

Ratio and Proportion

Ratio:

Fraction which is used to compare 2 quantities of same units. i.e ratio of 2 number a and b is $\frac{a}{b}$, where $b \neq 0$.

The fraction $\frac{a}{b}$ can be represented as $a:b$

Different types of ratios :

- 1) **Duplicate ratio:** duplicate ratio of $a : b$ is $a^2 : b^2$
- 2) **Sub-duplicate ratio:** sub-duplicate ratio of $a:b$ is $\sqrt{a} : \sqrt{b}$
- 3) **Triplicate ratio:** triplicate ratio of $a:b$ is $a^3 : b^3$
- 4) **Sub- Triplicate ratio:** sub-triplicate ratio of $a:b$ is $\sqrt[3]{a} : \sqrt[3]{b}$
- 5) **Compound ratio:** Compound ratio of $a : x, b : y, c : z$ is $abc : xyz$
- 6) **Inverse ratio:** Inverse ratio of $a:b$ is $b:a$.

Proportion: Proportion is the equality of two ratios. i.e. If $a:b = c:d$ then a,b,c,d are in proportion and written as $a:b :: c:d$

1. In $a : b :: c : d$, 'a' and 'd' are called **extremes** and 'b' and 'c' are called **mean terms**.

2. Product of means = Product of extremes i.e. : If $\frac{a}{b} = \frac{c}{d}$ then $ad = bc$

3. Mean proportion: Mean proportion between a and b is given as \sqrt{ab}

4. If a,b and c are in continuous proportion then $\frac{a}{b} = \frac{b}{c}$

5. If a,b,c and d are in discontinuous proportion then $\frac{a}{b} = \frac{c}{d}$

Numerical problem :

1. find the ratio of 1kg and 300 gm.
2. if $\frac{a}{b} = \frac{2}{3}$, $\frac{b}{c} = \frac{4}{3}$ and $\frac{c}{d} = \frac{6}{10}$ then find $\frac{a}{d}$
3. find the mean proportion between 2 and 72
4. the ratio of number of boys and girls is 2:3. If the number of girls is 45 then find the number of boys.
5. if 2,3 and x are in continuous proportion then find the value of x (third proportion)
6. The ratio of two numbers is 5:9. If each number is decreased by 5, the ratio becomes 5:11. Find the numbers.
7. If the ratio of present ages of Ram and hari is 5:7 and after 6 years the ratio will be 3:4, what is the present ram and hari?
8. Rs. 8400 is divided among A, B, C and D in such a way that the shares of A and B, B and C, and C and D are in the ratios of 2:3, 4:5 and 6:7 respectively. find the share of A.

9. Price of each article of type P, Q, and R is Rs. 300, Rs. 180 and Rs. 120 respectively. Suresh buys articles of each type in the ratio 3:2:3 in Rs. 6480. How many articles of type Q did he purchase?
10. It was intended that Rs. 585 be divided among P, Q and R in the ratio of 4 : 3 : 2, but by mistake the distribution was made in the proportion of $\frac{1}{4} : \frac{1}{3} : \frac{1}{2}$. How much does 'R' gain by the error ?
11. In a mixture of 13 litres, the ratio of milk and water is 3 : 2. If 3 liters of this mixture is replaced by 3 liters of milk, then what will be the ratio of milk and water in the newly formed mixture?
12. A bag contains equal number of 25 paisa, 50 paisa and one rupee coins respectively. If the total value is Rs 105, how many types of each type are present?
13. If two types of rice of price 100 and 80 per kg. are mixed in the ratio 2:3 then find the price of mixed rice per kg.
14. The ratio of milk and water in 150 liter of mixture is 2:3. How much liter milk should be added to make the ratio 3:2.