RATIO, PROFIT AND LOSS

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) $\dfrac{2}{3} : \dfrac{4}{9}$

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

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

a.   Increase 6 m in the ratio 4 : 3

b.   Decrease 800 /− in the ratio 4 : 5

Solution

(a) 6m x $\frac{4}{3}$ = 8 m

(b) 800/− x $\frac{4}{5}$ = 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:

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

And

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

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 $= 500,000/-$

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

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)

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

Example 6

Calculate the simple interest charged on the following

a.   850, 000/− at 15% per annum for 9 months

b.   200, 000/− at 8% per annum for 2 years

Solution

(a) $P = 850,000/-$, $R = 15\%$ $T = 9$ 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) $P = 200,000/-$, $R = 8\%$ $T = 2$ 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

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

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

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

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

∴ She deposited 590 909/−