

# Mathematics

## Chapter 12: Ratio and Proportion



## Important Questions

### Multiple Choice Questions:

Question 1. The cost of a pen is ₹ 10. The cost of a pencil 1 is ₹ 2. How many times of the cost of a pencil is the cost of a pen?

- (a) 5 times
- (b) 2 times
- (c) 10 times
- (d) none of these.

Question 2. The monthly salary of Hari Kishan is ₹ 80000. The monthly salary of Manish is ₹ 40000. How many times of the salary of Manish is the salary of Hari Kishan?

- (a) 2 times
- (b) 4 times
- (c) 3 times
- (d) 8 times.

Question 3. There are 30 boys and 20 girls in a class. The ratio of the number of girls to the number of boys is:

- (a) 2:3
- (b) 3:2
- (c) 2:5
- (d) 3:5

Question 4. There are 25 boys and 25 girls in a class. The ratio of the number of boys to the total number of students is

- (a) 1:2
- (b) 1: 3
- (c) 2:3
- (d) 3:2.

Question 5. The height of Apala is 150 cm. The height of Pari is 120 cm. The ratio of the height of Apala to the height of Pari is

- (a) 4:5
- (b) 5:4

(c) 5:2

(d) 4:1.

Question 6. The cost of a car is ₹ 3,00,000. The cost of a motorbike is ₹ 50,000. The ratio of the cost of motorbike to the cost of car is:

(a) 1:6

(b) 1:5

(c) 1:4

(d) 1:3.

Question 7. The speed of Shubham is 6 km per hour. The speed of Yash is 2 km per hour. The ratio of the speed of Shubham to the speed of Yash is

(a) 2:3

(b) 3:1

(c) 1:3

(d) 3:2.

Question 8. The length and breadth of a rectangular park are 50 m and 40 m respectively. Find the ratio of the length to the breadth of the park.

(a) 4:5

(b) 4:1

(c) 5:1

(d) 5:4.

Question 9. The ratio 40 cm to 1 m is:

(a) 2:5

(b) 3:5

(c) 4:5

(d) 5:2.

Question 10. In a family, there are 8 males and 4 females. The ratio of the number of females to the number of males is:

(a) 1:2

(b) 1:4

(c) 1:8

(d) 2:1.

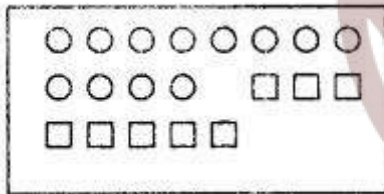
Question 11. Which of the following ratios is equivalent to 2:3?

- (a) 4:8
- (b) 4:9
- (c) 6:9
- (d) 6:12.

Question 12. Which of the following ratios is not equivalent to 10:5?

- (a) 1:2
- (b) 2:1
- (c) 20:10
- (d) 30:15.

Question 13. Find the ratio of number of circles and number of squares inside the following rectangle:



- (a) 3:1
- (b) 2:1
- (c) 2:3
- (d) 3:2

Question 14. There are 20 teachers in a school of 500 students. The ratio of the number of teachers to the number of students is

- (a) 1:20
- (d) 1:50
- (c) 1:25
- (d) 25:1.

Question 15. The ratio of 25 minutes to 1 hour is

- (a) 7:5
- (b) 5:12
- (c) 12:5
- (d) 5:7

### Match The Following:

	Column I		Column II
1.	13 A ratio equivalent to 3: 7	A.	3: 1
2.	Simplest form of 21: 7 is	B.	30: 24
3.	5: 4 is equal to	C.	9: 21
4.	Ratio of 35: 15 is	D.	7: 3

### Fill in the blanks:

- If 4, a, a, 36 are in proportion then a is equal to \_\_\_\_.
- 32 m: 64 m:: \_\_\_\_.
- 5: 4 = \_\_\_\_.
- If  $a = 2b$  then  $a : b =$  \_\_\_\_.

### True /False:

- A ratio equivalent to 3:7 is 9: 21.
- The ratio 35: 84 in simplest form is 7: 12.
- A ratio can be equal to 1.
- $5 : 2 = 2 : 5$ .

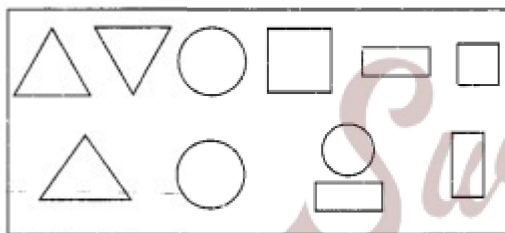
### Very Short Questions:

- Find X in the proportion  $X : 6 = 25 : 5$
- The weight of 25 copies is 5 kg. Find the weight of 30 such copies?
- Are the following statement true?  $45\text{km} : 60\text{km} = 12 \text{ hours} : 15 \text{ hours}$ .
- Write True or False against the following statement: $8 : 9 :: 24 : 27$ .
- Are the following statement true?  $7.5\text{litre} : 15\text{litre} = 5\text{kg} : 10\text{kg}$ .
- Write True or False against the following statement:  $5.2 : 3.9 :: 3 : 4$ .
- If  $2A = 3B = 4C$ , find  $A : B : C$
- Find the ratio of 75 cm to 1.5 m.
- Give two equivalent ratios of 3: 5.
- Fill in the blank box.

$$\frac{3}{8} = \frac{\square}{24}$$

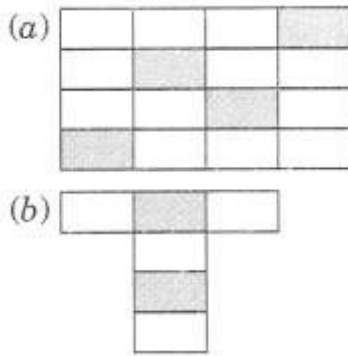
### Short Questions:

1. Check whether the given ratios are equivalent or not.  $\frac{2}{7}, \frac{6}{21}$
2. Divide 60 in the ratio of 2: 3.
3. Find the ratio of the following:
  - (a) 56 to 63.
  - (b) 55 to 120.
4. Ramesh deposited ₹ 2050 in a bank and in the month of January he withdrew ₹ 410 from his account on the last date of the month. Find the ratio of
  - (a) Money withdrawn to the total money deposited.
  - (b) Money withdrawn to the remaining amount in the bank.
5. There are 180 students in a class. Number of girls are 75. Find the ratio of the girls to the number of boys.
6. Green paint is made by mixing blue, yellow and white paints in the ratio 2: 7: 1. How much blue paint is needed to make 64 litres of green paint?
7. From the figure, find the ratio of
  - (a) The number of squares to the number of triangles.
  - (b) The number of circles to the number of rectangles



### Long Questions:

1. In each of the following figures, find the ratio of the shaded region to the unshaded region.



2. Are 20, 25, 12, 15 in proportion?
3. The first, second and fourth terms in a proportion are 32, 112, 217 respectively. Find the third term.
4. Find the value of  $x$ , if
  - (a) 8,  $x$ ,  $x$ , 50 are in proportion.
  - (b) 36, 90, 90,  $x$  are in proportion.
5. The cost of 10 tables is ₹ 7500. Find the number of tables that can be purchased with ₹ 9000.
6. 39 packets of 12 pens each costs ₹ 374.40. Find the cost of 52 packets of 10 pens each.

### Assertion and Reason Questions:

1.) **Assertion (A)** – The cost of a pen is ₹ 10. The cost of 10 pens are ₹ 2.

**Reason (R)** – Two quantities can be compared only if they are in the same unit.

- a) Both A and R are true and R is the correct explanation of A
- b) Both A and R are true but R is not the correct explanation of A
- c) A is true but R is false
- d) A is false but R is true

2.) **Assertion (A)** – The cost of a pen is ₹ 10. The cost of a pencil 1 ₹ 2.

**Reason (R)** – Two quantities can be compared only if they are in the same unit.

- a) Both A and R are true and R is the correct explanation of A
- b) Both A and R are true but R is not the correct explanation of A
- c) A is true but R is false
- d) A is false but R is true



### ANSWER KEY -

#### Multiple Choice questions:

1. (a) 5 times

**Hint:**

$$10 = 5 \times 2$$

2. (a) 2: 3

**Hint:**

$$80000 = 2 \times 40000$$

3. (a) 2:3

**Hint:**



$$\frac{20}{30} = \frac{2}{3} = 2:3$$

4. (a) 1:2

**Hint:**

$$\frac{25}{25 + 25} = \frac{25}{50} = 1:2$$

5. (b) 5:4

**Hint:**

$$\frac{150}{120} = \frac{15}{12} = \frac{5}{4} = 5:4$$

6. (a)

**Hint:**

$$\frac{50,000}{3,00,000} = \frac{1}{6} = 1:6$$

7. (b) 3:1

**Hint:**

$$\frac{6}{2} = \frac{3}{1} = 3:1$$

8. (d) 5:4.

**Hint:**

$$\frac{50}{40} = \frac{5}{4} = 5:4$$

9. (a) 2:5

**Hint:**

$$1 \text{ m} = 100 \text{ cm}$$

$$\frac{40}{100} = \frac{2}{5} = 2:5$$

10. (a) 1:2

**Hint:**

$$\frac{4}{8} = \frac{1}{2} = 1:2$$

11. (c) 6:9

**Hint:**



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$$2:3 = \frac{2}{3} = \frac{2 \times 3}{3 \times 3} = \frac{6}{9} = 6:9$$

12. (a) 1:2

Hint:

$$10:5 = \frac{10}{5} = \frac{10 \div 5}{5 \div 5} = \frac{2}{1} = 2:1$$

$$20 \div 10 = \frac{20}{10} = \frac{20 \div 10}{10 \div 10} = \frac{2}{1} = 2:1$$

$$30 \div 15 = \frac{30}{15} = \frac{30 \div 15}{15 \div 15} = \frac{2}{1} = 2:1$$

13. (d) 3:2

Hint:

$$12:8 = \frac{12}{8} = \frac{12 \div 4}{8 \div 4} = \frac{3}{2} = 3:2$$

14. (c) 1:25

Hint:

$$20:500 = \frac{20}{500} = \frac{1}{25} = 1:25$$

15. (b) 5:12

Hint:

1 hour = 60 minutes

$$25:60 = \frac{25}{60} = \frac{5}{12} = 5:12$$

Match The Following:

	Column I		Column II
1.	13 A ratio equivalent to 3:7	C.	9:21
2.	Simplest form of 21:7 is	A.	3:1
3.	5:4 is equal to	B.	30:24
4.	Ratio of 35:15 is	D.	7:3

Fill in the blanks:

- If 4, a, a, 36 are in proportion then a is equal to **12**.
- 32 m: 64 m:: **6 Sec: 12 Sec**.
- 5:4 = **30:24**.

4. If  $a = 2b$  then  $a : b = \underline{2:1}$ .

### True /False:

1. True
2. False
3. True
4. False

### Very Short Answer:

1.  $X : 6 = 25 : 5$

$$\Rightarrow \frac{X}{6} = \frac{25}{5} \Rightarrow \frac{X}{6} = \frac{25}{5}$$

$$\Rightarrow \frac{X}{6} = \frac{5}{1} \Rightarrow \frac{X}{6} = \frac{5}{1} \text{ (Dividing } \frac{25}{5} \text{ by 5)}$$

$$\Rightarrow X = 5 \times 6 = 30 \Rightarrow X = 5 \times 6 = 30$$

$$\Rightarrow X = 30 \Rightarrow X = 30$$

2. It is given that

Weight of 25 copies = 5 kg

$$\therefore \text{Weight of 1 copy} = 5 \div 25 = \frac{1}{5} \text{ kg}$$

$$\therefore \text{Weight of 30 copies} = 30 \times \frac{1}{5} = 6 \text{ kg}$$

3.  $45\text{km} : 60\text{km} = \frac{45}{60} = \frac{45 \div 15}{60 \div 15} [\because \text{H.C.F.}(45, 60) = 15] = \frac{3}{4} = 3 : 4$

$$12 \text{ hours} : 15 \text{ hours} = \frac{12}{15} = \frac{12 \div 3}{15 \div 3} [\because \text{H.C.F.}(12, 15) = 3] = \frac{4}{5} = 4 : 5$$

Since, the two ratios are not equal, therefore the given statement is false(F).

4.  $24 : 27 = \frac{24}{27} = \frac{24 \div 3}{27 \div 3} [\because \text{H.C.F.}(24, 27) = 3] = \frac{8}{9} = 8 : 9$

$$8 : 9 = 24 : 27$$

$\therefore 8 : 9 :: 24 : 27$  is true(T).

5. 7.5 liter: 15 liter

$$= \frac{7.5}{15} = \frac{7.5 \times 10}{15 \times 10} = \frac{75}{150} = \frac{75 \div 75}{150 \div 75} = \frac{7.5}{15} = \frac{7.5 \times 10}{15 \times 10} = \frac{75}{150} = \frac{75 \div 75}{150 \div 75} [\because \text{H.C.F.}(75, 150) = 75] = \frac{1}{2} = 1 : 2$$

$$5\text{kg} : 10\text{kg} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5} [\because \text{H.C.F.}(5, 10) = 5] = \frac{1}{2} = \frac{1}{2} = 1 : 2$$

Since, the two ratios are equal, therefore, the given statement is true (T).

- 6.

$$5.2 : 3.9 = \frac{5.2}{3.9} = \frac{5.2 \times 10}{3.9 \times 10} = \frac{52}{39} = \frac{52 \div 13}{39 \div 13} = \frac{5.2}{3.9} \quad [\therefore \text{H.C.F.}(52, 39) = 13]$$

$$= \frac{4}{3} = 4 : 3$$

$$\therefore 4 : 3 \neq$$

$\therefore 5.2 : 3.9 :: 3 : 4$  is false (F) .

7. Let  $2A = 3B = 4C = x$

$$\text{So, } A = \frac{x}{2}, B = \frac{x}{3}, C = \frac{x}{4}$$

The L.C.M of 2, 3 and 4 is 12

$$\text{Therefore, } A:B:C = \frac{x}{2} \times 12 : \frac{x}{3} \times 12 : \frac{x}{4} \times 12 = 6x : 4x : 3x = 6 : 4 : 3$$

Therefore  $A:B:C = 6:4:3$ .

8. The given numbers are not in the same units. So, converting them into same units.

$$1.5 \text{ m} = 1.5 \times 100 \text{ cm} = 150 \text{ cm}$$

$$[\because 1 \text{ m} = 100 \text{ cm}]$$

$\therefore$  The required ratio is 75 cm : 150 cm.

$$= \frac{75}{150} = \frac{75 \div 75}{150 \div 75} = \frac{1}{2}$$

$\therefore$  Required ratio = 1 : 2

9.

$$\text{Ratio } 3 : 5 = \frac{3}{5} = \frac{3 \times 3}{5 \times 3} = \frac{9}{15}$$

$$\text{Similarly } 3 : 5 = \frac{3}{5} = \frac{3 \times 2}{5 \times 2} = \frac{6}{10}$$

Thus, 9 : 15 and 6 : 10 are the two equivalent ratios of 3 : 5.

10.

$$\text{We have } \frac{3}{8} = \frac{\square}{24}$$

$$\Rightarrow 8 \times \square = 3 \times 24 \Rightarrow \square = \frac{3 \times 24}{8} = 9$$

$$\text{Thus } \square = 9$$

### Short Answer:

1.

We have  $\frac{2}{7}, \frac{6}{21}$

LCM of 7 and 21 = 21

$$\therefore \frac{2 \times 3}{7 \times 3}, \frac{6 \times 1}{21 \times 1} = \frac{6}{21}, \frac{6}{21}$$

$$\text{Thus } \frac{6}{21} = \frac{6}{21}$$

$\therefore$  They are equivalent ratios.

2. Sum = 2 + 3 = 5

$$\therefore \text{First part} = \frac{2}{5} \times 60 = 24$$

$$\therefore \text{Second part} = \frac{3}{5} \times 60 = 36$$

Thus, the required two parts = 24 and 36.

3.

$$(a) \text{ We have 56 to 63} = \frac{56}{63} = \frac{56 \div 7}{63 \div 7} = \frac{8}{9} = 8 : 9$$

[HCF of 56 and 63 = 7]

$$(b) \text{ We have 55 to 120}$$

$$= \frac{55}{120} = \frac{55 \div 5}{120 \div 5} = \frac{11}{24} = 11 : 24$$

[HCF of 55 and 120 = 5]

4. Total money deposited = ₹ 2050

Amount of money withdrawn = ₹ 410

Amount of money left in the bank = ₹ 2050 – ₹ 410 = ₹ 1640

(a) Ratio of money withdrawn to the total money deposited

$$= \frac{\text{Amount withdrawn}}{\text{Amount deposited}} = \frac{410}{2050} = \frac{1}{5}$$

$\therefore$  Required ratio = 1 : 5

(b) Ratio of money withdrawn to the money left in the bank

$$= \frac{\text{Amount withdrawn}}{\text{Amount left}} = \frac{410}{1640} = \frac{1}{4}$$

$\therefore$  Required ratio = 1 : 4

5. Total number of students = 180

Number of girls = 75

Number of boys =  $180 - 75 = 105$

$\therefore$  Ratio of number of girls to the number of boys

$$= \frac{\text{Number of girls}}{\text{Number of boys}} = \frac{75}{105} = \frac{75 \div 15}{105 \div 15} = \frac{5}{7}$$

Required ratio = 5: 7

6. Here, sum of ratios =  $2 + 7 + 1 = 10$

$\therefore$  Total quantity of green paint = 64 litres

Quantity of blue paint =  $\frac{2}{10} \times 64 = 12.8$  litres

Therefore, the required blue paint = 12.8 litres.

7. (a) Number of squares = 2

Number of triangles = 3

$\therefore$  Ratio =  $\frac{2}{3}$  or 2: 3

(b) Number of circles = 3

Number of rectangles = 3

$\therefore$  Ratio =  $\frac{3}{3}$  or 1: 1

### Long Answer:

1. (a) Number of shaded parts = 4

Number of unshaded parts = 12

$$\therefore \text{Ratio} = 4 : 12 = \frac{4}{12} = \frac{4 \div 4}{12 \div 4} = \frac{1}{3}$$

Required ratio = 1: 3

(b) Number of shaded parts = 2

Number of unshaded parts = 4

$$\therefore \text{Ratio} = 2 : 4 = \frac{2}{4} = \frac{2 \div 2}{4 \div 2} = \frac{1}{2}$$

Required ratio = 1: 2

2. We have 20, 25, 12, 15

Product of extremes =  $20 \times 15 = 300$

Product of middles =  $25 \times 12 = 300$

Since both the products are same.

∴ The four numbers 20, 25, 12, 15 are in proportion.

3. Let the third term be  $x$ .

∴ 32, 112,  $x$  and 217 are in proportion.

∴ 32: 112::  $x$ : 217

$$\text{or } \frac{32}{112} = \frac{x}{217}$$

$$\Rightarrow 112 \times x = 32 \times 217$$

$$\Rightarrow x = \frac{32 \times 217}{112} = 62$$

Thus, the third term = 62.

4. (a) Since 8,  $x$ ,  $x$ , 50, are in proportion.

∴  $x \times x = 8 \times 50$

$$\Rightarrow x^2 = 400$$

∴  $x = 20$

(b) Since 36, 90, 90,  $x$  are in proportion.

∴  $36 \times x = 90 \times 90$

$$\Rightarrow x = \frac{90 \times 90}{36} = 225$$

∴  $x = 225$

5. Number of tables purchased in ₹ 7500 = 10

Number of tables purchased in ₹ 1 =  $\frac{10}{7500}$

∴ Number of tables purchased in ₹ 9000

$$= \frac{10 \times 9000}{7500} = 12$$

6. Number of pens in 1 packet = 12

Number of pens in 39 packets =  $12 \times 39 = 468$

Number of pens in 1 packet = 10

Number of pens in 52 packets =  $10 \times 52 = 520$

Now cost of 468 pen = ₹ 374.40

$$\text{Cost of 1 pen} = ₹ \frac{374.40}{468}$$

$$\therefore \text{Cost of 520 pens} = ₹ \frac{374.40}{468} \times 520 = ₹ 416.$$

**Assertion and Reason Answers:**

1) d) A is false but R is true

2) a) Both A and R are true and R is the correct explanation of A



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