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 x d = b x 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 kg : 1 quintal (*v*) 10 paise : ₹ 1

(*vi*) 200 m : 5 km (*vii*) 3 hours : 1 day

(*viii*) 6 months : $1\frac{1}{3}$ 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*) $1{\cdot}5 : 2{\cdot}5 = \frac{1{\cdot}5}{2{\cdot}5} = \frac{15}{25} = \frac{15 \div 5}{25 \div 5} = \frac{3}{5}$

(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 kg : 1 quintal = 40 kg : 100 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 paise : 1 rupee = 10 paise : 100 paise

(1 Re = 100 Paise)

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

(*vi*) 200 m : 5 km = 200 m : 5000 m

(1 km = 1000 m)

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

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

(*vii*) 3 hours : 1 day = 3 hours : 24 hours
(1 day = 24 hours)

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

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

= 6 months : 16 months

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

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

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

= 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

∴ 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°
∴ First angle = $\frac{3}{12}$x 180°= 45°
Second angle = $\frac{2}{12}$ x 180°= 30°
Third angle = $\frac{7}{12}$ x 180°= 105°

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
∴Perimeter = 2 (l + b) = 2 (100 + 80) m = 2 x 180 = 360 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

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

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

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

$$= 400 : 504 : 735$$

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

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

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

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

$$= 2205$$

Question 7.
The ratio between two quantities is 3 : the first is Rs. 810, find the second.

Answer:
Ratio between two quantities = 3 : 4
Sum of ratio = 3+4 = 7
∴ Second quantity = Rs. $\frac{810x4}{3}$
= 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
= $\frac{5}{2}$ x 10=25
and second number = $\frac{7}{2}$ x 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 = $\frac{168}{21}$x 10 =80
Second number = $\frac{168}{21}$x 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 38
Now length of line = $\frac{38}{13}$ x 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

∴ 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

∴ 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

⇒ 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 x 12 + 8 = 72 + 8 = 80 months
B's age = 7 years 4 months = 7 x 12 + 4 = 84 + 4 = 88 months
∴ Ratio between them = 80 : 88 = 10 : 11
Amount = Rs. 3150
Sum of ratios = 10 + 11 =21
∴A's share = $\frac{3150x10}{21}$ = 1500 = Rs. 1500

B's share = $\frac{3150x11}{21}$ = 1650 = Rs. 1650

Question 15.
Three persons start a business and spend Rs. 25,000; Rs. 15,000 atid 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
∴ Ratio between their investment
= 25000 : 15000 : 40000
=5 : 3 : 8
Sum of ratios = 5 + 3 + 8=16 Total profit = ₹ 14400
∴ A's share = $\frac{14400}{16}$ x 5 = ₹ 4500
B's share = $\frac{14400}{16}$ x 3 = ₹ 2700
C's share = $\frac{14400}{16}$ x 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 = $\frac{3}{5}x$

$\therefore$ Ratio between them

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

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

Sum of ratios = 3 + 5 = 8

$\therefore$ Share of first person = $\frac{600}{8} \times 3$

$= 225$ sq. m

and second share = $\frac{600}{8} \times 5 = 375$ 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

$= 2 : 3$

$\therefore$ Height of smaller pole = 7.5 m

Height of taller pole = $\frac{7.5 \times 3}{2}$

$= \frac{22.5}{2} = 11.25$ m

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 x 7 x x = 28x
∴ 28x = 168
$x = \frac{168}{28}$
x = 6
∴ Required numbers = 4x and 7x = 4 x 6 = 24 and 7 x 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

Hence, ratio between A and $B = \frac{1}{2}$

$= 1 : 2$

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

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

$\therefore$ B' 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 ⇒ x = 16
∴Required numbers = 5x and 9x = 5×16 and 9×16 = 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,

$10x + 20y = 1600$ ...(i)

and $x = \frac{2}{3}y$ ...(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 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
⇒ 4x- 1x = 45000
⇒ 3x = 45000
$x = \frac{45000}{3}$
⇒ x = ₹15000
∴ Price of refrigerator = ₹15000

EXERCISE 6 (B)

Question 1.

Check whether the following quantities form a proportion or not ?

(*i*) 3*x*, 7*x*, 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*) 3*x*, 7*x*, 24 and 56
If these are in proportion, then
$3x \times 56 = 7x \times 24$
⇒ $168x = 168x$
which is true.
Hence 3*x*, 7*x*, 24 and 56 are in proportion.

(*ii*) 0·8, 3, 2·4 and 9 are in proportion
if $0{\cdot}8 \times 9 = 3 \times 2{\cdot}4$
⇒ $7{\cdot}2 = 7{\cdot}2$
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

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

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

$\Rightarrow \frac{117}{8} = \frac{117}{8}$ 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

if $0{\cdot}4 \times 3{\cdot}5 = 0{\cdot}5 \times 2{\cdot}9$

$\Rightarrow 1{\cdot}40 = 1{\cdot}45$

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

if $2\frac{1}{2} \times 6{\cdot}0 = 5\frac{1}{2} \times 3{\cdot}0$

$\Rightarrow \frac{5}{2} \times 6{\cdot}0 = \frac{11}{2} \times 3{\cdot}0 \Rightarrow \frac{30}{2} = \frac{33}{2}$

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

$$= \frac{1{\cdot}5 \times 8{\cdot}4}{2{\cdot}1} = 1{\cdot}5 \times 4 = 6{\cdot}0$$

(*iv*) Fourth proportional to $\frac{1}{3}, \frac{2}{5}$ and 8·4

$$= \frac{\frac{2}{5} \times 8{\cdot}4}{\frac{1}{3}} = \frac{2}{5} \times 8{\cdot}4 \times \frac{3}{1}$$

$$= \frac{2 \times 84 \times 3}{5 \times 10 \times 1} = \frac{252}{25} = 10{\cdot}08$$

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

4 hours 40 minutes = 4 × 60 + 40

= 240 + 40 = 280

1 hour 10 minutes = 1 × 60 + 10

= 60 + 10 = 70 minutes

16 hours = 16 × 60 = 960 minutes

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

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

$$= \frac{0{\cdot}6 \times 0{\cdot}6}{1{\cdot}8} = \frac{0{\cdot}36}{1{\cdot}8} = \frac{36}{180}$$

$$= \frac{1}{5} = 0{\cdot}2$$

(*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

$$= \frac{0{\cdot}8 \times 08}{1{\cdot}6} = \frac{0{\cdot}64}{1{\cdot}6}$$

$$= \frac{64}{160} = \frac{2}{5} = 0{\cdot}4$$

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

$= \sqrt{0{\cdot}9 \times 2{\cdot}5}$

$= \sqrt{\frac{9}{10} \times \frac{25}{10}} = \sqrt{\frac{225}{100}} = \frac{15}{10}$

$= 1{\cdot}5$

(*iv*) Mean proportional between 0·6 and 9·6

$= \sqrt{0{\cdot}6 \times 9{\cdot}6} = \sqrt{\frac{6}{10} \times \frac{96}{10}}$

$= \sqrt{\frac{576}{100}} = \frac{24}{10} = 2{\cdot}4$

(*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 $a : b = 1{\cdot}5 : 3{\cdot}5$ 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

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

and B : C = 4 : 7

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

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

$= 12 : 20 : 35$

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

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

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

$y : z = 5 : 7$

$= 1 : \frac{7}{5}$ (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 $n : s = 3 : 7$

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

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

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

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

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

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

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

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

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

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

$\therefore \quad \mathrm{P} : \mathrm{R} = 27 : 16$

(*v*) $a : b = 1{\cdot}5 : 3{\cdot}5$

$$\frac{a}{b} = \frac{1{\cdot}5}{3{\cdot}5} = \frac{15}{35} = \frac{3}{7}$$

$b : c = 5 : 6$

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

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

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

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

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

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

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

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

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

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

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

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

Question 6.

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

Answer:

$x : y = 5 : 4$

and $2 : x = 3 : 8$

Then, $\frac{x}{y} = \frac{5}{4}$ ...(*i*)

and $\frac{2}{x} = \frac{3}{8}$ ...(*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

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

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

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

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