

# GCSE Maths Formula Sheet

Essential Equations for Higher & Foundation Tiers

## 1. Geometry and Area

<b>Rectangle</b>	Area = $l \times w$
<b>Triangle</b>	Area = $\frac{1}{2}bh$
<b>Trapezium</b>	Area = $\frac{1}{2}(a + b)h$
<b>Parallelogram</b>	Area = $b \times h$
<b>Circle Area</b>	Area = $\pi r^2$
<b>Circumference</b>	$C = \pi d$ or $C = 2\pi r$

## 2. Right-Angled Triangles

**Pythagoras' Theorem:**

$$a^2 + b^2 = c^2$$

**Trigonometry (SOH CAH TOA):**

$$\sin(\theta) = \frac{\text{Opposite}}{\text{Hypotenuse}}$$

$$\cos(\theta) = \frac{\text{Adjacent}}{\text{Hypotenuse}}$$

$$\tan(\theta) = \frac{\text{Opposite}}{\text{Adjacent}}$$

## 3. Advanced Trig (Higher Tier)

**Sine Rule:**

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

**Cosine Rule:**

$$a^2 = b^2 + c^2 - 2bc \cos A$$

**Area of a Triangle:**

$$\text{Area} = \frac{1}{2}ab \sin C$$

## 4. Volume and Surface Area

<b>Prism Vol</b>	Area of cross-section $\times l$
<b>Cylinder Vol</b>	$\pi r^2 h$
<b>Sphere Vol</b>	$\frac{4}{3}\pi r^3$
<b>Sphere SA</b>	$4\pi r^2$
<b>Cone Vol</b>	$\frac{1}{3}\pi r^2 h$
<b>Cone CSA</b>	$\pi r l$

## 5. Algebra and Graphs

**The Quadratic Formula:**

$$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$$

**Straight Line Graphs:**

Equation:  $y = mx + c$

Gradient:  $m = \frac{y_2 - y_1}{x_2 - x_1}$

## 6. Compound Measures

**Speed**  $S = \frac{\text{Distance}}{\text{Time}}$

**Density**  $D = \frac{\text{Mass}}{\text{Volume}}$

**Pressure**  $P = \frac{\text{Force}}{\text{Area}}$

## 7. Finance and Probability

**Compound Interest:**

$$\text{Total} = P \left(1 + \frac{r}{100}\right)^n$$

**Probability:**

$P(A \text{ or } B) = P(A) + P(B)$  (Mutually exclusive)

$P(A \text{ and } B) = P(A) \times P(B)$  (Independent)

**Key:**  $P$  = Principal amount,  $r$  = interest rate,  $n$  = time periods.  $r$  = radius,  $d$  = diameter,  $h$  = height,  $l$  = length/slant height,  $b$  = base.