

Arithmetic Chapter 1 : Percentage, Profit & Loss, Interest

We have already seen that when two or more fractions are compared they are reduced to a common denominator. In some cases it is found convenient to express fractions with 100 as a common denominator.

For example, suppose that in an examine a boy has got 18 marks out of 25 in English, 13 out of 20 in Mathematics and 7 out of 10 in History. The measures of his success in the three papers may be expressed by the fractions $\frac{18}{25}$, $\frac{13}{20}$, $\frac{7}{10}$. Expressing the fractions with 100 as a common denominator, the measure of its success may be expressed by the fractions $\frac{72}{100}$, $\frac{65}{100}$, $\frac{70}{100}$. If the maximum in each paper had been 100 marks he would have got 72 marks in English, 65 marks in mathematics, 70 marks in History. This is usually expressed by saying that the percentage of marks obtained by the boy in three papers is 72, 65 and 70 respectively. Therefore, **a fraction expressed with 100 as its denominator is called a Percentage**, and the numerator which expresses the number of hundredths is called the rate per cent.

RELATION BETWEEN PERCENTAGE AND FRACTION :

Percentages are nothing but decimal fractions with 100 as the denominator. Remembering this will help you to convert fractions into percentages and percentages into fractions.

EXAMPLE :

$$35 \% = \frac{35}{100}$$

CONVERSION OF A PERCENTAGE INTO A FRACTION :

To convert a percentage into a fraction, divide the number by 100 and reduce the fraction to its simplest form.

EXAMPLE :

$$35 \% = \frac{\cancel{35}}{\cancel{100}} = \frac{7}{20}$$

CONVERSION OF A FRACTION INTO A PERCENTAGE :

To convert a fraction into percentage multiply the fraction by 100 and add the % symbol.

EXAMPLE :

$$\frac{7}{25} = \left(\frac{7}{25} \cdot 100 \right) \% = 28 \%$$

CONVERSION OF A PERCENTAGE INTO A DECIMAL :

To convert a percentage into a decimal , remove the % sign and shift the decimal point in the number by two places to the left .

EXAMPLE :

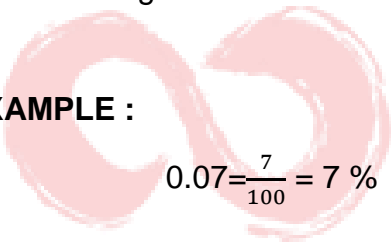
$$7 \% = \frac{7}{100} = 0.07$$

CONVERSION OF A DECIMAL INTO A PERCENTAGE :

To convert a decimal into a percentage , shift the decimal point by two places to the right and add the % sign .

EXAMPLE :

$$0.07 = \frac{7}{100} = 7 \%$$

**A QUANTITY AS A PERCENTAGE OF ANOTHER :**

To express a given quantity as a percentage of another quantity of the same kind , divide the given quantity by the other , multiply the result by 100, and add the % sign .

$$x = \left(\frac{x}{y} \cdot 100 \right) \% \text{ of } y$$

EXAMPLE :

$$16 = \left(\frac{16}{40} \cdot 100 \right) \% \text{ of } 40 = 40\% \text{ of } 40$$

TO CALCULATE A QUANTITY FROM A GIVEN PERCENTAGE OF THE QUANTITY

:

Express the given percentage as a fraction and divide the quantity by the fraction .

EXAMPLE :

If 80% of a number is 120 ,

$$\therefore \text{The number} = 120 \div \frac{80}{100} = 150$$

Note :

$$\text{i) Increase \%} = \frac{\text{Increase in quantity}}{\text{Original quantity}} \cdot 100$$

$$\text{ii) Decrease \%} = \frac{\text{Decrease in quantity}}{\text{Original quantity}} \cdot 100$$

Calculating Cost Price or Selling Price When any One Of them is given :

In order to calculate C.P or S.P ., if any one of them is given along with the profit or loss per cent , we use the following result .

A . When the profit % is given , then

$$\text{C.P} = \frac{\text{S.P} \cdot 100}{100 + \text{Profit\%}}$$

And
$$\text{S.P} = \frac{\text{C.P} \cdot (100 + \text{Profit\%})}{100}$$

Example :

Find the cost price of the pencil box which is sold for \$ 55 at a profit of 10% .

Solution :

Let the cost price be \$ x .

We have , C.P + 10% of x = 55

$$\Rightarrow x + \frac{10x}{100} = 55$$

$$\Rightarrow \frac{11x}{10} = 55$$

$$\Rightarrow x = 50$$

Then the cost price = \$ 50

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