FREE FORMULA SHEET

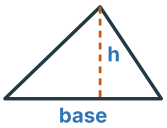
Cambridge IGCSE Maths Formula Sheet

EXTENDED

Cambridge IGCSE Mathematics (0580) · Extended

1 Given in Your Exam

These formulas are printed on the list of formulas in every Cambridge IGCSE Extended paper. You don't need to memorise them, but you do need to know when and how to use each one.



Area of a Triangle

$$A = \frac{1}{2} \times \text{base} \times \text{height}$$

The height is perpendicular to the base

Area of a Circle

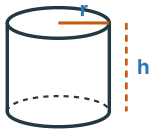
$$A = \pi r^2$$

r is the radius

Circumference of a Circle

$$C = 2\pi r = \pi d$$

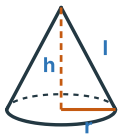
r is the radius, d is the diameter



Curved Surface Area of a Cylinder

$$A = 2\pi rh$$

r is the radius, h is the height



Curved Surface Area of a Cone

$$A = \pi rl$$

l is the slant height

Surface Area of a Sphere

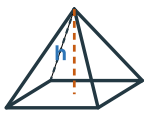
$$A = 4\pi r^2$$

r is the radius

Volume of a Prism

$$V = \text{area of cross-section} \times \text{length}$$

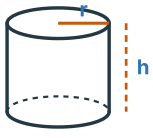
Works for any prism, including a cylinder



Volume of a Pyramid

$$V = \frac{1}{3} \times \text{base area} \times h$$

h is the perpendicular height



Volume of a Cylinder

$$V = \pi r^2 h$$

r is the radius, h is the height

Volume of a Cone

$$V = \frac{1}{3}\pi r^2 h$$

h is the perpendicular height

Volume of a Sphere

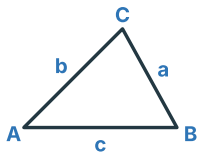
$$V = \frac{4}{3}\pi r^3$$

r is the radius

The Quadratic Formula

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

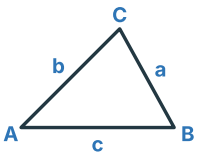
Solves $ax^2 + bx + c = 0$, where $a \neq 0$



The Sine Rule

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

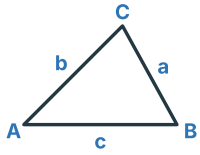
Side a is opposite angle A, and so on



The Cosine Rule

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

Use when you know two sides and the angle between them, or all three sides



Area of Any Triangle

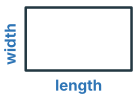
$$A = \frac{1}{2}ab\sin C$$

C is the angle between sides a and b

2 Learn These by Heart

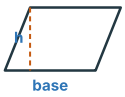
These are **not** given in the exam. Students lose marks on them every year, so learn them until you can write them from memory.

SHAPE AND SPACE



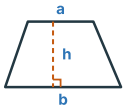
Area of a Rectangle

$$A = \text{length} \times \text{width}$$



Area of a Parallelogram

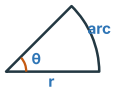
$$A = \text{base} \times \text{perpendicular height}$$



Area of a Trapezium

$$A = \frac{1}{2}(a + b)h$$

a and b are the parallel sides, h is the perpendicular height



Arc Length and Sector Area

$$\text{Arc} = \frac{\theta}{360} \times 2\pi r$$

$$\text{Sector} = \frac{\theta}{360} \times \pi r^2$$

θ is the angle at the centre

Angles in Polygons

Interior angles add to $(n - 2) \times 180°$

Exterior angles add to $360°$

n is the number of sides; a triangle is 180°, a quadrilateral 360°

Similar Shapes

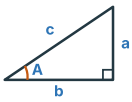
Lengths $\times k$

Areas $\times k^2$

Volumes $\times k^3$

k is the length scale factor

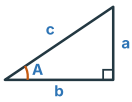
TRIGONOMETRY



Pythagoras' Theorem

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

In a right-angled triangle, c is the hypotenuse



Trigonometric Ratios

$$\sin A = \frac{a}{c}$$

$$\cos A = \frac{b}{c}$$

$$\tan A = \frac{a}{b}$$

SOH CAH TOA: a is opposite A, b is adjacent to A, c is the hypotenuse

Exact Trigonometric Values

	0°	30°	45°	60°	90°
sin	0	$\frac{1}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{\sqrt{3}}{2}$	1
cos	1	$\frac{\sqrt{3}}{2}$	$\frac{\sqrt{2}}{2}$	$\frac{1}{2}$	0
tan	0	$\frac{\sqrt{3}}{3}$	1	$\sqrt{3}$	–

NUMBER AND MEASURES

Speed, Distance and Time

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

Cover the one you want in the triangle

Percentage Change

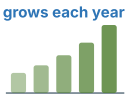
$$\%\ \text{change} = \frac{\text{change}}{\text{original}} \times 100$$

Use the original amount, not the new one

Reverse Percentages

$$\text{Original} = \frac{\text{new amount}}{\text{multiplier}}$$

For a 20% increase the multiplier is 1.2; for a 20% decrease it is 0.8



Compound Interest

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

P is the amount invested, r is the % rate per period, n is the number of periods

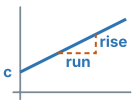
Surds

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$$

$$\frac{\sqrt{a}}{\sqrt{b}} = \sqrt{\frac{a}{b}}$$

Rationalise by multiplying top and bottom by the surd

ALGEBRA



Straight-Line Graphs

$$y = mx + c$$

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

m is the gradient, c is the y-intercept

Perpendicular Gradients

$$m_1 \times m_2 = -1$$

Perpendicular gradients are negative reciprocals

Midpoint and Length of a Line

$$\text{Midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

$$\text{Length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

Laws of Indices

$$a^m \times a^n = a^{m+n}$$

$$a^m \div a^n = a^{m-n}$$

$$(a^m)^n = a^{mn}$$

$$a^0 = 1$$

$$a^{-n} = \frac{1}{a^n}$$

Fractional Indices

$$a^{1/n} = \sqrt[n]{a}$$

$$a^{m/n} = (\sqrt[n]{a})^m$$

Completing the Square

$$x^2 + bx = \left(x + \frac{b}{2}\right)^2 - \left(\frac{b}{2}\right)^2$$

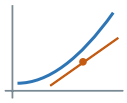
The turning point of $y = (x + p)^2 + q$ is $(-p, q)$

Direct and Inverse Proportion

$y \propto x \rightarrow y = kx$

$y \propto \frac{1}{x} \rightarrow y = \frac{k}{x}$

Find k first using the values you are given



Differentiation

If $y = ax^n$ then $\frac{dy}{dx} = anx^{n-1}$

At a turning point $\frac{dy}{dx} = 0$

VECTORS, STATISTICS AND PROBABILITY

Magnitude of a Vector

$\left|\begin{pmatrix} x \\ y \end{pmatrix}\right| = \sqrt{x^2 + y^2}$

The length of the vector, using Pythagoras

Mean

$\text{Mean} = \frac{\text{total of the values}}{\text{number of values}}$

From a table: $\Sigma fx \div \Sigma f$ (Σ means "add up")

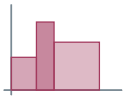
Probability Basics

$P(\text{not A}) = 1 - P(A)$

Expected number = P(A) × number of trials

Interquartile Range

IQR = upper quartile − lower quartile



Histograms

$\text{Frequency density} = \frac{\text{frequency}}{\text{class width}}$

Frequency = area of the bar

Write It First

Write the formula down before you substitute. You can earn a method mark even if the answer goes wrong.

Check the Units

Make sure every length is in the same unit before you use a formula.

Test Yourself

Cover the right-hand side of each card and try to write the formula from memory.

Need Help Using These Formulas?

Book a free 90-minute lesson and I'll show your child exactly when and how to use each one.

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