1}{6}$$

$$\text{As, } \frac{a}{b} = \frac{b}{c}$$

$\therefore$ 2, 12 and 72 are in continued proportion.