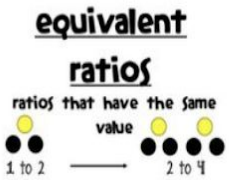
Ratio

The ratio is the method to show the relationship between two numbers or two quantities which indicate the number of times the first number contains the second. The ratio between two quantities is obtained by dividing the first quantity by the second. For example: the ratio between Rs 15 and Rs 30 = $\frac{15}{30} = \frac{1}{2}$ = 1:2

There are three ways to write a ratio:

As fraction = $\frac{1}{2}$ (1 upon 2)
With a colon (:), 2 : 5 (2 is to 5)
With the word " to", (2 to 5)

Things to remember



A ratio doesn't contain any unit as it is pure number.
While finding the ratio between two quantities, both quantities should be of the same unit. For example, the ratio between 20 cm and 3 m = ratio between 20 cm and 300 cm = $\frac{20}{300} = \frac{1}{15}$ = 1:15.
A ratio remains unchanged if both of its terms be multiplied or divided by the same number.
For example:
$\frac{1}{3} = \frac{1}{3} \times \frac{4}{4} = \frac{4}{12} = \frac{1}{3}$
A ratio should always be expressed in its lowest terms.
For example;
$\frac{20}{32} = \frac{20}{32} \div \frac{4}{4} = \frac{5}{8}$

To divide a given quantity in a given ratio

Let's divide Rs 450 among three persons in the ratio 2 : 3: 4

Since 2 + 3 + 4 =9

Renu's share = $\frac{2}{9}$ x Rs 450 = Rs 100
Barsha's share = $\frac{3}{9}$ x Rs 450 =Rs 150
Sabina's share = $\frac{4}{9}$ x Rs 450 =Rs 200

Proportion

When two ratios are equal, then it is called as a proportion. It is an equation that can be solved. It is a case where two fractions are equal. It can be written in two ways:

1. Two equal fractions, $\frac{a}{b} = \frac{c}{d}$
2. Using a colon, a : b = c : d

Proportion
Definition

Proportion is an equation where two ratios are equal to each other.

For example:

$\frac{3}{5} = \frac{9}{15}$

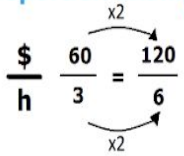
Here if you simplify the ratio $\frac{9}{15}$ by $\frac{9 \div 3}{15 \div 3} = \frac{3}{5}$

Reading proportions:

The above proportions can be read as 3 is to 5 is equal to 9 is to 15.

The proportions help in finding the 4th value when you know 3 other values. We shall learn about how to use proportions in word problem in the next video.

Proportion Example



There are four quantities in proportions where the first and fourth terms are known as extremes and the second and third terms are called means. It shows or tells two fraction or ratios are equal.

Terms are the four different quantities in the proportion. In proportion a: b: :c: d, a, b, c, and d are its first term, second term, third term& fourth terms. The fourth term is called the fourth proportional to the numbers a, b, and c.

In a proportion, the first and fourth terms are called extremes and the second and third terms are called means.

Examples

1. Find the fourth proportional of 6, 8, 9.
   Solution:
   Let the fourth proportional to 6, 8, 9
   Then, $\frac{6}{8} = \frac{9}{x}$
   or, 6x = 72
   or, x = $\frac{72}{6}$ = 12

2. Find the value of x in 16 : 8 = x : 5
   Solution:
   16 : 8 = x : 5
   or, $\frac{16}{8} = \frac{x}{5}$
   or, 8x =16 × 5
   or, x = $\frac{80}{8}$
   ∴ x = 10

Percentage

A percentage is a number or ratio which shows a fraction of 100. It is often denoted using the percentage sign " % ".

For example, 65 % is equal to $\frac{60}{100}$ or 0.655.

Example:

60% of 2000

= $\frac{60}{100}$ x Rs 2000

= Rs 1200

Percentage can be determined by the following ways:

Commission

The commission is meant to motivate sales person to sell more. Sales commission are paid to employee or companies that sell goods in stores or by calling on customers.

A commission is generally a percentage of the sales price of an item.

Example:

If a sales person receives 15% commission on his sales and sells Rs 5000 worth of merchandise, he would earn 15% of Rs 5000

$\frac{15}{100}$ x Rs 5000

= Rs 750 (commission)

Discount

There is discount in the sale or purchase of goods or services .The store will often sell items for a discounted sales price.

Example:

An item that originally cost Rs 500 may be discounted by 20% of Rs 500.

20% of Rs 500 = $\frac{20}{100}$ x Rs 500

= Rs 100

Subtract the discount amount from the original price to finds the sales price.

Sales price = Original price - discount

= Rs 500 - Rs 100

= Rs 400

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Income Tax is levied on the income of individuals by the government of the country. The Government will not charge tax in all the income it will charge above certain criteria.

Example:

Jos Magar's monthly salary is Rs 30,000. If 10% income tax is levied on the amount of Rs 100,000, how much income tax will he pay in a year?

Solution:

Monthly income = Rs 30,000

Yearly income = Rs 30,000 x 12 = Rs 360,000

Taxable income = Rs 360,000 - Rs100,000 = Rs 260,000

Income Tax = 10% of Rs 260,000 = $\frac{10}{100}$ x Rs 260,000 = Rs 26,000

Value Added Tax (VAT)

Value added tax (VAT) is added to the price of most things we buy.

Example:

A car costs Rs 40,00,000 before VAT. Work out the cost of the VAT if it is charged at 25%.

Solution:

Cost of the car before Tax = Rs 40,00,000

VAT Rate = 25%

Now, VAT amount = 25% of Rs 40,00,000

= $\frac{25}{100}$ x Rs 40,00,000

= Rs 10,00,000

Percent Change

Have a look at this formula.

Percent Change = $\frac{Amount\ of\ change}{Original\ Value}$ x 100

Example:

The price of rice is increased from Rs 100 to Rs 120 per kg. By how much percentage has the price increased?

Solution:

Original Price = Rs 100

New Price = Rs 120

Percentage increase = $\frac{Amount\ of\ change}{Original\ Value}$ x 100

= $\frac{20}{100}$ x 100

= 20%