

In algebra, the proportion is widely used to solve various kinds of mathematical problems. It is based on the ratios (p: q) & fractions (p/q). The fraction is a term or away to write numbers in the form of p/q, where p & q are the integers and q is not equal to zero.

There are several kinds of problems in our daily life that are solved by using the ratio & proportion. In this article, we will study the definition, formula, types, and examples of proportion.

## What is the proportion?

In algebra, an equation that is equal to two ratios is known as proportion. The proportion is a part from the whole of several things. The ratio plays a vital role in it because proportion is totally dependent on the ratios.

In simple words, a [proportion](#) is the comparison of two numbers, fractions, or ratios. The set of ratios can be increasing or decreasing. When both sets are increasing or decreasing it is called a direct proportion.

While if the set of ratios is increasing and decreasing, in the same way, is said to be the inverse proportion. The set of ratios is separated by  $∝$  to denote a proportion. Proportions are also denoted with an equality sign  $∝ = ∝$  among the fractions.

For example, a bus that covers a distance of 35 kilometers per hour is equal to the distance covered by a car covering 90 kilometers per hour. i.e., 35 kilometers/per hour = 85 kilometers/per hour.

## The formula of the proportion

You must be familiar with the equation of ratio to use the formula of proportion. Below is the general equation of the ratio.

**a : b or a/b**

Where a & b are the integers. the ratio can be written in the form of a fraction by taking the first term of the ratio as a numerator, while the second term as a denominator. In algebra, the first term of the ratio is known as antecedent. While the other term is known as consequent. The formula of the proportion can be written by using two sets of ratios or two ratios. Let the ratios be a : b & c : d. write these ratios with the proportion sign  $∝$  among them.

a : b :: c : d

The formula of the proportion can also be written in the form of fractions with an equality sign among them.

$$a/b = c/d$$

in proportion, there are two kinds of terms as the inner terms b & c are known as mean terms. While the outer terms a & d are known as extreme terms.

## Different methods to write the formula of proportion

Here are some methods or ways to write the formula of the proportion.

- $a/b = c/d = ad = bc$
- $a/b = c/d = b/a = d/c$
- $a/b = c/d = a/c = b/d$
- $a/b = c/d = (a + b)/b = (c + d)/d$
- $a/b = c/d = (a - b)/b = (c - d)/d$

## Types of the proportion

The proportion is of two types i.e., direct proportion & inverse proportion. Let's discuss these types of proportions briefly.

## 1. Inverse proportion

The proportion in which the increase in the first term causes the decrease in the second term or a decrease in the first term causes an increase in the second term is called inverse proportion. In other words, a proportion that is not direct is known as an indirect proportion.

## 2. Direct proportion

The proportion in which the increase in the first term causes the increase in the second term or a decrease in the first term causes a decrease in the second term is said to be the direct proportion. For example, if the speed of a car decrease it covers less time in the fixed time.

## How to solve the problems of ratios & proportion?

The problems of ratios and proportion can be solved easily either by using the formulas or a [proportion calculator](#). This tool finds the result of the given problem in a fraction of seconds with steps. Follow the below examples to learn how to solve the problems of the proportion & ratios.

### Example I

28 buses are required to bring the workers of a factory in a week, how many buses are required to bring the same number of workers in five days.

### Solution

**Step I:** Write the given data of buses and days.

Buses required to bring the workers of a factory in a week = 28

Buses required to bring the workers of a factory in five days = x

**Step 2:** Write the formula of the proportion and write the data of buses & days according to the formula.

$a : b :: c : d$

buses : days :: buses : days

$28 : 7 :: x : 5$

**Step 3:** Write the ratios in the form of fractions and put an equality sign among them.

$28/7 = x/5$

**Step 4:** Simplify the above expression to find the value of x.

$28/7 = x/5$

$(28/7) * 5 = x$

$(4/1) * 5 = x$

$4 * 5 = x$

$X = 4 * 5$

$X = 20$

Hence, 20 more buses are required to bring the same number of workers.

Buses required to bring the workers of a factory in five days =  $28 + 20 = 48$

### Example II

In a wooden box, there are 30 vegetables. From these 30 vegetables, 8 are carrots, 4 are tomatoes, 6 are cabbage, and 12 are turnips. Find the ratio of:

- Carrot to tomatoes
- Cabbage to total vegetables
- Turnip to tomatoes
- Cabbage to tomatoes

### Solution

**Step I:** First of all, write the number of vegetables.

Total Vegetables = 30

Tomatoes = 4

Carrot = 8

Cabbage = 6

Turnip = 12

**Step II:** Now find the ratio of carrots to tomatoes.

Number of carrots = 8

Number of tomatoes = 4

The ratio is,  $8 : 4 = 4 : 2 = 2 : 1$

or

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

**Step III:** Determine the ratio of cabbage to total vegetables.

Number of total vegetables = 30

Number of cabbage = 6

Subtract the total vegetables from cabbage to find the difference =  $30 - 6 = 24$

Now the ratio is,

$6 : 24 = 3 : 12 = 1 : 4$

Or

$\frac{6}{24} = \frac{3}{12} = \frac{1}{4}$

**Step IV:** Now find the ratio of turnip to tomatoes.

Number of turnip = 12

Number of tomatoes = 4

Ratio is,

$$12 : 4 = 6 : 2 \Rightarrow 3 : 1$$

Or

$$12/4 = 6/2 \Rightarrow 3/1$$

**Step V:** Now find the ratio of cabbage to tomatoes.

Number of cabbage = 6

Number of tomatoes = 4

Ratio is,

$$6 : 4 = 3 : 2$$

Or

$$12/4 = 3/2$$

### **Summary**

You can grab all the basics of ratios & proportions from this post. We have mentioned all the basics of proportion in this post. Now after reading the above post, you can easily solve any kind of problem-related to ratios or proportions.