

Chapter - 8

Ratio and Proportion

Exercise - 8.1

Q.1 Akhil is - - - - - 40 minutes?

Speed of bicycle = 12 km/hr
Akhil covers distance in 1 hr = 12 km
Akhil covers distance in 3 hrs = 12×3 km
= 36 km

Akhil covers distance in 40 min = $12 \times \frac{40}{60}$
= 8 km

Ans. He will cover total distance = $36 + 8$ km
= 44 km

Q.23 The height of 25 wooden boards is 18.75 inches. Find the height of 55 boards.

The height of 25 wooden board is = 18.75 inches
The height of 1 wooden board is = $\frac{18.75}{25}$
= $\frac{1875}{2500}$
= 0.75 inches

The height of 55 wooden board is = 0.75×55
= 41.25 inches

Ans. Height of 55 wooden board is 41.25 inches

Q.3 30 bags of gravel of 35 kg each cost ₹ 3150. Find the cost of 50 bags of 45 kg each.

$$\begin{aligned} \text{Weight of 1 bag} &= 35 \text{ kg} \\ \text{Weight of 30 bag} &= (35 \times 30) \text{ kg} \\ &= 1050 \text{ kg} \end{aligned}$$

$$\begin{aligned} \text{Cost of 1050 kg gravel} &= ₹ 3150 \\ \text{Cost of 1 kg gravel} &= ₹ \frac{3150}{1050} \\ &= ₹ 3 \end{aligned}$$

$$\begin{aligned} \text{Weight of 50 bag} &= 45 \text{ kg each} \\ &= (50 \times 45) \text{ kg} \\ &= 2250 \text{ kg} \end{aligned}$$

Ans: Cost of 2250 kg gravel = ₹ 3×2250
= ₹ 6750

Q.5 Divide the following in the ratio indicated

(a) ₹ 714 between Binu and Adil in the ratio 2:5.

Money to distribute = ₹ 714

$$\begin{aligned} \text{Ratio} &= 2:5 \\ \text{Sum of ratio} &= 2+5 \\ &= 7 \end{aligned}$$

Binu will get money = $\frac{2}{7} \times 714$

$$\begin{aligned} &= ₹ 204 \\ \text{Adil will get money} &= ₹ \frac{5}{7} \times 714 \\ &= ₹ 510 \end{aligned}$$

Ans: Binu got money = ₹ 204
Adil got money = ₹ 510

Q.6 1696 kg of flour between Uma and Navin in the ratio 3:5.

Flour to distribute = 1696 kg

$$\begin{aligned} \text{Ratio} &= 3:5 \\ \text{Sum of ratio} &= 3+5 \\ &= 8 \end{aligned}$$

Uma will get flour = $(\frac{3}{8} \times 1696) \text{ kg}$

$$= 636 \text{ kg}$$

Navin will get flour = $(\frac{5}{8} \times 1696) \text{ kg}$

$$= 1060 \text{ kg}$$

Ans: Uma's flour = 636 kg
Navin's flour = 1060 kg

(c) 2170 in the ratio 1:3:1:1

Ratio = $\frac{1}{2} : \frac{1}{3} : \frac{1}{5}$

LCM of 2, 3, 5 is = 30

$= \frac{1}{2} \times \frac{15}{30}, \frac{1}{3} \times \frac{10}{30}, \frac{1}{5} \times \frac{6}{30}$

$= 15 : 10 : 6$

Quantity per distribution = $45 + 10 + 6 = 2170$ g

Sum of ratio = $21 + 31 + 15 + 10 + 6$

$= \frac{31}{21}$

I part = $\frac{15}{21} \times 2170$

$= 1050$ g

II part = $\frac{10}{21} \times 2170$

$= 700$ g

III part = $\frac{6}{21} \times 2170$

$= 420$ g

Ans
I part is 1050 g
II part is 700 g
III part is 420 g

Q5b In the ratio $1 : \frac{1}{2} : \frac{1}{3}$

Ratio = $\frac{1}{3} : \frac{1}{6} : \frac{1}{7}$

LCM of 3, 6, 7 is = 42

$= \frac{1}{3} \times \frac{14}{14}, \frac{1}{6} \times \frac{7}{7}, \frac{1}{7} \times \frac{6}{6}$

$= 14 : 7 : 6$

Quantity per distribution = 318 g

Sum of ratio = $14 + 7 + 6 = 27$

I part = $\frac{14}{27} \times 318$

$= 196$ g

II part = $\frac{7}{27} \times 318$

$= 98$ g

III part = $\frac{6}{27} \times 318$

$= 84$ g

Ans
I part is 196 g
II part is 98 g
III part is 84 g

Q6 Compare the ratio:

a) 3:5 and 6:7

$\rightarrow \frac{3}{5}$ and $\frac{6}{7}$

Q.7 3×7 , 6×6
 $21 < 36$
Ans: $3:5 < 6:7$

(b) $3:11$ and $2:9$

$\Rightarrow \frac{3}{11}$ and $\frac{2}{9}$

$\Rightarrow \frac{3 \times 9}{27} > \frac{2 \times 11}{22}$

Ans: $3:11 > 2:9$

Q.7 Arrange the given ratios as indicated:

a) $2:3$, $3:5$, $4:9$ in ascending order.

$\Rightarrow \frac{2}{3}, \frac{3}{5}, \frac{4}{9}$

$\Rightarrow \frac{20}{45}, \frac{27}{45}, \frac{20}{45}$

Ans: $\Rightarrow$ Ascending order and $4:9 < 3:5 < 2:3$.

(b) $3:7$, $4:11$, $5:13$ in ascending order.

$\Rightarrow \frac{3}{7}, \frac{4}{11}, \frac{5}{13}$

$\Rightarrow$ LCM of 7, 11, 13 is = 1001

$= \frac{3}{7} \times 1001, \frac{4}{11} \times 1001, \frac{5}{13} \times 1001$

Ans: $\Rightarrow$ Ascending order and $3:7 > 5:13 > 4:11$

Q.8 Give pencils --- One pencil

5 pencils cost = ₹ 32.50
1 pencil cost = ₹ $\frac{32.50}{5}$

= ₹ 6.50

8 pens cost = ₹ 72
1 pen cost = ₹ $72 \div 8$

= ₹ 9

Ratio = ₹ 9 : ₹ 6.50

= $\frac{9}{6.50}$

= $\frac{18}{13}$

= $\frac{18}{13}$

Answer: 18:13

Q.9 One shop --- Why?

Cost of 26 pens = ₹ 234
Cost of 1 pen = ₹ $\frac{234}{26}$

= ₹ 9

Cost of 19 pens = ₹ 152
Cost of 1 pen = ₹ $\frac{152}{19}$

= ₹ 8

Ans. I will prefer the buy from other shop because the price are cheaper.

Q10) Given $x = 5y = 8z$ find $x:y:z$

$$\Rightarrow \text{Let, } x = 5y = 8z = k$$

$$\Rightarrow x = k$$

$$5y = k$$

$$\Rightarrow y = \frac{k}{5}$$

$$\Rightarrow x:y:z = k : \frac{k}{5} : \frac{k}{8}$$

$$= 1 : \frac{1}{5} : \frac{1}{8}$$

$$= 1 \times 40 : \frac{1}{5} \times 40 : \frac{1}{8} \times 40$$

$$= 40 : 8 : 5$$

Ans. $40:8:5$

(Q11) If $2A = 5B = 7C$, find $A:B:C$

$$\Rightarrow \text{Let, } 2A = 5B = 7C = k$$

$$\Rightarrow A = \frac{k}{2}$$

$$\Rightarrow B = \frac{k}{5}$$

$$\Rightarrow C = \frac{k}{7}$$

$$\Rightarrow A:B:C = \frac{k}{2} : \frac{k}{5} : \frac{k}{7}$$

$$= \frac{1}{2} : \frac{1}{5} : \frac{1}{7}$$

$$= \frac{1}{2} \times 70 : \frac{1}{5} \times 70 : \frac{1}{7} \times 70$$

$$= 35 : 14 : 10$$

Ans. $35:14:10$

Q11) If $A:B = 3:5$ and $B:C = 8:11$, find $A:C$.

$$\Rightarrow \frac{A}{B} = \frac{3}{5} \text{ and } \frac{B}{C} = \frac{8}{11}$$

$$\Rightarrow \text{LCM of 5 and 8} = 40$$

$$\Rightarrow \frac{A}{B} = \frac{3 \times 8}{5 \times 8} = \frac{24}{40} \text{ and } \frac{B}{C} = \frac{8 \times 5}{11 \times 5} = \frac{40}{55}$$

$$\Rightarrow \frac{A}{B} = \frac{24}{40} \text{ and } \frac{B}{C} = \frac{40}{55}$$

$$\Rightarrow A:B:C = 24:40:55$$

Ans. $A:B:C = 24:55$

(Q12) If $A:B = 2:7$ and $B:C = 9:13$, find $A:C$

$$\frac{A}{B} = \frac{2}{7} \text{ and } \frac{B}{C} = \frac{9}{13}$$

$$\text{LCM of 7 and 13} = 91$$

$$\Rightarrow \frac{A}{B} = \frac{2 \times 9}{7 \times 9} \text{ and } \frac{B}{C} = \frac{9 \times 7}{13 \times 7}$$

$$\Rightarrow \frac{A}{B} = \frac{2}{7} \text{ and } \frac{B}{C} = \frac{63}{91}$$

$$\Rightarrow A:B:C = 18:63:91$$

$$\text{Ans} \Rightarrow A:C = 18:91$$

Q.12 If $x:y = 4:7$, find $2x+5y : 3x+4y$.

$$\Rightarrow \text{Let, } \frac{x}{y} = \frac{4a}{7a}$$

$$\Rightarrow 2x+5y = 2 \times 4a + 5 \times 7a$$

$$= 8a + 35a$$

$$= 43a$$

$$\Rightarrow 3x+4y = 3 \times 4a + 4 \times 7a$$

$$= 12a + 28a$$

$$= 40a$$

$$\Rightarrow \frac{43a}{40a}$$

$$\text{Ans} \Rightarrow 43:40$$

(b) If $x:y = 3:5$, find $4x+5y : 6x+7y$.

$$\Rightarrow \text{Let, } \frac{x}{y} = \frac{3a}{5a}$$

$$\Rightarrow 4x+5y = 4 \times 3a + 5 \times 5a$$

$$= 12a + 25a$$

$$= 37a$$

$$\Rightarrow 6x+7y = 6 \times 3a + 7 \times 5a$$

$$= 18a + 35a$$

$$= 53a$$

$$\Rightarrow \frac{37a}{53a}$$

$$\text{Ans} \Rightarrow 37:53$$

Q.13 If three numbers are in the ratio 3:5 and their LCM is 120, find the numbers.

$$\text{Ratio} = 3:5$$

$$\text{Let, one number} = 3x \text{ and } 5x$$

$$\text{LCM of number} = 15x$$

(ATQ)

$$\Rightarrow 15x = 120$$

$$\Rightarrow x = \frac{120}{15}$$

$$x = 8$$

$$\text{So, 1 no.} = 3x$$

$$= 3 \times 8$$

$$= 24$$

$$\text{II no.} = 5x$$

$$= 5 \times 8$$

$$= 40$$

Q14 The LCM of two numbers is 294 and the numbers are in the ratio 4:7. Find the numbers.

Ratio = 4:7
Let a no. = x
= $4x:7x$
LCM of $4x$ and $7x$ = $28x$

(ATQ)

$$\begin{aligned} \frac{28x}{x} &= \frac{224}{28} \\ x &= \frac{224}{28} \\ x &= 8 \end{aligned}$$

Ans I no. = 4×8
= 32
II no. = 7×8
= 56

Q15 The sides of a triangle are in the ratio 1:2:3 if the perimeter is 30 cm, find the sides.

Let the first side = x
the second side = $2x$
the third side = $3x$
In ratio = $x:2x:3x$

Perimeter of Triangle = Sum of all sides

$$\begin{aligned} 30 \text{ cm} &= x + 2x + 3x \\ 30 \text{ cm} &= 6x \\ 30 \text{ cm} &\div 6 \\ 5 \text{ cm} &= x \end{aligned}$$

1st side of Triangle = 5 cm

2nd side of Triangle = $2 \times 5 = 10 \text{ cm}$

3rd side of Triangle = $3 \times 5 = 15 \text{ cm}$

Q16 A field is a parallelogram.

Ratio of sides = 4:5
Let, in sides of parallelogram = $4x:5x$

(ATQ)

Perimeter of field = 216 m

$$\begin{aligned} 4x + 5x + 4x + 5x &= 216 \text{ m} \\ 18x &= 216 \text{ m} \\ x &= \frac{216}{18} \\ x &= 12 \text{ m} \end{aligned}$$

Hence, one side = $4 \times 12 \text{ m}$
= 48 m
adjacent side = $5 \times 12 \text{ m}$
= 60 m

Q.17 Find the value of x if:

(a) $x, 7, 9, 21$ are in proportion

$$\Rightarrow x:7::9:21$$

Product of mean = Product of extreme

$$\frac{7 \times 9}{1 \times x} = \frac{x \times 21}{21 \times 3}$$

$$\boxed{3 = x}$$

Ans. $\boxed{x = 3}$

(b) $6, 15, 8, x$ are in proportion

$$\Rightarrow 6:15::8:x$$

$\Rightarrow$ Product of mean = Product of extreme

$$\frac{15 \times 8}{5 \times 6} = \frac{x \times 6}{6 \times 21}$$

$$\frac{120}{30} = \frac{6x}{126}$$

$$\text{Ans. } \Rightarrow \boxed{20 = 2x}$$

Q.20 A mixture of 20 vessels

Let, value of vessels = x

Milk in one vessel = $\frac{4}{7}$ of x

$$= \frac{4x}{7}$$

Milk of other vessels = $\frac{3}{8}$ of x

$$= \frac{3x}{8}$$

Ratio = $\frac{4x}{7} :: \frac{3x}{8}$

$$= \frac{4x}{7} \times \frac{8}{3x}$$

$$= \frac{32x}{21x}$$

Ans. The two vessels ratio = $32:21$

Q.21 A bottle of fruit juice

A mixed fruit juice of juices

Quantity of juice = 20.2 L

Apple : Orange : Pineapple = 2:3:6

Sum of ratio = $2+3+6$

$$= 11$$

Juice contain apple = $\frac{2}{11} \times 20.2$

$$= 0.4 \text{ L}$$

Juice contain orange = $\frac{3}{11} \times 20.2$

$$= 0.6 \text{ L}$$

Q.1
juice contain pineapple = $\frac{5}{11} \times 2.2$
= 1.2 l

Ans: The quantity of each juice
Apple = 0.4 l
Orange = 0.6 l
Pineapple = 1.2 l

Q.23
A bag of map is --- each kind of map is --- and ---

Ratio of no. of coins = 4:1:2

Let no. of ₹ 1 coins = 4x
no. of ₹ 2 coins = x
no. of ₹ 5 coins = 2x

(AIB)

$$\begin{aligned} &\Rightarrow ₹ 1 \times 4x + ₹ 2 \times x + ₹ 5 \times 2x = ₹ 320 \\ &\Rightarrow 4x + 2x + 10x = ₹ 320 \\ &\Rightarrow 16x = ₹ 320 \\ &\Rightarrow x = \frac{320}{16} = 20 \end{aligned}$$

Then, No. of ₹ 1 coins = 4x
= 4 × 20
= 80

No. of ₹ 2 coins = 20
No. of ₹ 5 coins = 2 × 20
= 40

Q.24
A map is --- metres.

distance in map	2	5.25
actual distance	550	x

$$\Rightarrow \frac{2}{550} = \frac{5.25}{x} \quad \text{Just Method}$$

$$\Rightarrow x = \frac{5.25 \times 550}{2} = 1443.75 \text{ km}$$

Second Method

distance of 2 cm = 550 km
distance of 1 cm = $\frac{550}{2}$

= 275 km

distance of 23.5 × 2.5 cm = 215 × 5.25 km
= 1128.75 km

Ans: 1128.75 km

Q.25 The ratio --- present age

Ratio of ages = 3:8

Let, Riti's age = 3x
Anjali's age = 8x

Eight years ago -

Rishi's age = $3x - 8$
Anya's age = $8x - 8$

(A10)

$$\frac{3x - 8}{8x - 8} = \frac{1}{6}$$

$$6(3x - 8) = 1(8x - 8)$$

$$18x - 48 = 8x - 8$$

$$18x - 8x = -8 + 48$$

$$10x = 40$$

$$x = \frac{40}{10}$$

$$x = 4$$

Ans:

Rishi's age = 3×4

$$= 12 \text{ years}$$

Anya's age = 8×4

$$= 32 \text{ years}$$

Q.10 What must be added to the given numbers so that they are in proportion

(a) 1, 3, 10, 18

Let, x be added

$$1+x : 3+x :: 10+x : 18+x$$

$$\text{Product of mean} = \text{Product of extremes}$$

$$(3+x)(10+x) = (1+x)(18+x)$$

$$30+3x+10x+x^2 = 18+x+18x+x^2$$

$$30+13x = 18+19x$$

$$30-18 = 19x-13x$$

$$12 = 6x$$

$$x = 2$$

Ans: Hence, 2 is added to make it in proportion.

(b) 23, 34, 56, 78

Let, x is added

$$23+x : 34+x :: 56+x : 78+x$$

$$\text{Product of mean} = \text{Product of extremes}$$

$$(34+x)(56+x) = (23+x)(78+x)$$

$$1904+34x+56x+x^2 = 1794+23x+78x+x^2$$

$$1904+90x = 1794+101x$$

$$1904-1794 = 101x-90x$$

$$110 = 11x$$

$$x = 10$$

$$x = 10$$

Ans: Hence, 10 is added to make it in proportion.

Q.19 Are the following numbers in continued proportion?

(a) 9, 15, 25

If they are in continued proportion

$$9:15 :: 15:25$$

$$\text{Product of mean} = 15 \times 15 = 225$$

$$\text{Product of extreme} = 9 \times 25 = 225$$

Here, Product of mean = Product of extreme

∴ they are in continued proportion.

(b) 8, 13, 26

If they are in continued proportion

$$8:13 :: 13:26$$

$$\text{Product of mean} = 13 \times 13 = 169$$

$$\text{Product of extreme} = 8 \times 26 = 208$$

∴ here, Product of mean ≠ Product of extreme

Q.20 Are they are not in continued proportion.

Q.2

Speed of Aashu = 45 km/hr
Time taken by him = 40 min

$$= \frac{2}{3} \text{ hrs}$$

$$\text{Distance} = \text{Speed} \times \text{Time} = \left(45 \times \frac{2}{3}\right) \text{ km} = 30 \text{ km}$$

Time taken by = 24 min
= $\frac{2}{5}$ hrs

$$= \frac{2}{5} \text{ hrs}$$

Speed of Ashu = $\frac{\text{Distance}}{\text{Time}}$

$$= \frac{30}{\frac{2}{5}} \text{ km/hr}$$

$$= \frac{150 \times 5}{2} \text{ km/hr}$$

$$= 75 \text{ km/hr}$$