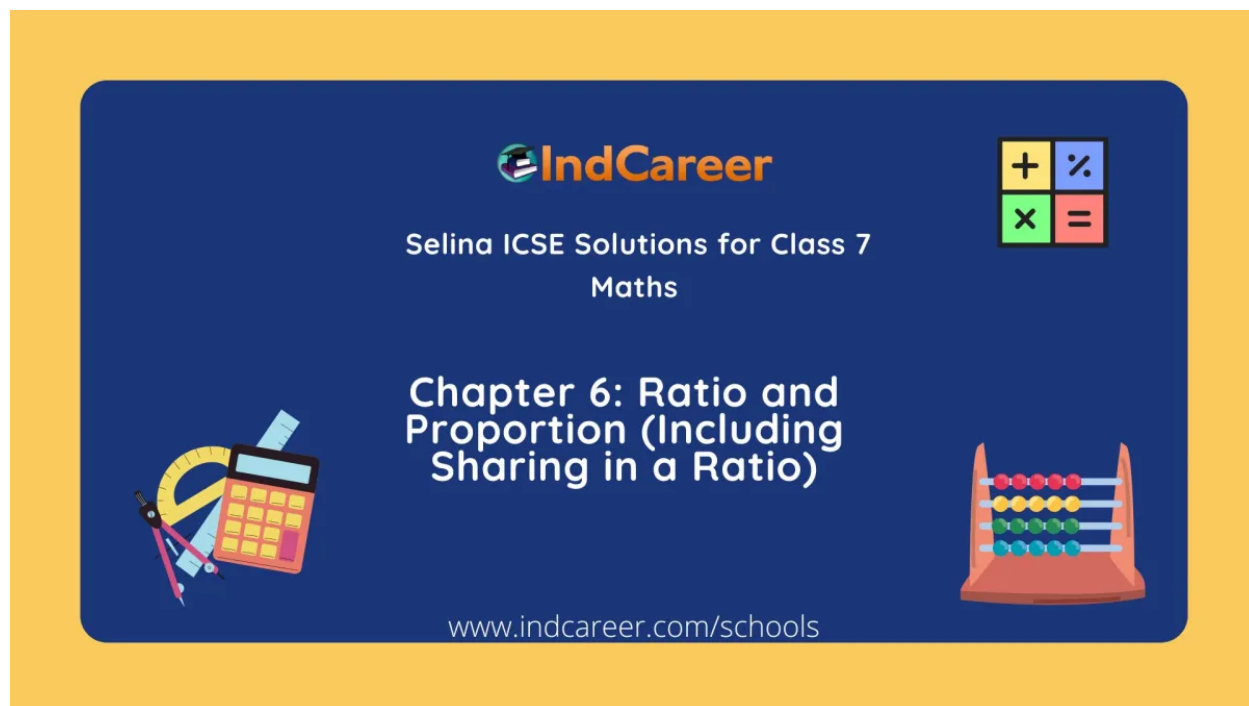


Selina Class 7 ICSE Solutions Mathematics : Chapter 6- Ratio and Proportion (Including Sharing in a Ratio)



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Chapter 6- Ratio and Proportion (Including Sharing in a Ratio)

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Exercise 6A page – 80

1. Express each of the given ratios 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) $1\frac{1}{3}$: $2\frac{1}{4}$: $2\frac{1}{2}$

Solution:

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(i) 22: 66

It can be written as

$$= 22/66$$

We know that the HCF of 22 and 66 is 22

Dividing both numerator and denominator by 22

$$= (22 \div 22) / (66 \div 22)$$

So we get

$$= 1/3$$

$$= 1: 3$$

(ii) 1.5: 2.5

It can be written as

$$= 1.5/ 2.5$$

Multiplying both numerator and denominator by 10

$$= 15/25$$

We know that the HCF of 15 and 25 is 5

Dividing both numerator and denominator by 5

$$= (15 \div 5) / (25 \div 5)$$

So we get

$$= 3/5$$

$$= 3: 5$$

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

It can be written as

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$$= 25/4 : 25/2$$

$$= 25/4 \times 2/25$$

By further calculation

$$= 2/4$$

So we get

$$= 1/2$$

$$= 1 : 2$$

(iv) 40 kg: 1 quintal

We know that

$$1 \text{ quintal} = 100 \text{ kg}$$

We get

$$= 40 \text{ kg} : 100 \text{ kg}$$

It can be written as

$$= 40/100$$

We know that the HCF of 40 and 100 is 20

Dividing both numerator and denominator by 20

$$= (40 \div 20) / (100 \div 20)$$

So we get

$$= 2/5$$

$$= 2 : 5$$

(v) 10 paise: ₹ 1

We know that

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1 Rupee = 100 Paise

We get

= 10 paise: 100 paise

It can be written as

= 10/100

So we get

= 1/10

= 1: 10

(vi) 200 m: 5 km

We know that

1 km = 1000 m

We get

= 200 m: 5000 m

It can be written as

= 200/ 5000

Here the HCF of 200 and 5000 is 200

Dividing both numerator and denominator by 200

= (200 ÷ 200)/ (5000 ÷ 200)

So we get

= 1/25

= 1: 25

(vii) 3 hours: 1 day

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We know that

$$1 \text{ day} = 24 \text{ hours}$$

We get

$$= 3 \text{ hours} : 24 \text{ hours}$$

It can be written as

$$= \frac{3}{24}$$

So we get

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

$$= 1 : 8$$

(viii) 6 months: $1 \frac{1}{3}$ years

We know that

$$1 \text{ year} = 12 \text{ months}$$

We get

$$= 6 \text{ months} : \frac{4}{3} \times 12 \text{ months}$$

It can be written as

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

$$= \frac{6}{16}$$

Here the HCF of 6 and 16 is 2

Dividing both numerator and denominator by 2

$$= \frac{(6 \div 2)}{(16 \div 2)}$$

So we get

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

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$$= 3: 8$$

$$(ix) 1 \frac{1}{3}: 2 \frac{1}{4}: 2 \frac{1}{2}$$

It can be written as

$$= 4/3: 9/4: 5/2$$

We know that the LCM of 3, 4 and 2 is 12

$$= (16: 27: 30)/ 12$$

So we get

$$= 16: 27: 30$$

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

Solution:

We know that

$$\text{The sum of ratios} = 5 + 3 = 8$$

$$\text{So the first part} = 5/8 \text{ of } 64 \text{ cm} = 40 \text{ cm}$$

$$\text{Similarly the second part} = 3/8 \text{ of } 64 \text{ cm} = 24 \text{ cm}$$

3. ₹ 720 is divided between x and y in the ratio 4: 5. How many rupees will each get?

Solution:

It is given that

$$\text{Total amount} = ₹ 720$$

$$\text{Ratio between x and y} = 4: 5$$

We know that

$$\text{The sum of ratios} = 4 + 5 = 9$$

$$\text{So x's share} = 4/9 \text{ of } ₹ 720 = ₹ 320$$

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Similarly y's share = $\frac{5}{9}$ of ₹ 720 = ₹ 400

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

Solution:

It is given that

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

We know that

The sum of ratios = $3 + 2 + 7 = 12$

In a triangle, the sum of all the angles = 180°

So the first angle of the triangle = $\frac{3}{12} \times 180^\circ = 45^\circ$

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

Similarly the third angle of the triangle = $\frac{7}{12} \times 180^\circ = 105^\circ$

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

(i) length to its breadth

(ii) breadth to its perimeter.

Solution:

It is given that

Length of the rectangular field = 100 m

Breadth of the rectangular field = 80 m

So the perimeter = 2 (length + breadth)

= $2 (100 + 80)$ m

By further calculation

= 2×180

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$$= 360 \text{ m}$$

(i) Ratio of length to its breadth

$$= 100: 80$$

Here the HCF of 100 and 80 is 20

Dividing both numerator and denominator by 20

$$= (100 \div 20) / (80 \div 20)$$

So we get

$$= 5/4$$

$$= 5: 4$$

(ii) Ratio of breadth to its perimeter

$$= 80: 360$$

Here the HCF of 80 and 360 is 40

Dividing both numerator and denominator by 40

$$= (80 \div 40) / (360 \div 40)$$

So we get

$$= 2/9$$

$$= 2: 9$$

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.

Solution:

It is given that

Sum of three numbers = 4917

Ratio between the three numbers = $3 \frac{1}{3}: 4 \frac{1}{5}: 6 \frac{1}{8}$

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It can be written as

$$= 10/3: 21/5: 49/8$$

We know that the LCM of 3, 5 and 8 is 120

$$= (400: 504: 735)/ 120$$

So we get

$$= 400: 504: 735$$

Here the sum of ratio = $400 + 504 + 735 = 1639$

So the first number = $400/1639$ of $4917 = 1200$

Second number = $504/1639$ of $4917 = 1512$

Similarly the third number = $735/1639$ of $4917 = 2205$

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

Solution:

It is given that

The ratio between two quantities = 3: 4

So the sum of ratio = $3 + 4 = 7$

Here the second quantity = $(810 \times 4)/ 3$

We get

$$= 270 \times 4$$

$$= ₹ 1080$$

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

Solution:

It is given that

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The ratio between two numbers = 5: 7

The difference between two numbers = $7 - 5 = 2$

Here if 2 is the difference, the first number is 5

Similarly if 10 is the difference, the first number = $5/2 \times 10 = 25$

Second number = $7/2 \times 10 = 35$

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

Solution:

It is given that

The ratio between two numbers = 10: 11

Sum of ratio between two numbers = $10 + 11 = 21$

Sum of two numbers = 168

So the first number = $168/21 \times 10 = 80$

Similarly the second number = $168/21 \times 11 = 88$

10. A line is divided into two parts in the ratio 2.5: 1.3. If the smaller one is 35.1 cm, find the length of the line.

Solution:

It is given that

Ratio between two parts of a line = 2.5: 1.3

Multiplying by 10

= 25: 13

Here the sum of ratios = $25 + 13 = 38$

Length of smaller one = 35.1 cm

So the length of the line = $38/13 \times 35.1$

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We get

$$= 38 \times 2.7 \text{ cm}$$

$$= 102.6 \text{ cm}$$

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

Solution:

It is given that

Ratio of boys to the girls = 7: 8

Here the sum of ratios = $7 + 8 = 15$

So the part of the whole class are girls = $8/15$

Hence, $8/15$ part of the whole class are girls.

12. The population of a town is 180,000, out of which males are $1/3$ of the whole population. Find the number of females. Also, find the ratio of the number of females to the whole population.

Solution:

It is given that

Total population = 180000

So the population of males = $1/3$ of 180000 = 60, 000

Similarly the population of females = $180000 - 60000 = 120000$

Here the ratio of females to whole population = $120000: 180000 = 2: 3$

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.

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Solution:

We know that

Total weight of A and B metals = 10 gm A weight – 7.5 gm B weight

So we get

$$= 10 - 7.5$$

$$= 2.5 \text{ gm}$$

(i) Ratio between the weight of A and B in the alloy = 7.5: 2.5

It can be written as

$$= 75/10: 25/10$$

So we get

$$= 3: 1$$

(ii) Ratio between the weight of metal B and the weight of the alloy = 2.5: 10

It can be written as

$$= 25/10: 10$$

So we get

$$= 25: 100$$

$$= 1: 4$$

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

Solution:

It is given that

Age of A = 6 years 8 months

It can be written as

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$$= 6 \times 12 + 8$$

$$= 72 + 8$$

$$= 80 \text{ months}$$

Age of B = 7 years 4 months

It can be written as

$$= 7 \times 12 + 4$$

$$= 84 + 4$$

$$= 88 \text{ months}$$

So the ratio between them = 80: 88 = 10: 11

Amount = ₹ 3150

We know that

Sum of ratio between them = 10 + 11 = 21

Here A share = $(3150 \times 10) / 21 = ₹ 1500$

Similarly B share = $(3150 \times 11) / 21 = ₹ 1650$

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

Solution:

It is given that

Investment of A = ₹ 25000

Investment of B = ₹ 15000

Investment of C = ₹ 40000

Here the ratio between their investment = 25000: 15000: 40000 = 5: 3: 8

So the sum of ratios = 5 + 3 + 8 = 16

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Total profit = ₹ 14400

Share of A = $14400/16 \times 5 = ₹ 4500$

Share of B = $14400/16 \times 3 = ₹ 2700$

Share of C = $14400/16 \times 8 = ₹ 7200$

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

Solution:

It is given that

Area of plot of land = 600 sq m

Consider second share = x

So first share = $3/5 x$

Here the ratio between them = $3/5x : x$

We get

= $3/5 : 1$

= $3 : 5$

Sum of the ratio between them = $3 + 5 = 8$

So the share of first person = $600/8 \times 3 = 225$ sq m

Similarly the share of second person = $600/8 \times 5 = 375$ sq m

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.

Solution:

It is given that

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Ratio between the shadows of two poles = 2: 3

We know that the height of smaller pole = 7.5 m

So the height of taller pole = $(7.5 \times 3) / 2$

On further calculation

$$= 22.5 / 2$$

$$= 11.25 \text{ m}$$

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

Solution:

It is given that

Ratio between two numbers = 4: 7

LCM of two numbers = 168

Consider first number = $4x$

Second number = $7x$

Now the LCM of $4x$ and $7x = 4 \times 7 \times x = 28x$

By equating both the values

$$28x = 168$$

So we get

$$x = 168 / 28 = 6$$

So the required numbers

$$4x = 4 \times 6 = 24$$

$$7x = 7 \times 6 = 42$$

19. ₹ 300 is divided between A and B in such a way that A gets half of B. Find:

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

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

Solution:

Amount divided between A and B = ₹ 300

(i) We know that A gets half of B

So the ratio between the shares of A and B = $\frac{1}{2}$ = 1: 2

(ii) We know that

Sum of the ratios = $1 + 2 = 3$

Share of A = $(300 \times 1) / 3 = ₹ 100$

Share of B = $(300 \times 2) / 3 = ₹ 200$

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

Solution:

Consider first number = $5x$

Second number = $9x$

We know that

HCF of $5x$ and $9x$ = LCM of $5x$ and $9x$ = x

So HCF = 16

Here $x = 16$

We get the required numbers

$5x = 5 \times 16 = 80$

$9x = 9 \times 16 = 144$

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.

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Solution:

Amount in the bag = ₹ 1,600

The bag has notes in the denomination of ₹ 10 and ₹ 20

So the ratio between the number of ₹ 10 and ₹ 20 notes = 2: 3

Consider the number of ₹ 10 notes = x

Number of ₹ 20 notes = y

Using the condition

$$10x + 20y = 1600 \dots (1)$$

$$x = \frac{2}{3} y \dots (2)$$

By substituting the value of x in equation (1)

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

On further calculation

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

By taking LCM

$$(20 + 60)/ 3 y = 1600$$

We get

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

We can write it as

$$y = (1600 \times 3)/ 80$$

$$y = 60$$

Substituting the value of y in equation (2)

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

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So the total number of notes in all = $x + y$

$$= 60 + 40$$

$$= 100 \text{ notes}$$

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.

Solution:

It is given that

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

Cost of scooter = ₹ 45,000

Consider the cost of scooter = $4x$

Cost of refrigerator = $1x$

Using the condition

Cost of scooter > Cost of refrigerator

$$4x - 1x = 45000$$

On further calculation

$$3x = 45000$$

So we get

$$x = 45000/3 = ₹ 15000$$

So the price of refrigerator = ₹ 15000

Exercise 6B page – 83

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

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(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

Solution:

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

If the quantities are in proportion

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

By further calculation

$$168x = 168x \text{ which is true}$$

Therefore, 3x, 7x, 24 and 56 are in proportion.

(ii) 0.8, 3, 2.4 and 9

If the quantities are in proportion

$$0.8 \times 9 = 3 \times 2.4$$

By further calculation

$$7.2 = 7.2 \text{ which is true}$$

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

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

If the quantities are in proportion

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

By further calculation

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

$$117/8 = 117/8 \text{ which is true}$$

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

(iv) 0.4, 0.5, 2.9 and 3.5

If the quantities are in proportion

$$0.4 \times 3.5 = 0.5 \times 2.9$$

By further calculation

$$1.40 = 1.45 \text{ which is not true}$$

Therefore, 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

If the quantities are in proportion

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

By further calculation

$$5/2 \times 6.0 = 11/2 \times 3.0$$

$$30/2 = 33/2 \text{ which is not true}$$

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

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

Solution:

(i) 3, 12 and 4

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Here the 4th proportional = $(12 \times 4) / 3 = 16$

(ii) 5, 9 and 45

Here the 4th proportional = $(9 \times 45) / 5 = 81$

(iii) 2.1, 1.5 and 8.4

Here the 4th proportional = $(1.5 \times 8.4) / 2.1 = 1.5 \times 4 = 6.0$

(iv) $1/3$, $2/5$ and 8.4

Here the 4th proportional = $(2/5 \times 8.4) / 1/3$

By further calculation

$$= 2/5 \times 8.4 \times 3/1$$

So we get

$$= (2 \times 84 \times 3) / (5 \times 10 \times 1)$$

$$= 252/25$$

$$= 10.08$$

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

It can be written as

$$4 \text{ hours } 40 \text{ minutes} = 4 \times 60 + 40 = 240 + 40 = 280 \text{ minutes}$$

$$1 \text{ hour } 10 \text{ minutes} = 1 \times 60 + 10 = 60 + 10 = 70 \text{ minutes}$$

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

$$\text{So the fourth proportional} = (70 \times 960) / 280 = 240 \text{ minutes}$$

We get

$$= 240/60$$

$$= 4 \text{ hours}$$

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3. Find the third proportional of:

(i) 27 and 9

(ii) 2 m 40 cm and 40 cm

(iii) 1.8 and 0.6

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

(v) 1.6 and 0.8

Solution:

(i) 27 and 9

Here the 3rd proportional = $(9 \times 9) / 27 = 3$

(ii) 2 m 40 cm and 40 cm

It can be written as

240 cm and 40 cm

Here the 3rd proportional = $(40 \times 40) / 240 = 20/3 = 6 \frac{2}{3}$ cm

(iii) 1.8 and 0.6

Here the 3rd proportional = $(0.6 \times 0.6) / 1.8 = 0.36 / 1.8$

Multiplying by 100

= $36 / 180$

So we get

= $\frac{1}{5}$

= 0.2

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

Here the 3rd proportional = $(\frac{3}{14} \times \frac{3}{14}) / \frac{1}{7}$

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By further calculation

$$= 9/196 \times 7/1$$

So we get

$$= 9/28$$

(v) 1.6 and 0.8

$$\text{Here the 3}^{\text{rd}} \text{ proportional} = (0.8 \times 0.8) / 1.6 = 0.64/1.6$$

By further calculation

$$= 64/160$$

$$= 2/5$$

$$= 0.4$$

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 $\frac{1}{16}$

Solution:

(i) 16 and 4

Here the mean proportional between them

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

By multiplication

$$= \sqrt{64}$$

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$$= 8$$

(ii) 3 and 27

Here the mean proportional between them

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

By multiplication

$$= \sqrt{81}$$

$$= 9$$

(iii) 0.9 and 2.5

Here the mean proportional between them

$$= \sqrt{0.9 \times 2.5}$$

Multiplying and dividing by 10

$$= \sqrt{9/10 \times 25/10}$$

So we get

$$= \sqrt{225/100}$$

$$= 15/10$$

$$= 1.5$$

(iv) 0.6 and 9.6

Here the mean proportional between them

$$= \sqrt{0.6 \times 9.6}$$

Multiplying and dividing by 10

$$= \sqrt{6/10 \times 96/10}$$

So we get

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$$= \sqrt{576/100}$$

$$= 24/10$$

$$= 2.4$$

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

Here the mean proportional between them

$$= \sqrt{\left(\frac{1}{4} \times \frac{1}{16}\right)}$$

So we get

$$= \sqrt{\frac{1}{64}}$$

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

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.

Solution:

(i) A: B = 3: 5

Now divide by 5

$$= 3/5: 1$$

Similarly

$$B: C = 4: 7$$

Now divide by 4

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$$= 1: \frac{7}{4}$$

So we get

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

Multiplying by $5 \times 4 = 20$

$$A: B: C = 12: 20: 35$$

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

Now divide by 3

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

Similarly

$$y: z = 5: 7$$

Now divide by 5

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

So we get

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

Multiplying by $3 \times 5 = 15$

$$x: y: z = 10: 15: 21$$

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

We can write it as

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

Similarly $n: s = 3: 7$

We can write it as

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

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So we get

$$m/n \times n/s = 4/9 \times 3/7$$

Here

$$m/s = 4/21$$

$$m : s = 4 : 21$$

$$(iv) P : Q = 1/2 : 1/3$$

It can be written as

$$P/Q = 1/2 \times 3/1 = 3/2$$

Similarly

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

It can be written as

$$Q/R = 3/2 \times 3/4 = 9/8$$

So we get

$$P/Q \times Q/R = 3/2 \times 9/8$$

$$P/R = 27/16$$

$$P : R = 27 : 16$$

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

It can be written as

$$a/b = 1.5/3.5 = 15/35 = 3/7$$

We know that

$$b : c = 5 : 6$$

It can be written as

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$$b/c = 5/6$$

So we get

$$a/b \times b/c = 3/7 \times 5/6$$

By further calculation

$$a/c = 5/14$$

$$a: c = 5: 14$$

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

We can write it as

$$= 5/4: 7/3$$

We get

$$p/q = 5/4 \times 3/7 = 15/28$$

Similarly

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

We can write it as

$$q/r = 9/2 \times 4/21 = 6/7$$

So we get

$$p/q \times q/r = 15/28 \times 6/7$$

$$p/r = 45/98$$

$$p: r = 45: 98$$

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

Solution:

It is given that

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$$x: y = 5: 4 \text{ and } 2: x = 3: 8$$

We can write it as

$$x/y = 5/4 \dots (1)$$

$$2/x = 3/8 \dots (2)$$

$$x = (2 \times 8)/3 = 16/3$$

Substituting the value of x in equation (1)

$$x/y = 5/4$$

We get

$$y = x \times 4/5$$

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

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

Solution:

It is given that

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

We can write it as

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

$$x = (2.5 \times 7.5)/4$$

Now multiplying by 100

$$x = (25 \times 75)/(4 \times 100)$$

By further calculation

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

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

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Solution:

Consider a, b and c as the three numbers in continued proportion where $a : b :: b : c$

So the numbers are 2, 12 and 72

$$a/b = 2/12 = 1/6$$

$$b/c = 12/72 = 1/6$$

We get $a/b = b/c$

Hence, 2, 12 and 72 are in continued proportion.

Exercise 6B

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

Solution:

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

If the quantities are in proportion

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

By further calculation

$$168x = 168x \text{ which is true}$$

Therefore, 3x, 7x, 24 and 56 are in proportion.

(ii) 0.8, 3, 2.4 and 9

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If the quantities are in proportion

$$0.8 \times 9 = 3 \times 2.4$$

By further calculation

$$7.2 = 7.2 \text{ which is true}$$

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

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

If the quantities are in proportion

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

By further calculation

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

$$117/8 = 117/8 \text{ which is true}$$

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

(iv) 0.4, 0.5, 2.9 and 3.5

If the quantities are in proportion

$$0.4 \times 3.5 = 0.5 \times 2.9$$

By further calculation

$$1.40 = 1.45 \text{ which is not true}$$

Therefore, 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

If the quantities are in proportion

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

By further calculation

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$$5/2 \times 6.0 = 11/2 \times 3.0$$

$$30/2 = 33/2 \text{ which is not true}$$

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

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

Solution:

(i) 3, 12 and 4

$$\text{Here the 4}^{\text{th}} \text{ proportional} = (12 \times 4) / 3 = 16$$

(ii) 5, 9 and 45

$$\text{Here the 4}^{\text{th}} \text{ proportional} = (9 \times 45) / 5 = 81$$

(iii) 2.1, 1.5 and 8.4

$$\text{Here the 4}^{\text{th}} \text{ proportional} = (1.5 \times 8.4) / 2.1 = 1.5 \times 4 = 6.0$$

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

$$\text{Here the 4}^{\text{th}} \text{ proportional} = (2/5 \times 8.4) / \frac{1}{3}$$

By further calculation

$$= 2/5 \times 8.4 \times 3/1$$

So we get

$$= (2 \times 84 \times 3) / (5 \times 10 \times 1)$$

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$$= 252/25$$

$$= 10.08$$

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

It can be written as

$$4 \text{ hours } 40 \text{ minutes} = 4 \times 60 + 40 = 240 + 40 = 280 \text{ minutes}$$

$$1 \text{ hour } 10 \text{ minutes} = 1 \times 60 + 10 = 60 + 10 = 70 \text{ minutes}$$

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

$$\text{So the fourth proportional} = (70 \times 960) / 280 = 240 \text{ minutes}$$

We get

$$= 240/60$$

$$= 4 \text{ hours}$$

3. Find the third proportional of:

(i) 27 and 9

(ii) 2 m 40 cm and 40 cm

(iii) 1.8 and 0.6

(iv) $1/7$ and $3/14$

(v) 1.6 and 0.8

Solution:

(i) 27 and 9

$$\text{Here the 3}^{\text{rd}} \text{ proportional} = (9 \times 9) / 27 = 3$$

(ii) 2 m 40 cm and 40 cm

It can be written as

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240 cm and 40 cm

Here the 3rd proportional = $(40 \times 40) / 240 = 20/3 = 6 \frac{2}{3}$ cm

(iii) 1.8 and 0.6

Here the 3rd proportional = $(0.6 \times 0.6) / 1.8 = 0.36 / 1.8$

Multiplying by 100

= $36 / 180$

So we get

= $1/5$

= 0.2

(iv) $1/7$ and $3/14$

Here the 3rd proportional = $(3/14 \times 3/14) / 1/7$

By further calculation

= $9/196 \times 7/1$

So we get

= $9/28$

(v) 1.6 and 0.8

Here the 3rd proportional = $(0.8 \times 0.8) / 1.6 = 0.64/1.6$

By further calculation

= $64/160$

= $2/5$

= 0.4

4. Find the mean proportional between:

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(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 $\frac{1}{16}$

Solution:

(i) 16 and 4

Here the mean proportional between them

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

By multiplication

$$= \sqrt{64}$$

$$= 8$$

(ii) 3 and 27

Here the mean proportional between them

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

By multiplication

$$= \sqrt{81}$$

$$= 9$$

(iii) 0.9 and 2.5

Here the mean proportional between them

$$= \sqrt{0.9 \times 2.5}$$

Multiplying and dividing by 10

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$$= \sqrt{9/10 \times 25/10}$$

So we get

$$= \sqrt{225/100}$$

$$= 15/10$$

$$= 1.5$$

(iv) 0.6 and 9.6

Here the mean proportional between them

$$= \sqrt{0.6 \times 9.6}$$

Multiplying and dividing by 10

$$= \sqrt{6/10 \times 96/10}$$

So we get

$$= \sqrt{576/100}$$

$$= 24/10$$

$$= 2.4$$

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

Here the mean proportional between them

$$= \sqrt{1/4 \times 1/16}$$

So we get

$$= \sqrt{1/64}$$

$$= 1/8$$

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.

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(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 $p : r$.

Solution:

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

Now divide by 5

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

Similarly

$$B : C = 4 : 7$$

Now divide by 4

$$= 1 : \frac{7}{4}$$

So we get

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

Multiplying by $5 \times 4 = 20$

$$A : B : C = 12 : 20 : 35$$

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

Now divide by 3

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

Similarly

$$y : z = 5 : 7$$

Now divide by 5

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

So we get

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

Multiplying by $3 \times 5 = 15$

$$x: y: z = 10: 15: 21$$

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

We can write it as

$$m/n = 4/9$$

$$\text{Similarly } n: s = 3: 7$$

We can write it as

$$n/s = 3/7$$

So we get

$$m/n \times n/s = 4/9 \times 3/7$$

Here

$$m/s = 4/21$$

$$m: s = 4: 21$$

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

It can be written as

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

Similarly

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

It can be written as

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$$Q/R = 3/2 \times 3/4 = 9/8$$

So we get

$$P/Q \times Q/R = 3/2 \times 9/8$$

$$P/R = 27/16$$

$$P: R = 27: 16$$

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

It can be written as

$$a/b = 1.5/ 3.5 = 15/35 = 3/7$$

We know that

$$b: c = 5: 6$$

It can be written as

$$b/c = 5/6$$

So we get

$$a/b \times b/c = 3/7 \times 5/6$$

By further calculation

$$a/c = 5/14$$

$$a: c = 5: 14$$

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

We can write it as

$$= 5/4: 7/3$$

We get

$$p/q = 5/4 \times 3/7 = 15/28$$

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Similarly

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

We can write it as

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

So we get

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

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

$$p: r = 45: 98$$

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

Solution:

It is given that

$$x: y = 5: 4 \text{ and } 2: x = 3: 8$$

We can write it as

$$x/y = 5/4 \dots (1)$$

$$2/x = 3/8 \dots (2)$$

$$x = (2 \times 8)/3 = 16/3$$

Substituting the value of x in equation (1)

$$x/y = 5/4$$

We get

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

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

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

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Solution:

It is given that

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

We can write it as

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

$$x = (2.5 \times 7.5) / 4$$

Now multiplying by 100

$$x = (25 \times 75) / (4 \times 100)$$

By further calculation

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

8. Show that 2, 12 and 72 are in continued proportion.**Solution:**

Consider a, b and c as the three numbers in continued proportion where $a: b:: b: c$

So the numbers are 2, 12 and 72

$$a/b = 2/12 = 1/6$$

$$b/c = 12/72 = 1/6$$

We get $a/b = b/c$

Hence, 2, 12 and 72 are in continued proportion.

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