Mathematics

Chapter 12: Ratio and Proportion

RATIO AND PROPORTION

Mathematical numbers used in comparing two things which are similar to each other in terms of units are ratios. A ratio can be written in three different ways viz, x to y, x: y and

$$\frac{x}{y}$$

but read as the ratio of x to y.

For example:

The ratio of 4 to 5 is 4: 5.

Ram's weight is 40 kgs and Ali's weight is 80 kgs. To find out the ratio of Ram's weight to Ali's weight we need to divide Ram's weight to Ali's weight. Therefore, the ratio between Ram's and Ali's weight is

$$\frac{40}{80}$$

= 1:2

Comparing things similar to each other is the concept of ratio. And when two ratios are the same, they are said to be in proportion to each other. It is represented by the symbol '::' or '='.

Golden ratio

Two quantities are in the golden ratio if their ratio is the same as the ratio of their sum to larger of the two quantities.

If two numbers a and b are in golden ratio, then

$$\frac{a+b}{a} = \frac{a}{b}$$

It is approximately equal to 1.618.

Ratio

- The ratio is the comparison of a quantity with respect to another quantity.
- It is denoted by ":".
- Two quantities can be compared only if they are in the same unit.

Example: Father's age is 75 years and the daughter's age is 25 years.

⇒The ratio of father's age to daughter's age

$$\Rightarrow \frac{Fathers's Age}{Daughter's Age} = \frac{3}{1} = 3:1$$

Difference between fractions and ratios

- A fraction describes a part of a whole and its denominator represents the total number of parts.

- Example: 13 means one part out of 3 parts.
- A ratio is a comparison of two different quantities.
- Example: In a society, 10 people like driving, 20 people like swimming and the total number of people in society is 30.
- The ratio of the number of people liking driving to the total number of people = 10:30.
- The ratio of the number of people liking swimming to the number of people liking driving is 20:10.

Same ratio in different situations

Ratios can remain same in different situations.

Example:

1. $\frac{Weight of Joe}{Weight of James} = \frac{50}{100} = 1:2$
2. $\frac{Number of Girls}{Number of Boys} = \frac{50}{100} = 1:2$

Here, both the above ratios are equal.

Comparing quantities using ratios

Quantities can be compared using ratios.

Example: Joe worked for 8 hours and James worked for 2 hours. How many times Joe's working hours

is of James' working hours?

Solution: Working hours of Joe = 8 hours

⇒Working hours of Sheela = 2 hours

⇒The ratio of working hours of Joe to Sheela = $\frac{8}{2} = 4$

Therefore, Joe works four times more than James.

To know more about Comparison of Ratios,

Comparison of Ratios

Let us consider a problem statement to understand the concept of comparison of ratios.

Statement: An architect states that the buildings that have the ratio of span to height more than 1:4 is only feasible. The dimensions of the plans of various buildings are laid before him. See the table below.

Read: Ratio and Proportion

Let us find out the span to height ratios for all the buildings in the simplest form.

Building A, Height 100 m, Span 60 m

Building B, Height 300 m, Span 60 m

Building C, Height 300 m, Span 100 m

Building A = 3/5

Building B = 1/5

Building C = 1/3

Compare this with the ratio given by the architect.

For Building A,

$$\frac{3}{5}\ ??\ \frac{1}{4}$$

The question mark above can be anything, >, < or =.

Cross multiplying the terms,

$$(3 \times 4)\ ??\ (5 \times 1)$$

We get,

12 > 5

Hence we can say ratio ¾ is greater than¼. According to the problem statement, this satisfies the criteria as per the architect. Therefore Building A is feasible.

Similarly calculating for other buildings, for Building B, we find that 1/5 is less than ¼ and for Building C, 1/3 is greater than ¼. Hence Buildings A and C are feasible while building B is not feasible.

Concept of comparison of ratios is used for the design of aeroplanes to tall buildings to large ships.

Equivalent Ratios

When the given ratios are equal, then these ratios are called as equivalent ratios.

Equivalent ratios can be obtained by multiplying and dividing the numerator and denominator with the same number.

Example: Ratios 10:30 (=1:3) and 11:33 (=1:3) are equivalent ratios.

Unitary Method

The method in which first we find the value of one unit and then the value of required number of units is known as Unitary Method.

Example: Cost of two shirts in a shop is Rs.200. What will be the cost of 5 shirts in the shop?

Solution: Cost of 2 shirts = Rs.200

⇒ Cost of 1 shirt = $\frac{200}{2} = 100$

⇒Cost of 5 shirts =

$$\left(\frac{200}{2}\right) \times 5 = 100 \times 5$$

= Rs. 500

Proportions

If two ratios are equal, then they are said to be in proportion.

Symbol "::" or "=" is used to equate the two ratios.

Example: Ratios 2:3 and 6:9 are proportional.

⇒ 2:3 :: 6:9 or 2:3 = 6:9

The unitary method is a method in which you find the value of a unit and then the value of a required number of units. What can units and values be?

Suppose you go to the market to purchase 6 apples. The shopkeeper tells you that he is selling 10 apples for Rs 100. In this case, the apples are the units, and the cost of the apples is the value. While solving a problem using the unitary method, it is important to recognize the units and values.

For simplification, always write the things to be calculated on the right-hand side and things known on the left-hand side. In the above problem, we know the amount of the number of apples and the value of the apples is unknown. It should be noted that the concept of ratio and proportion is used for problems related to this method.

Example of Unitary Method

Consider another example; a car runs 150 km on 15 litres of fuel, how many kilometres will it run on 10 litres of fuel?

In the above question, try and identify units (known) and values (unknown).

Kilometre = Unknown (Right Hand Side)

No of litres of fuel = Known (Left Hand Side)

Now we will try and solve this problem.

15 litres = 150 km

1 litre = 150/15 = 10 km

10 litres = 10 x 10 = 100 km

The car will run 100 kilometres on 10 litres of fuel.

Unitary Method in Ratio and Proportion

If we need to find the ratio of one quantity with respect to another quantity, then we need to use the unitary method. Let us understand with the help of examples.

Example: Income of Amir is Rs 12000 per month, and that of Amit is Rs 191520 per annum. If the monthly expenditure of each of them is Rs 9960 per month, find the ratio of their savings.

Solution: Savings of Amir per month = Rs (12000 – 9960) = Rs 2040

In 12 month Amit earn = Rs.191520

Income of Amit per month = Rs 191520/12 = Rs. 15960

Savings of Amit per month = Rs (15960 – 9960) = Rs 6000

Therefore, the ratio of savings of Amir and Amit = 2040:6000 = 17:50

Types of Unitary Method

In the unitary method, the value of a unit quantity is calculated first to calculate the value of other units. It has two types of variations.

Direct Variation

Inverse Variation

Direct Variation

In direct variation, increase or decrease in one quantity will cause an increase or decrease in another quantity. For instance, an increase in the number of goods will cost more price.

Also, the amount of work done by a single man will be less than the amount of work done by a group of men. Hence, if we increase the number of men, the work will increase.

Indirect Variation

It is the inverse of direct variation. If we increase a quantity, then the value of another quantity gets decrease. For example, if we increase the speed, then we can cover the distance in less time. So, with an increase in speed, the travelling time will decrease.

Applications of Unitary Method

The unitary method finds its practical application everywhere ranging from problems of speed, distance, time to the problems related to calculating the cost of materials.

The method is used for evaluating the price of a good.

It is used to find the time taken by a vehicle or a person to cover some distance in an hour.

It is used in business to determine profit and loss.

Uses of ratios and proportions

Example: Suppose a man travelled 80 km in 2 hours, how much time will he take to travel 40 km?

Solution: If x is the required time, then the proportion is

80:2::40:x.

$$\frac{80}{2} \times \frac{40}{x}$$

80x = 80

X = 1 hour

So, the man takes one hour to complete 40 km.

Ratio and Proportion in Maths

The definition of ratio and proportion is described here in this section. Both concepts are an important part of Mathematics. In real life also, you may find a lot of examples such as the rate of speed (distance/time) or price (rupees/meter) of a material, etc, where the concept of the ratio is highlighted.

Proportion is an equation that defines that the two given ratios are equivalent to each other. For example, the time taken by train to cover 100km per hour is equal to the time taken by it to cover the distance of 500km for 5 hours. Such as 100km/hr = 500km/5hrs.

Ratio Meaning

In certain situations, the comparison of two quantities by the method of division is very efficient. We can say that the comparison or simplified form of two quantities of the same kind is referred to as a ratio. This relation gives us how many times one quantity is equal to the other quantity. In simple words, the ratio is the number that can be used to express one quantity as a fraction of the other ones.

The two numbers in a ratio can only be compared when they have the same unit. We make use of ratios to compare two things. The sign used to denote a ratio is ':'.

A ratio can be written as a fraction, say 2/5. We happen to see various comparisons or say ratios in our daily life.

Hence, the ratio can be represented in three different forms, such as:

Proportion

Proportion is an equation that defines that the two given ratios are equivalent to each other. In other words, the proportion states the equality of the two fractions or the ratios. In proportion, if two sets of given numbers are increasing or decreasing in the same ratio, then the ratios are said to be directly proportional to each other.

For example, the time taken by train to cover 100km per hour is equal to the time taken by it to cover the distance of 500km for 5 hours. Such as 100km/hr = 500km/5hrs.

Ratio and proportions are said to be faces of the same coin. When two ratios are equal in value, then they are said to be in proportion. In simple words, it compares two ratios. Proportions are denoted by the symbol '::' or '='.

The proportion can be classified into the following categories, such as:

Direct Proportion

Inverse Proportion

Continued Proportion

Direct Proportion

The direct proportion describes the relationship between two quantities, in which the increases in one quantity, there is an increase in the other quantity also. Similarly, if one quantity decreases, the other quantity also decreases. Hence, if "a" and "b" are two quantities, then the direction proportion is written as $a \propto b$.

Inverse Proportion

The inverse proportion describes the relationship between two quantities in which an increase in one quantity leads to a decrease in the other quantity. Similarly, if there is a decrease in one quantity, there is an increase in the other quantity. Therefore, the inverse proportion of two quantities, say "a" and "b" is represented by $a \propto (1/b)$.

Continued Proportion

Consider two ratios to be a: b and c: d.

Then in order to find the continued proportion for the two given ratio terms, we convert the means to a single term/number. This would, in general, be the LCM of means.

For the given ratio, the LCM of b & c will be bc.

Thus, multiplying the first ratio by c and the second ratio by b, we have

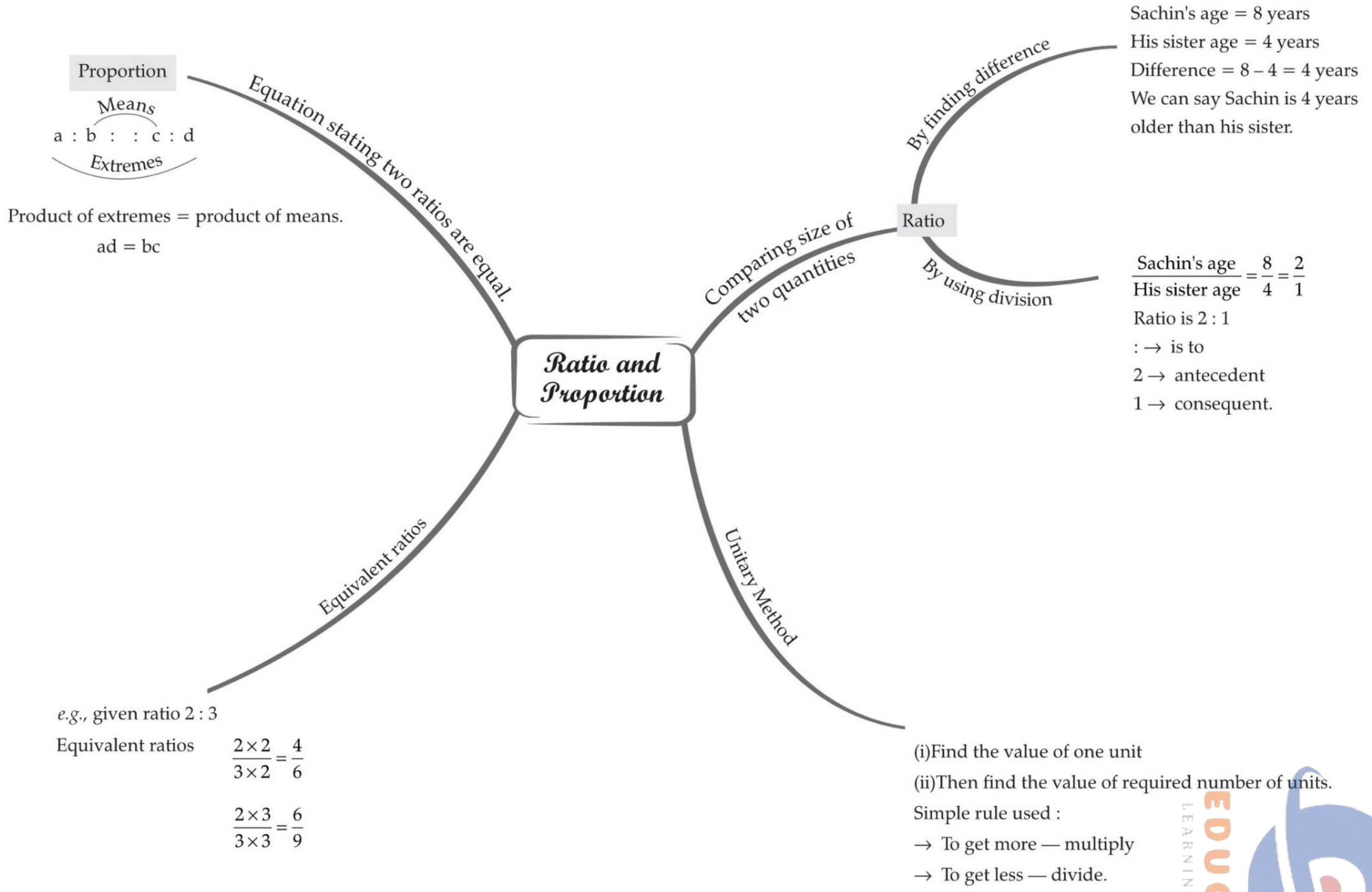
First ratio- ca:bc

Second ratio- bc: bd

Thus, the continued proportion can be written in the form of ca: bc: bd

MIND MAP : LEARNING MADE SIMPLE

CHAPTER-12



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?

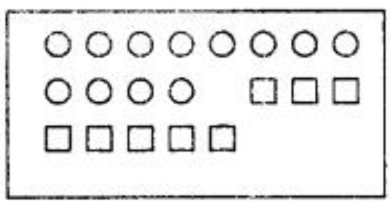
(a) 1:2

(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:

1. If 4, a, a, 36 are in proportion then a is equal to ____.
2. 32 m: 64 m:: ____.
3. 5: 4 = ____.
4. If a = 2b then a: b = ____.

True /False:

1. A ratio equivalent to 3:7 is 9: 21.
2. The ratio 35: 84 in simplest form is 7: 12.
3. A ratio can be equal to 1.
4. 5: 2 = 2: 5.

Very Short Questions:

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

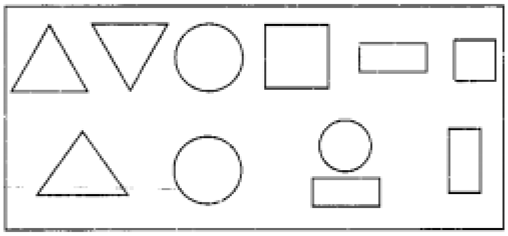
5. There are 180 students in a class. Number of girls are 75. Find the ratio of the girls to the number of boys.

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

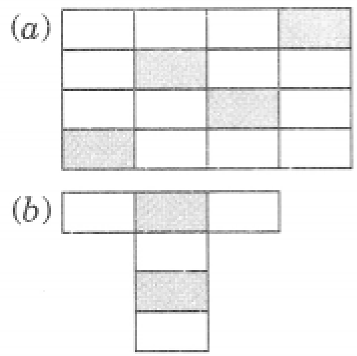
(a) The number of squares to the number of triangles.

(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 × 2

2. (a) 2: 3

Hint:

80000 = 2 × 40000

3. (a) 2:3

Hint:

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

4. (a) 1:2

Hint:

$$\frac{25}{25+25} = \frac{25}{50} = 12 = 1:2$$

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 m = 100 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:

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

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
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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:

1. If 4, a, a, 36 are in proportion then a is equal to **12**.
2. 32 m: 64 m:: **6 Sec: 12 Sec**.
3. 5: 4 = **30: 24**.
4. If a = 2b then a: b = **2: 1**.

True /False:

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

Very Short Answer:

1. X: 6 = 25: 5

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

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

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

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

2. It is given that

Weight of 25 copies = 5 kg

∴ Weight of 1 copy = 5 ÷ 25 = $\frac{1}{5}$ kg

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

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

12 hours: 15 hours $= \frac{12}{15} = \frac{12 \div 3}{15 \div 3}$ [∴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. $24:27 = \frac{24}{27} = \frac{24 \div 3}{27 \div 3}$ [∴H.C.F.(24, 27) = 3] $= \frac{8}{9} = 8:9$

8: 9 = 24: 27

∴ 8: 9:: 24: 27 is true(T).

5. 7.5 liter: 15 liter

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

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

$5\text{kg} : 10\text{kg} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5} = \frac{5}{10} = \frac{5 \div 5}{10 \div 5}$ [∴∵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.

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

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

∴ $4:3 \neq$

∴ 5.2 : 3.9 : : 3 : 4 is false (F) .

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

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

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

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 m = 1.5 × 100 cm = 150 cm

[∵ 1 m = 100 cm]

∴ The required ratio is 75 cm: 150 cm.

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

∴ Required ratio = 1: 2

9.

Ratio $3:5 = \frac{3}{5} = \frac{3\times3}{5\times3} = \frac{9}{15}$

Similarly $3:5 = \frac{3}{5} = \frac{3\times2}{5\times2} = \frac{6}{10}$

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

10.

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

$\Rightarrow 8 \times \square = 3 \times 24 \quad \Rightarrow \square = \frac{3\times24}{8} = 9$

Thus $\square = 9$

Short Answer:

1.

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

LCM of 7 and 21 = 21

$\therefore \quad \frac{2\times3}{7\times3}, \frac{6\times1}{21\times1} = \frac{6}{21}, \frac{6}{21}$

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

∴ They are equivalent ratios.

2. Sum = 2 + 3 = 5

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

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

Thus, the required two parts = 24 and 36.

3.

(*a*) We have 56 to 63 $= \frac{56}{63} = \frac{56\div7}{63\div7} = \frac{8}{9} = 8:9$

[HCF of 56 and 63 = 7]

(*b*) We have 55 to 120

$= \frac{55}{120} = \frac{55\div5}{120\div5} = \frac{11}{24} = 11:24$

[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

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

∴ Required ratio = 1: 5

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

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

∴ Required ratio = 1: 4

5. Total number of students = 180

Number of girls = 75

Number of boys = 180 – 75 = 105

∴ 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

∴ 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 2

∴ Ratio $= \frac{2}{3}$ or 2: 3

(b) Number of circles = 3

Number of rectangles = 3

∴ Ratio $= \frac{3}{3}$ or 1: 1

Long Answer:

1. (a) Number of shaded parts = 4

Number of unshaded parts = 12

$\therefore$ 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

$\therefore$ 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 × 15 = 300

Product of middles = 25 × 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

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 × x = 8 × 50

$\Rightarrow x^2 = 400$

∴ x = 20

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

∴ 36 × x = 90 × 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

$$= \frac{10 \times 9000}{75000} = 12$$

6. Number of pens in 1 packet = 12

Number of pens in 39 packets = 12 × 39 = 468

Number of pens in 1 packet = 10

Number of pens in 52 packets = 10 × 52 = 520

Now cost of 468 pen = ₹ 374.40

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

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

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