TOPIC 9 - RATIO, PROFIT AND LOSS | BASIC MATHEMATICS FORM I

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Ratio

A ratio – is a way of comparing quantities measured in the same units

Examples of ratios

1. A class has 45 girls and 40 boys. The ratio of number of boys to the number of girls = 40: 45

2. A football ground 100 m long and 50 m wide. The ratio of length to the width = 100: 50

NOTE: Ratios can be simplified like fractions

1. 40: 45 = 8: 9
2. 100: 50 = 2: 1

A Ratio in its Simplest Form

Express a ratio in its simplest form

Example 1

Simplify the following ratios, giving answers as whole numbers

(a) 17: 34

(b) 2.4 : 1.4

(c) 5.6 : 2.4

(d) $\frac{2}{3} : \frac{4}{9}$

(e) $\frac{3}{8} : \frac{9}{16}$

Solution

(a) Divide by 17 each number $17:34 = 1:2$

(b) Multiply by 10 each number $2.4 : 1.4 = 24 : 14$
Divide by 2 $24 : 14 = 12:7$

(c) Multiply by 10 each number $5.6 : 2.4 = 56 : 24$
Divide by 8 $56 : 24 = 7:3$

(d) Multiply by 9 each fraction $\frac{2}{3} : \frac{4}{9} = 6 : 4$
Divide by 2 $6 : 4 = 3:2$

(e) Multiply by 16 each fraction $\frac{3}{8} : \frac{9}{16} = 6 : 9$
Divide by 3 $6 : 9 = 2:3$

A Given Quantity into Proportional Parts
Divide a given quantity into proportional parts
Example 2
Express the following ratios in the form of

(a) $0.8 : 1.6$
(b) $55 : 11$
(c) $500 : 250$
(d) $\frac{2}{3} : \frac{1}{6}$
(e) $\frac{3}{4} : \frac{5}{12}$

Solution

(a) Divide by 1.6 each number $0.8 : 1.6 = \frac{0.8}{1.6} : \frac{1.6}{1.6} = 0.5 : 1$

(b) Divide by 11 each number $55 : 11 = \frac{55}{11} : \frac{11}{11} = 5 : 1$

(c) Divide by 250 each number $500 : 250 = \frac{500}{250} : \frac{250}{250} = 2 : 1$

(d) Multiply by 6 each fraction $\frac{2}{3} : \frac{1}{6} = 4 : 1$

(e) Multiply by 12 each fraction $\frac{3}{4} : \frac{5}{12} = 9 : 5$

Divide by 5 $9 : 5 = \frac{9}{5} : \frac{5}{5} = 1.8 : 1$

To increase or decrease a certain quantity in a given ratio, multiply the quantity with that ratio
Example 3

1. Increase 6 m in the ratio 4 : 3
2. Decrease 800 /− in the ratio 4 : 5

Solution

(a) $6\text{m} \times \frac{4}{3} = 8\,m$

(b) $800/- \times \frac{4}{5} = 640/-$

Profits and Loss

Profit or Loss

Find profit or loss

If you buy something and then sell it at a higher price, then you have a profit which is given by: Profit = selling price − buying price

If you buy something and then sell it at a lower price, then you have a loss which is given by: Loss = buying price − selling price

The profit or loss can also be expressed as a percentage of buying price as follows:

$$\text{Percentage profit} = \frac{\text{profit}}{\text{buying price}} \times 100\%$$

And

$$\text{Percentage loss} = \frac{\text{loss}}{\text{buying price}} \times 100\%$$

Percentage Profit and Percentage Loss

Calculate percentage profit and percentage profit and percentage loss

Example 4

Mr. Richard bought a car for 3, 000, 000/− and sold for 3, 500, 000/−. What is the profit and percentage profit obtained?

Solution

Profit= selling price − buying price = 3,500,000-3,000,000=500,000

Therefore the profit obtained is 500,000/-

$$\text{Percentage profit} = \frac{\text{profit}}{\text{buying price}} \text{ x } 100\%$$

But buying price $= 3,000,000/-$ and

Profit $= 500,000/-$

$$\therefore \text{Percentage profit} = \frac{500,000}{3,000,000} \text{ x } 100\% = \frac{1}{6} \text{ x } 100\% = \frac{100}{6}\% = 16.67$$

Example 5

Eradia bought a laptop for

Solution

$$\text{Percentage loss} = \frac{\text{loss}}{\text{buying price}} \text{ x } 100\%$$

But buying price = 780, 000/− and loss = buying price − selling price = 780, 000 − 720, 000 = 60, 000/−

$$\therefore \text{Percentage loss} = \frac{60,000}{780,000} \text{ x } 100\% = \frac{1}{13} \text{ x } 100\% = \frac{100}{13}\% = 7.69\%$$

Simple Interest

Simple Interest

Calculate simple interest

The amount of money charged when a person borrows money e. g from a bank is called interest (I)

The amount of money borrowed is called principle (P)

To calculate interest, we use interest rate (R) given as a percentage and is usually taken per year or per annum (p.a)

$$\boxed{I = \frac{PRT}{100}}$$

Example 6

Calculate the simple interest charged on the following

1. 850, 000/− at 15% per annum for 9 months
2. 200, 000/− at 8% per annum for 2 years

Solution

(a) $P = 850,000/-,\ R = 15\%\quad T = 9$ months

Change time from months to years

$$1\ year = 12\ months$$
$$?\quad = 9\ months$$
$$= \frac{1\ year\ x\ 9\ months}{12\ months} = \frac{9}{12}\ years$$
$$T = \frac{9}{12}\ years$$

$$I = \frac{PRT}{100} = \frac{850,000\ x\ 15\ x\ \frac{9}{12}}{100} = \frac{850,000\ x\ 15\ x\ 0.75}{100} = 95\ 625/-$$

(b) $P = 200,000/-,\ R = 8\%\quad T = 2$ years

$$I = \frac{PRT}{100} = \frac{200,000\ x\ 8\ x\ 2}{100} = 32\ 00/-$$

Real Life Problems Related to Simple Interest

Solve real life problems related to simple interest

Example 7

Mrs. Mihambo deposited money in CRDB bank for 3 years and 4 months. A t the end of this time she earned a simple interest of 87, 750/− at 4.5% per annum. How much had she deposited in the bank?

Solution

Given I = 87, 750/− R = 4.5% % T = 3 years and 4 months

Change months to years

$$1\ year = 12\ months$$
$$?\quad = 4\ months$$
$$= \frac{1\ year\ x\ 4\ months}{12\ months} = \frac{4}{12}\ years = 0.3\ years$$

$$T = (3 + 0.3)years = 3.3years$$

$$I = \frac{PRT}{100} \quad \rightarrow 100I = PRT$$

$$P = \frac{100I}{RT} = \frac{100\ x\ 87,750}{4.5\ x\ 3.3} = \frac{8775000}{14.85} = 590\ 909/-$$

∴ She deposited 590 909/−