

Ratio and Proportion

1. Ratio:

The ratio of two quantities a and b in the same units, is the fraction $\frac{a}{b}$ and we write it as $a : b$.

In the ratio $a : b$, we call a as the first term or **antecedent** and b , the second term or **consequent**.

Eg. The ratio $3 : 4$ represents $\frac{3}{4}$ with antecedent = 3, consequent = 4.

Rule: The multiplication or division of each term of a ratio by the same non-zero number does not affect the ratio.

Eg. $4 : 5 = 8 : 10 = 12 : 15$. Also, $4 : 6 = 2 : 3$

2. Proportion:

The equality of two ratios is called proportion.

If $a : b = c : d$, we write $a : b :: c : d$ and we say that a, b, c, d are in proportion.

Here a and d are called **extremes**, while b and c are called **mean terms**.

Product of means = Product of extremes.

Thus, $a : b :: c : d \Leftrightarrow (b \times c) = (a \times d)$.

3. Fourth Proportional:

If $a : b = c : d$, then d is called the fourth proportional to a, b, c .

Third Proportional:

$a : b = c : d$, then c is called the third proportion to a and b .

Mean Proportional: Mean proportional between a and b is square root of ab .

4. Comparison of Ratios:

We say that $(a : b) > (c : d) \Leftrightarrow \frac{a}{b} > \frac{c}{d}$.

1. 25% of A is same as 40% of B. Find the ratio A:B

2. What same number must be added to each term of the ratio 9:16 to make 2:3?

3. A vessel is partially filled with a mixture of 91 litres of milk and water in the ratio of 6:7. Find the quantity of water to be added to change the ratio to 3:5.
4. The ratio of income of A to that of B is 3:5. After sometime the income is increased by Rs 600 and the ratio changes to 7:9. Find the income of A initially.
5. Rs 195 contained in a box consists of one rupee, 50 paise and 25 paise coin in the ratio of 5:6:7. Find the number of 50 paise coins.
6. Three vessels of equal capacity contain mixture of milk and water in ratio 5:3, 5:1, 1:2 respectively. If all the solutions are mixed find the final ratio?
7. If $A:B = 1:3$, $B:C = 6:5$, what is the value of $A:B:C$?
8. Two numbers are in the ratio 2:7. If each number is increased by 10, the ratio changes to 3:8. What are the two numbers?
9. In a mixture of 45 litres, milk and water are in the ratio 4:1. If 9 litres of water is added, what will be the ratio of milk and water in the final mixture?
10. Three numbers are in the ratio 3:4:5 such that the sum of their squares is 200. What is the middle number?
11. Rs 910 is divided among A, B and C so that thrice the share of A is equal to twice of B which is equal to four times that of C. What is the share of A?
12. A mixture contains alcohol and water in the ratio 4:3. If 5 litres of water is added to the mixture, the ratio becomes 4:5. Find the quantity of alcohol in the given mixture.
13. Two numbers are in the ratio 3:5. If 9 is subtracted from each, the new numbers are in the ratio 12 : 23. The smaller number is?