Ratio

A ratio compares quantities of the same kind. Ratios can be simplified like fractions.

eg. $9:12 = 3:4$

$4 \text{ min} : 120 \text{ s} = 240 : 120$

$= 2:1$

eg. $\frac{1}{2} : \frac{1}{3}$ (×6, ×6)

$3 : 2$.

Sharing out in a given ratio

Find the total number of 'parts', then the value of each part.

Example: Concrete is mixed using 4 parts gravel, 2 parts sand and 1 part cement. Find how many kg. of sand are needed for 3·5 t of concrete.

Solution: Total 'parts' = 7

$1 \text{ part} = \frac{3500}{7}$

$= 500 \text{ kg}$

(since $1 \text{ t} = 1000 \text{ kg}$)

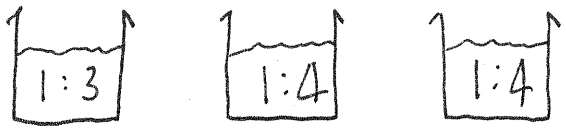
$\text{Sand} = 2 \times 500$

$= 1000 \text{ kg}$

Applications

Examples: A full glass contains water + vinegar in the ratio 1:3. Another glass with twice the capacity has vinegar & water in the ratio 1:4. If the contents of both glasses are mixed, what is the ratio of vinegar to water?

Solution: Treat large glass as 2 smaller glasses.
Find equivalent ratios with the same number of total parts, then combine.



Total parts	4	5	5
Equivalent ratio	5:15	4:16	4:16
total parts	20	20	20

Hence final ratio is 13:47

Percentage

Percentage means out of 100. Generally we work with the percentage expressed as a decimal.

Examples: 1) Find 8% of 300

0.08×300

'of' means times

2) Write 13 out of 20 as a percentage

$\frac{13}{20} \times 100 = 65\%$

Increase & Decrease using a multiplier:

To increase an amount by 20% we could calculate 20% and add it on. In one step, we could multiply by 1.2. Simply to decrease an amount by 20% we could calculate 20% and subtract. In one step this is the same as finding 80% of the amount i.e. multiplying by $1 - 0.2 = 0.8$

Examples: 1) Increase 50 by 8% multiply by $1 + 0.08 = 1.08$

$1.08 \times 50 = 54$

2) Decrease 50 by 8%

Multiply by $1 - 0.08 = 0.92$

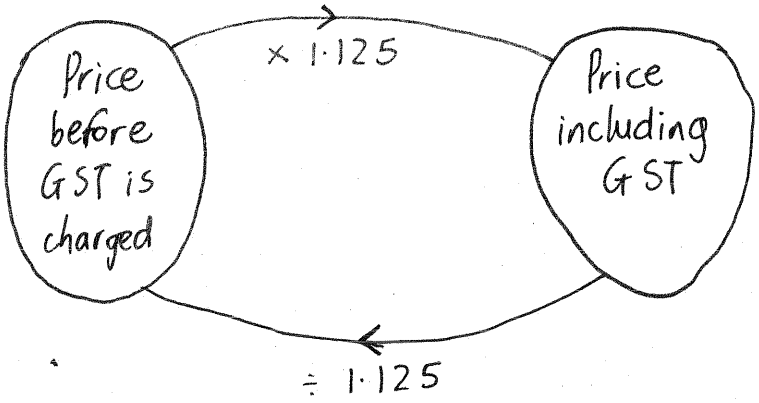
$0.92 \times 50 = 46$

G.S.T

This is a goods and service tax and is set at $12\frac{1}{2}\%$

Since $12.5\% = \frac{12.5}{100} = \frac{125}{1000} = \frac{1}{8}$ then G.S.T is $\frac{1}{8}$ as a fraction

As a multiplier, to increase by 12.5%, multiply by 1.125. The following diagram is useful



Examples

1) A computer is advertised at $1999 plus GST.
a) Calculate the selling price
b) How much is the GST?

a) Selling price = 1999×1.125

S.P. = $2248.87

b) G.S.T = $2248.87 - 1999$
= $249.87

OR
G.S.T = $\frac{1}{8} \times 1999$
= $249.87

2) A burger, fries & thick shake cost $6·50 including G.S.T.
a) Calculate the original price (before GST)
b) Find the GST

a) Original price = $6·50 ÷ 1·125
= $5·78

b) GST = $6·50 - $5·78
= $0·72

OR
GST = $\frac{1}{9}$ x $6·50 ⟶ i.e. $\frac{1}{9}$ of price <u>with</u> GST
= $0·72

Profit & Loss

To find the percentage profit or loss place it over the original price and multiply by 100.

Examples: A computer is bought for $2300 and sold 3 years later for $1900. Find the percentage loss.

$$\text{Loss} = \$2300 - \$1900$$
$$= \$400$$

$$\% \text{ loss} = \frac{400}{2300} \times 100$$
$$= 17.4\% \text{ (1 d.p)}$$

Finding GST

(A) If price does NOT include GST then ÷ 8

(B) If price already includes GST, then ÷ 9

eg. Find GST

1) On $56 before GST is added

$$GST = \frac{\$56}{8}$$
$$= \$7$$

2) On $38 which includes GST

$$GST = \frac{\$38}{9}$$
$$= \$4.22$$