

Maths Knowledge Organiser

Year 10 (F) Multiplicative reasoning



Percentage multipliers

Calculate the percentage and divide by 100

To find 45% → **1.45**

To increase by 9% → $100+9 = 109 \rightarrow$ **1.09**

To decrease by 14.5% → $100-14.5 = 85.5 \rightarrow$ **0.855**

Reverse percentages

We divide by the multiplier.

An object has increased in size by 7% to 53.5kg

$53.5 \div 1.07 =$ **50kg**

Repeat percentage change

Change percentage to decimal and multiply

Increase 450 by 30% then decrease by 12%

$130\% \rightarrow 1.3$ $88 \rightarrow 0.88$

$450 \times 1.3 \times 0.88 = 514.8$

Compound interest

Is the same as repeat percentage but there is a shortcut. I invest £4000 in bank account which earns 4% interest for 7 years.

$4000 \times 1.04^7 =$ **5263.73**

Percentage change

$$\frac{\text{difference}}{\text{original}} \times 100$$

This is the same for percentage profit and loss

Inverse proportion

A relation between two quantities such that one increases in proportion as the other decreases.

a and b are inversely proportional

When $a = 4$ $b = 5$

$4 \times 5 = 20$

So $a = \frac{5}{b}$

a and b^2 are inversely proportional

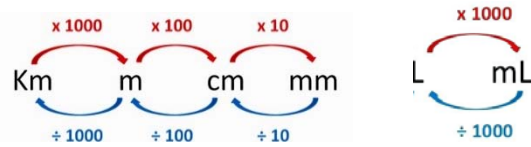
When $a = 3$ $b = 4$

$3 \times 16 = 48$

So $a = \frac{48}{b^2}$

Converting units

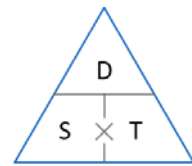
Select the correct conversion factor then either multiply or divide.



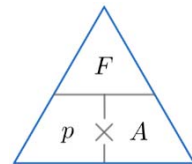
Volume, mass and density

Use the formula triangle to calculate different values

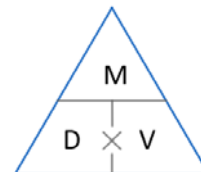
$$\text{Speed} = \frac{\text{distance}}{\text{time}}$$



$$\text{pressure} = \frac{\text{force}}{\text{Area}}$$



$$\text{density} = \frac{\text{mass}}{\text{volume}}$$



Direct proportion

The relation between quantities whose ratio is constant.

a and b are directly proportional

a and b are directly proportional

When $a = 4$ $b = 20$

$20 \div 4 = 5$

So $b = 5a$

b is 5 times bigger than a