# Essential Mathematics v1.1

## Mensuration

| | | | |
|---|---|---|---|
| circumference of a circle | $C = 2\pi r$ | area of a circle | $A = \pi r^2$ |
| area of a parallelogram | $A = bh$ | area of a trapezium | $A = \dfrac{1}{2}(a+b)h$ |
| area of a triangle | $A = \dfrac{1}{2}bh$ | total surface area of a cone | $S = \pi rs + \pi r^2$ |
| total surface area of a cylinder | $S = 2\pi rh + 2\pi r^2$ | surface area of a sphere | $S = 4\pi r^2$ |
| volume of a cone | $V = \dfrac{1}{3}\pi r^2 h$ | volume of a cylinder | $V = \pi r^2 h$ |
| volume of a prism | $V = Ah$ | volume of a pyramid | $V = \dfrac{1}{3}Ah$ |
| volume of a sphere | $V = \dfrac{4}{3}\pi r^3$ | arc length | $l = \dfrac{\theta}{180}\pi r$ |
| area of a sector | $A = \dfrac{\theta}{360}\pi r^2$ | | |

## Finance

| | | | |
|---|---|---|---|
| simple interest | $I = Pin$ | compound interest | $A = P(1+i)^n$ |

## Trigonometry
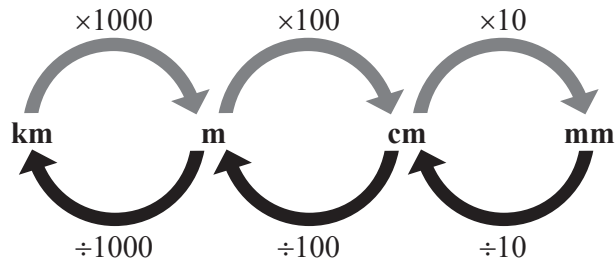
| | | | |
|---|---|---|---|
| Pythagoras' theorem | $c^2 = a^2 + b^2$ | | |
| trigonometric ratios | $\cos\theta = \dfrac{\text{adjacent}}{\text{hypotenuse}}$ | $\sin\theta = \dfrac{\text{opposite}}{\text{hypotenuse}}$ | $\tan\theta = \dfrac{\text{opposite}}{\text{adjacent}}$ |

## Location and time

| | | | | | |
|---|---|---|---|---|---|
| distance | $d = s \times t$ | speed | $s = \dfrac{d}{t}$ | time | $t = \dfrac{d}{s}$ |

## Statistics

| | |
|---|---|
| mean | $\bar{x} = \dfrac{\text{sum of all data values}}{\text{number of data values}}$ |
| range | $\text{range} = \text{highest score} - \text{lowest score}$ |
| interquartile range (IQR) | $\text{IQR} = Q_3 - Q_1$ |

## Conversions
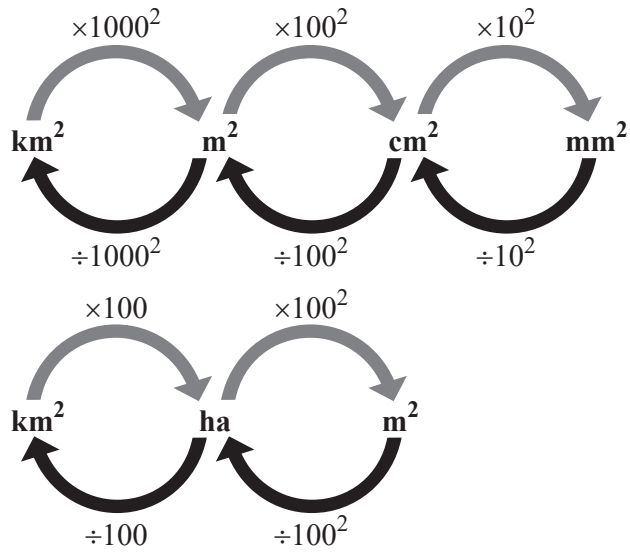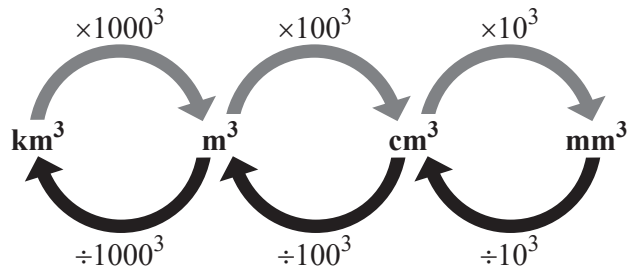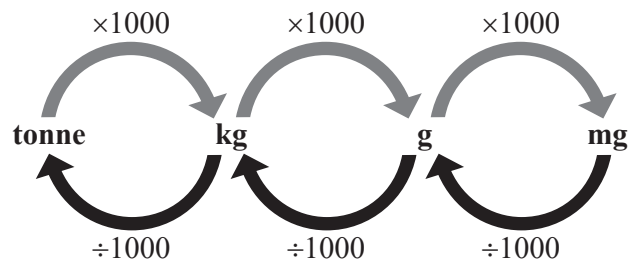
| | |
|---|---|
| **length unit conversion** | $\times 1000$    $\times 100$    $\times 10$<br>**km**    **m**    **cm**    **mm**<br>$\div 1000$    $\div 100$    $\div 10$ |
| **area unit conversion** | $\times 1000^2$    $\times 100^2$    $\times 10^2$<br>$\text{km}^2$    $\text{m}^2$    $\text{cm}^2$    $\text{mm}^2$<br>$\div 1000^2$    $\div 100^2$    $\div 10^2$<br><br>$\times 100$    $\times 100^2$<br>$\text{km}^2$    **ha**    $\text{m}^2$<br>$\div 100$    $\div 100^2$ |
| **volume unit conversion** | $\times 1000^3$    $\times 100^3$    $\times 10^3$<br>$\text{km}^3$    $\text{m}^3$    $\text{cm}^3$    $\text{mm}^3$<br>$\div 1000^3$    $\div 100^3$    $\div 10^3$ |
| **mass unit conversion** | $\times 1000$    $\times 1000$    $\times 1000$<br>**tonne**    **kg**    **g**    **mg**<br>$\div 1000$    $\div 1000$    $\div 1000$ |
| **capacity unit conversion** | $\times 1000$    $\times 1000$    $\times 1000$<br>**ML**    **kL**    **L**    **mL**<br>$\div 1000$    $\div 1000$    $\div 1000$ |