

# Chapter-12

## Ratio And Proportion

### 2 MARKS QUESTIONS

1. There are 20 girls and 15 boys in a class.

(a) What is the ratio of the number of girls to the number of boys?

(b) What is the ratio of the number of girls to the total number of students in the class?

#### Solutions:

Given

Number of girls = 20 girls

Number of boys = 15 boys

Total number of students =  $20 + 15$

= 35

(a) Ratio of the number of girls to the number of boys =  $20 / 15 = 4 / 3$

(b) Ratio of the number of girls to the total number of students =  $20 / 35 = 4 / 7$

**2. The distance travelled by Hamid and Akhtar in an hour is 9 km and 12 km, respectively. Find the ratio of the speed of Hamid to the speed of Akhtar.**

**Solutions:**

We know that the speed of a certain object is the distance travelled by that object in an hour

Distance travelled by Hamid in one hour = 9 km

Distance travelled by Akhtar in one hour = 12 km

Speed of Hamid = 9 km/hr

Speed of Akhtar = 12 km/hr

The ratio of the speed of Hamid to the speed of Akhtar =  $9 / 12 = 3 / 4$

**3. Fill in the blanks:**

**$15 / 18 = \square / 6 = 10 / \square = \square / 30$  [Are these equivalent ratios?]**

**Solutions:**

$$15 / 18 = (5 \times 3) / (6 \times 3)$$

$$= 5 / 6$$

$$5 / 6 = (5 \times 2) / (6 \times 2)$$

$$= 10 / 12$$

$$5 / 6 = (5 \times 5) / (6 \times 5)$$

$$= 25 / 30$$

Hence, 5, 12 and 25 are the numbers which come in the blanks, respectively.

Yes, all are equivalent ratios.

**4. Find the ratio of the following:**

**(a) 81 to 108**

**(b) 98 to 63**

**(c) 33 km to 121 km**

**(d) 30 minutes to 45 minutes**

**Solutions:**

$$\begin{aligned} \text{(a) } 81 / 108 &= (3 \times 3 \times 3 \times 3) / (2 \times 2 \times 3 \times 3 \times 3) \\ &= 3 / 4 \end{aligned}$$

$$\begin{aligned} \text{(b) } 98 / 63 &= (14 \times 7) / (9 \times 7) \\ &= 14 / 9 \end{aligned}$$

$$\begin{aligned} \text{(c) } 33 / 121 &= (3 \times 11) / (11 \times 11) \\ &= 3 / 11 \end{aligned}$$

$$\begin{aligned} \text{(d) } 30 / 45 &= (2 \times 3 \times 5) / (3 \times 3 \times 5) \\ &= 2 / 3 \end{aligned}$$

**5. In a year, Seema earns ₹ 1,50,000 and saves ₹ 50,000. Find the ratio of**

**(a) Money that Seema earns to the money she saves**

**(b) Money that she saves to the money she spends.**

**Solutions:**

Money earned by Seema = ₹ 150000

Money saved by her = ₹ 50000

Money spent by her = ₹ 150000 – ₹ 50000 = ₹ 100000

(a) Ratio of money earned to money saved =  $150000 / 50000 = 15 / 5$   
 $= 3 / 1$

(b) Ratio of money saved to money spent =  $50000 / 100000 = 5 / 10$   
 $= 1 / 2$

**6. There are 102 teachers in a school of 3300 students. Find the ratio of the number of teachers to the number of students.**

**Solutions:**

Given

Number of teachers in the school = 102

Number of students in the school = 3300

The ratio of the number of teachers to the number of students =  $102 / 3300$   
 $= (2 \times 3 \times 17) / (2 \times 3 \times 550)$   
 $= 17 / 550$

**7. Cost of a dozen pens is ₹ 180, and the cost of 8 ball pens is ₹ 56. Find the ratio of the cost of a pen to the cost of a ball pen.**

**Solutions:**

Cost of a dozen pens = ₹ 180

Cost of 1 pen =  $180 / 12$

= ₹ 15

Cost of 8 ball pens = ₹ 56

Cost of 1 ball pen =  $56 / 8$

= ₹ 7

Hence, the required ratio is  $15 / 7$ .

**8. Divide 20 pens between Sheela and Sangeeta in a ratio of 3:2.**

**Solutions:**

Terms of 3:2 = 3 and 2

The sum of these terms =  $3 + 2$

= 5

Now, Sheela will get  $3 / 5$  of the total pens, and Sangeeta will get  $2 / 5$  of the total pens

Number of pens with Sheela =  $3 / 5 \times 20$

=  $3 \times 4$

= 12

Number of pens with Sangeeta =  $2 / 5 \times 20$

=  $2 \times 4 = 8$

**9. If the cost of 7 m of cloth is ₹ 1470, find the cost of 5 m of cloth.**

**Solutions:**

Given

Cost of 7 m cloth = ₹ 1470

Cost of 1 m cloth =  $1470 / 7$

= ₹ 210

So, cost of 5 cloth =  $210 \times 5 = 1050$

∴ The cost of 5 m cloth is ₹ 1050.

**10. Ekta earns ₹ 3000 in 10 days. How much will she earn in 30 days?**

**Solutions:**

Money earned by Ekta in 10 days = ₹ 3000

Money earned by her in one day =  $3000 / 10$

= ₹ 300

So, money earned by her in 30 days =  $300 \times 30$

= ₹ 9000.

**11. If it has rained 276 mm in the last 3 days, how many cm of rain will fall in one full week (7 days)? Assume that the rain continues to fall at the same rate.**

**Solutions:**

The measure of rain in 3 days = 276 mm

The measure of rain in one day =  $276 / 3$

= 92 mm

So, the measure of rain in one week, i.e. 7 days =  $92 \times 7$

= 644 mm

=  $644 / 10$

= 64.4 cm

**12. Cost of 5 kg of wheat is ₹ 91.50.**

**(a) What will be the cost of 8 kg of wheat?**

**(b) What quantity of wheat can be purchased for ₹ 183?**

**Solutions:**

**(a)** Cost of 5 kg wheat = ₹ 91.50.

Cost of 1 kg wheat =  $91.50 / 5$

= ₹ 18.3

So, the cost of 8 kg wheat =  $18.3 \times 8$

= ₹ 146.40

**(b)** Wheat purchased for ₹ 91.50 = 5 kg

Wheat purchased for ₹ 1 =  $5 / 91.50$  kg

So, wheat purchased for ₹ 183 =  $(5 / 91.50) \times 183$

= 10 kg

**13. The temperature dropped  $15^{\circ}\text{C}$  in the last 30 days. If the rate of temperature drop remains the same, how many degrees will the temperature drop in the next ten days?**

**Solutions:**

Temperature drop in 30 days =  $15^{\circ}\text{C}$

Temperature drop in 1 day =  $15 / 30$

=  $(1 / 2)^{\circ}\text{C}$

So, the temperature drop in next 10 days =  $(1 / 2) \times 10$

=  $5^{\circ}\text{C}$

$\therefore$  The temperature drop in the next 10 days will be  $5^{\circ}\text{C}$

**14. Shaina pays ₹ 15000 as rent for 3 months. How much does she have to pay for a whole year if the rent per month remains the same?**

**Solutions:**

Rent paid by Shaina in 3 months = ₹ 15000

Rent for 1 month =  $15000 / 3$

= ₹ 5000

So, rent for 12 months, i.e. 1 year =  $5000 \times 12$

= ₹ 60,000

$\therefore$  Rent paid by Shaina in 1 year is ₹ 60,000



**15. Cost of 4 dozen bananas is ₹ 180. How many bananas can be purchased for ₹ 90?**

**Solutions:**

Number of bananas bought for ₹ 180 = 4 dozens

$$= 4 \times 12$$

$$= 48 \text{ bananas}$$

Number of bananas bought for ₹ 1 =  $48 / 180$

So, number of bananas bought for ₹ 90 =  $(48 / 180) \times 90$

$$= 24 \text{ bananas}$$

$\therefore$  24 bananas can be purchased for ₹ 90

**16. The weight of 72 books is 9 kg. What is the weight of 40 such books?**

**Solutions:**

Weight of 72 books = 9 kg

Weight of 1 book =  $9 / 72$

$$= 1 / 8 \text{ kg}$$

So, weight of 40 books =  $(1 / 8) \times 40$

$$= 5 \text{ kg}$$

$\therefore$  The weight of 40 books is 5 kg.

**17. A truck requires 108 litres of diesel to cover a distance of 594 km. How much diesel will be required by the truck to cover a distance of 1650 km?**

**Solutions:**

Diesel required for 594 km = 108 litres

Diesel required for 1 km =  $108 / 594$

=  $2 / 11$  litre

So, diesel required for 1650 km =  $(2 / 11) \times 1650$

= 300 litres

∴ The diesel required by the truck to cover a distance of 1650 km is 300 litres.

**18. Raju purchases 10 pens for ₹ 150, and Manish buys 7 pens for ₹ 84. Can you say who got the pens cheaper?**

**Solutions:**

Pens purchased by Raju for ₹ 150 = 10 pens

Cost of 1 pen =  $150 / 10$

= ₹ 15

Pens purchased by Manish for ₹ 84 = 7 pens

Cost of 1 pen =  $84 / 7$

= ₹ 12

∴ Pens purchased by Manish are cheaper than those of Raju.

**19. Anish made 42 runs in 6 overs, and Anup made 63 runs in 7 overs. Who made more runs per over?**

**Solutions:**

Runs made by Anish in 6 overs = 42

Runs made by Anish in 1 over =  $42 / 6$

= 7

Runs made by Anup in 7 overs = 63

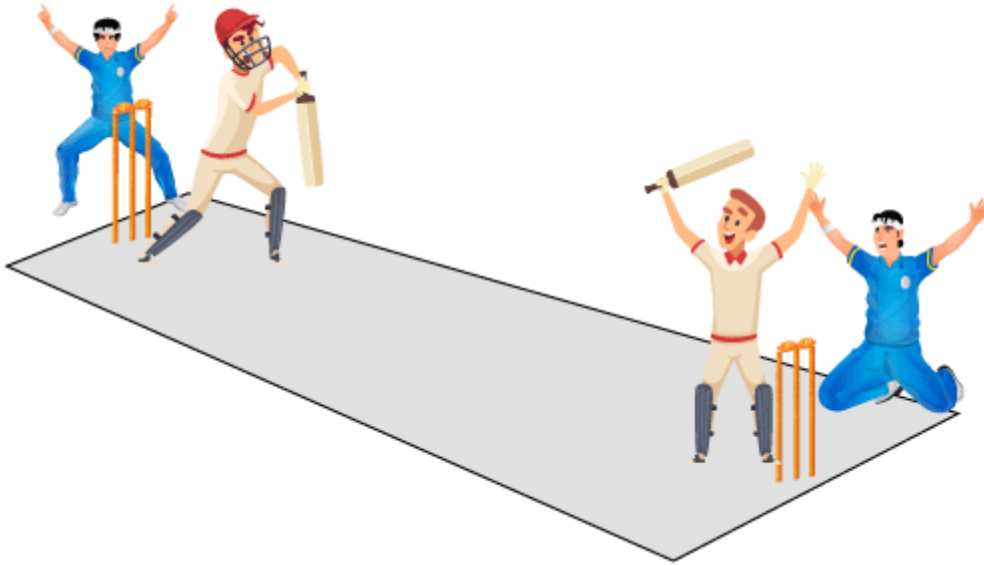
Runs made by Anup in 1 over =  $63 / 7$

= 9

∴ Anup scored more runs than Anish.

## 4 MARKS QUESTIONS

1. Out of 30 students in a class, 6 like football, 12 like cricket and the remaining like tennis. Find the ratio of



- (a) The number of students liking football to the number of students liking tennis.
- (b) The number of students liking cricket to the total number of students.

### **Solutions:**

Given

Number of students who like football = 6

Number of students who like cricket = 12

Number of students who like tennis =  $30 - 6 - 12$

= 12

(a) Ratio of the number of students liking football to the number of students liking tennis

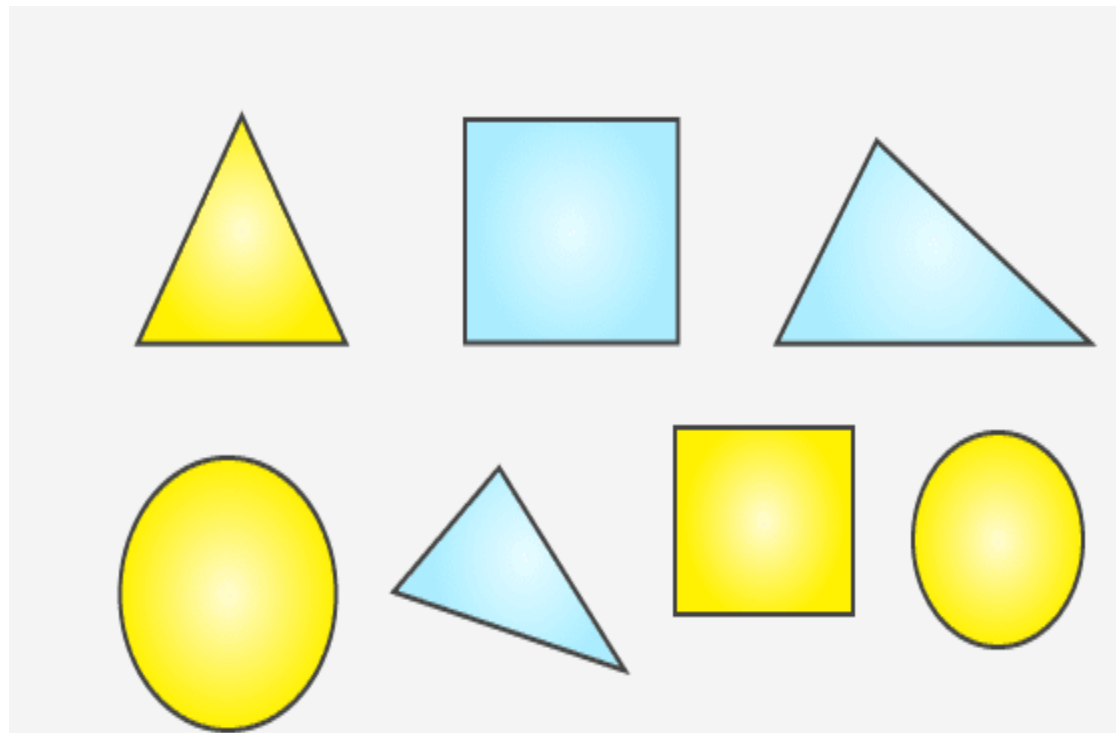
$$= 6 / 12 = 1 / 2$$

(b) Ratio of the number of students liking cricket to the total number of students

$$= 12 / 30$$

$$= 2 / 5$$

**2. See the figure and find the ratio of**



**(a) Number of triangles to the number of circles inside the rectangle.**

**(b) Number of squares to all the figures inside the rectangle.**

**(c) Number of circles to all the figures inside the rectangle.**

### Solutions:

Given in the figure

Number of triangles = 3

Number of circles = 2

Number of squares = 2

Total number of figures = 7

(a) Ratio of the number of triangles to the number of circles inside the rectangle

$$= 3 / 2$$

(b) Ratio of the number of squares to all the figures inside the rectangle

$$= 2 / 7$$

(c) Ratio of the number of circles to all the figures inside the rectangle

$$= 2 / 7$$

**3. Find the ratio of the following:**

**(a) 30 minutes to 1.5 hours**

**(b) 40 cm to 1.5 m**

**(c) 55 paise to ₹ 1**

**(d) 500 ml to 2 litres**

**Solutions:**

**(a)** 30 minutes to 1.5 hours

$$30 \text{ min} = 30 / 60$$

$$= 0.5 \text{ hours}$$

$$\text{Required ratio} = (0.5 \times 1) / (0.5 \times 3)$$

$$= 1 / 3$$

**(b)** 40 cm to 1.5 m

$$1.5 \text{ m} = 150 \text{ cm}$$

$$\text{Required ratio} = 40 / 150$$

$$= 4 / 15$$

**(c)** 55 paise to ₹ 1

$$\text{₹ } 1 = 100 \text{ paise}$$

$$\text{Required ratio} = 55 / 100 = (11 \times 5) / (20 \times 5)$$

$$= 11 / 20$$

**(d)** 500 ml to 2 litres

$$1 \text{ litre} = 1000 \text{ ml}$$

$$2 \text{ litre} = 2000 \text{ ml}$$

$$\text{Required ratio} = 500 / 2000 = 5 / 20 = 5 / (5 \times 4)$$

$$= 1 / 4$$

**4. In a college, out of 4320 students, 2300 are girls. Find the ratio of**

**(a) Number of girls to the total number of students.**

**(b) Number of boys to the number of girls.**

**(c) Number of boys to the total number of students.**

**Solutions:**

Given

Total number of students = 4320

Number of girls = 2300

Number of boys =  $4320 - 2300$

= 2020

(a) Ratio of the number of girls to the total number of students =  $2300 / 4320$

=  $(2 \times 2 \times 5 \times 115) / (2 \times 2 \times 5 \times 216)$

=  $115 / 216$

(b) Ratio of the number of boys to the number of girls =  $2020 / 2300$

=  $(2 \times 2 \times 5 \times 101) / (2 \times 2 \times 5 \times 115)$

=  $101 / 115$

(c) Ratio of the number of boys to the total number of students =  $2020 / 4320$

=  $(2 \times 2 \times 5 \times 101) / (2 \times 2 \times 5 \times 216)$

=  $101 / 216$



**5. Consider the statement: The ratio of breadth and length of a hall is 2:5. Complete the following table that shows some possible breadths and lengths of the hall.**

<b>Breadth of the hall (in metres)</b>	<b>10</b>		<b>40</b>
<b>Length of the hall (in metres)</b>	<b>25</b>	<b>50</b>	

**Solutions:**

**(i) Length = 50 m**

$$\text{Breadth} / 50 = 2 / 5$$

By cross multiplication

$$5 \times \text{breadth} = 50 \times 2$$

$$\text{Breadth} = (50 \times 2) / 5$$

$$= 100 / 5$$

$$= 20 \text{ m}$$

**(ii) Breadth = 40 m**

$$40 / \text{Length} = 2 / 5$$

By cross multiplication

$$2 \times \text{Length} = 40 \times 5$$

$$\text{Length} = (40 \times 5) / 2$$

$$\text{Length} = 200 / 2$$

$$\text{Length} = 100 \text{ m}$$

**6. Mother wants to divide ₹ 36 between her daughters Shreya and Bhoomika in the ratio of their ages. If the age of Shreya is 15 years and the age of Bhoomika is 12 years, find how much Shreya and Bhoomika will get.**



**Solutions:**

Ratio of ages =  $15 / 12$

=  $5 / 4$

Hence, the mother wants to divide ₹ 36 in the ratio of 5:4

Terms of 5:4 are 5 and 4

The sum of these terms =  $5 + 4$

= 9

Here, Shreya will get  $5 / 9$  of the total money, and Sangeeta will get  $4 / 9$  of the total money

The amount Shreya get =  $5 / 9 \times 36$

$$= 20$$

The amount Sangeeta get =  $4 / 9 \times 36$

$$= 16$$

Therefore, Shreya will get ₹ 20, and Sangeeta will get ₹ 16.

**7. Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion.**

**(a) 25 cm : 1 m and ₹ 40 : ₹ 160**

**(b) 39 litres : 65 litres and 6 bottles : 10 bottles**

**(c) 2 kg : 80 kg and 25 g : 625 g**

**(d) 200 mL : 2.5 litre and ₹ 4 : ₹ 50**

**Solutions:**

**(a) 25 cm : 1 m and ₹ 40 : ₹ 160**

$$25 \text{ cm} = 25 / 100 \text{ m}$$

$$= 0.25 \text{ m}$$

$$0.25 / 1 = 1 / 4$$

$$40 / 160 = 1 / 4$$

Yes, these are in proportion.

Middle terms are 1 m, ₹ 40, and extreme terms are 25 cm, ₹ 160.

**(b) 39 litres : 65 litres and 6 bottles : 10 bottles**

$$39 / 65 = 3 / 5$$

$$6 / 10 = 3 / 5$$

Yes, these are in proportion.

Middle terms are 65 litres, 6 bottles, and extreme terms are 39 litres, 10 bottles.

(c) 2 kg : 80 kg and 25 g : 625 g

$$2 / 80 = 1 / 40$$

$$25 / 625 = 1 / 25$$

No, these are not in proportion.

(d) 200 mL : 2.5 litre and ₹ 4 : ₹ 50

$$1 \text{ litre} = 1000 \text{ ml}$$

$$2.5 \text{ litre} = 2500 \text{ ml}$$

$$200 / 2500 = 2 / 25$$

$$4 / 50 = 2 / 25$$

Yes, these are in proportion.

Middle terms are 2.5 litres, ₹ 4 and extreme terms are 200 ml, ₹ 50.

## 7 MARKS QUESTIONS

**1. Present age of the father is 42 years, and that of his son is 14 years. Find the ratio of**

**(a) Present age of the father to the present age of the son**

**(b) Age of the father to the age of the son, when the son was 12 years old**

**(c) Age of father after 10 years to the age of son after 10 years**

**(d) Age of father to the age of son when father was 30 years old**

### **Solutions:**

**(a)** Present age of father = 42 years

Present age of son = 14 years

Required ratio 42 / 14

= 3 / 1

**(b)** 2 years ago, the son was 12 years old. So, 2 years ago, the age of the father was

= 42 – 2 = 40 years

Required ratio = 40 / 12 =  $(4 \times 10) / (4 \times 3) = 10 / 3$

**(c)** After ten years, the age of the father = 42 + 10 = 52 years

After 10 years, the age of the son = 14 + 10 = 24 years

Required ratio = 52 / 24 =  $(4 \times 13) / (4 \times 6)$

= 13 / 6

**(d)** 12 years ago, the age of the father was 30

At that time, the age of the son =  $14 - 12$

= 2 years

Required ratio =  $30 / 2 = (2 \times 15) / 2$

=  $15 / 1$

**2. Determine if the following are in proportion.**

**(a) 15, 45, 40, 120**

**(b) 33, 121, 9, 96**

**(c) 24, 28, 36, 48**

**(d) 32, 48, 70, 210**

**(e) 4, 6, 8, 12**

**(f) 33, 44, 75, 100**

**Solutions:**

**(a) 15, 45, 40, 120**

$$15 / 45 = 1 / 3$$

$$40 / 120 = 1 / 3$$

Hence,  $15:45 = 40:120$

$\therefore$  They are in proportion.

**(b) 33, 121, 9, 96**

$$33 / 121 = 3 / 11$$

$$9 / 96 = 3 / 32$$

Hence  $33:121 \neq 9:96$

$\therefore$  They are not in proportion.

(c) 24, 28, 36, 48

$$24 / 28 = 6 / 7$$

$$36 / 48 = 3 / 4$$

Hence,  $24:28 \neq 36:48$

$\therefore$  They are not in proportion.

(d) 32, 48, 70, 210

$$32 / 48 = 2 / 3$$

$$70 / 210 = 1 / 3$$

Hence,  $32:48 \neq 70:210$

$\therefore$  They are not in proportion.

(e) 4, 6, 8, 12

$$4 / 6 = 2 / 3$$

$$8 / 12 = 2 / 3$$

Hence  $4: 6 = 8: 12$

$\therefore$  These are in a proportion

(f) 33, 44, 75, 100

$$33 / 44 = 3 / 4$$

$$75 / 100 = 3 / 4$$

Hence,  $33:44 = 75:100$

$\therefore$  These are in proportion.

**3. Write True (T) or False ( F ) against each of the following statements :**

**(a)  $16:24 :: 20:30$**

**(b)  $21:6 :: 35:10$**

**(c)  $12:18 :: 28:12$**

**(d)  $8:9 :: 24:27$**

**(e)  $5.2:3.9 :: 3:4$**

**(f)  $0.9:0.36 :: 10:4$**

**Solutions:**

**(a)  $16:24 :: 20:30$**

$$16 / 24 = 2 / 3$$

$$20 / 30 = 2 / 3$$

Hence,  $16:24 = 20:30$

Therefore, True.

**(b)  $21:6 :: 35:10$**

$$21 / 6 = 7 / 2$$

$$35 / 10 = 7 / 2$$

Hence,  $21:6 = 35:10$

Therefore, True.

**(c)  $12:18 :: 28:12$**

$$12 / 18 = 2 / 3$$

$$28 / 12 = 7 / 3$$



Hence,  $12:18 \neq 28:12$

Therefore, False,

(d)  $8:9:: 24:27$

We know that  $= 24 / 27 = (3 \times 8) / (3 \times 9)$

$$= 8 / 9$$

Hence,  $8:9 = 24:27$

Therefore, True.

(e)  $5.2:3.9 :: 3: 4$

$$\text{As } 5.2 / 3.9 = 4 / 3$$

Hence,  $5.2: 3.9 \neq 3: 4$

Therefore, False,

(f)  $0.9:0.36 :: 10:4$

$$0.9 / 0.36 = 90 / 36$$

$$= 10 / 4$$

Hence,  $0.9: 0.36 = 10: 4$

Therefore, True,

**4. Are the following statements true?**

**(a) 40 persons: 200 persons = ₹ 15 : ₹ 75**

**(b) 7.5 litres: 15 litres = 5 kg : 10 kg**

**(c) 99 kg: 45 kg = ₹ 44 : ₹ 20**

**(d) 32 m: 64 m = 6 sec : 12 sec**

**(e) 45 km : 60 km = 12 hours : 15 hours**

**Solutions:**

**(a) 40 persons : 200 persons = ₹ 15 : ₹ 75**

$$40 / 200 = 1 / 5$$

$$15 / 75 = 1 / 5$$

Hence, True.

**(b) 7.5 litres : 15 litres = 5 kg : 10 kg**

$$7.5 / 15 = 1 / 2$$

$$5 / 10 = 1 / 2$$

Hence, True.

**(c) 99 kg : 45 kg = ₹ 44 : ₹ 20**

$$99 / 45 = 11 / 5$$

$$44 / 20 = 11 / 5$$

Hence, True.

**(d) 32 m : 64 m = 6 sec : 12 sec**

$$32 / 64 = 1 / 2$$

$$6 / 12 = 1 / 2$$

Hence, True.

(e) 45 km : 60 km = 12 hours : 15 hours

$$45 / 60 = 3 / 4$$

$$12 / 15 = 4 / 5$$

Hence, False.

**5. Determine if the following ratios form a proportion. Also, write the middle terms and extreme terms where the ratios form a proportion.**

**(a) 25 cm : 1 m and ₹ 40 : ₹ 160**

**(b) 39 litres : 65 litres and 6 bottles : 10 bottles**

**(c) 2 kg : 80 kg and 25 g : 625 g**

**(d) 200 mL : 2.5 litre and ₹ 4 : ₹ 50**

**Solutions:**

**(a) 25 cm : 1 m and ₹ 40 : ₹ 160**

$$25 \text{ cm} = 25 / 100 \text{ m}$$

$$= 0.25 \text{ m}$$

$$0.25 / 1 = 1 / 4$$

$$40 / 160 = 1 / 4$$

Yes, these are in proportion.

Middle terms are 1 m, ₹ 40, and extreme terms are 25 cm, ₹ 160.

**(b) 39 litres : 65 litres and 6 bottles : 10 bottles**

$$39 / 65 = 3 / 5$$

$$6 / 10 = 3 / 5$$

Yes, these are in proportion.

Middle terms are 65 litres, 6 bottles, and extreme terms are 39 litres, 10 bottles.

(c) 2 kg : 80 kg and 25 g : 625 g

$$2 / 80 = 1 / 40$$

$$25 / 625 = 1 / 25$$

No, these are not in proportion.

(d) 200 mL : 2.5 litre and ₹ 4 : ₹ 50

$$1 \text{ litre} = 1000 \text{ ml}$$

$$2.5 \text{ litre} = 2500 \text{ ml}$$

$$200 / 2500 = 2 / 25$$

$$4 / 50 = 2 / 25$$

Yes, these are in proportion.

Middle terms are 2.5 litres, ₹ 4 and extreme terms are 200 ml, ₹ 50.