

11. Ratio and Proportion

- In many situations, comparison between quantities is made by using division i.e., by observing how many times one quantity is in relation to the other quantity. This comparison is known as **ratio**. We denote it by using the symbol ‘:’.
- A ratio may be treated as a fraction. For example, 3:11 can be treated as $\frac{3}{11}$.

- We can compare two quantities in terms of ratio, if these quantities are in the same unit. If they are not, then they should be expressed in the same unit before the ratio is taken.

For example, if we want to compare 70 paise and Rs 3 in terms of ratio then we have to convert Rs 3 into paise.

Rs 3 = 300 paise

Hence, required ratio $\frac{70}{300} = 7:30$

- The same ratio may occur in different situations.

To understand this concept, let us consider the following situations.

- Distances of Lata’s home and Ravi’s home from their school are 12 km and 21 km respectively. Therefore, the ratio of the distance of Lata’s home to the distance of Ravi’s home from their school is $\frac{12}{21} = \frac{12 \div 3}{21 \div 3} = \frac{4}{7} = 4:7$
- Neha has Rs 20 and Saroj has Rs 35. Therefore, the ratio of the amount of money that Neha has to that of Saroj is $\frac{20}{35} = \frac{20 \div 5}{35 \div 5} = \frac{4}{7} = 4:7$

In this way, we can come across many situations where the ratio would be 4:7.

- The order of ratio is important.

For example, let us consider that the length and breadth of a rectangle are 80 m and 30 m respectively. The ratio of length to the breadth of rectangle is $\frac{80}{30}$. This ratio can be written as 8: 3. However, it cannot be written as 3:8.

Therefore, the order in which quantities are taken to express their ratio is important.

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

Example:

If 15 men can do a piece of work in 10 days, then in how many days can 6 men do the same work?

Solution:

This is the case of indirect variation since more the number of men, less will be the number of days required to finish the work.

It is given that 15 men can do the work in 10 days.

∴ One man can do the work in (10×15) days.

Hence, 6 men can do the work in $\frac{10 \times 15}{6}$ days = 25 days