FREE FORMULA SHEET

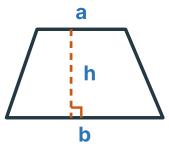
Eduqas GCSE Maths Formula Sheet

HIGHER

WJEC Eduqas GCSE Mathematics (C300) · Higher Tier

1 Given in Your Exam

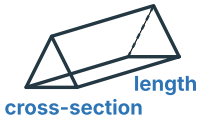
These formulas are printed on the formulae sheet in every Eduqas GCSE Higher paper. You don't need to memorise them, but you do need to know when and how to use each one.



Area of a Trapezium

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

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



Volume of a Prism

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

Works for any prism, including a cylinder

Circumference of a Circle

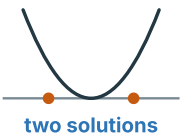
$$C = 2\pi r = \pi d$$

r is the radius, d is the diameter

Area of a Circle

$$A = \pi r^2$$

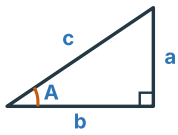
r is the radius



The Quadratic Formula

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

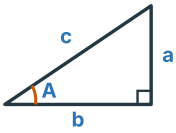
Solves $ax^2 + bx + c = 0$, where $a \neq 0$



Pythagoras' Theorem

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

In a right-angled triangle, c is the hypotenuse



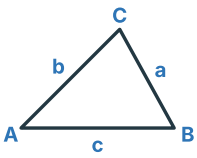
Trigonometric Ratios

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

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

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

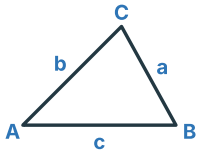
SOH CAH TOA: a is opposite A, b is adjacent to A, c is the hypotenuse



The Sine Rule

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

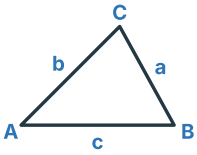
Side a is opposite angle A, and so on



The Cosine Rule

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

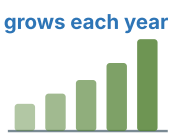
Use when you know two sides and the angle between them, or all three sides



Area of Any Triangle

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

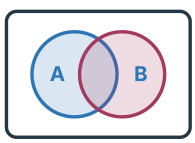
C is the angle between sides a and b



Compound Interest

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

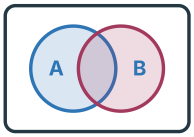
P is the amount invested, r is the % rate per period, n is the number of periods



Probability: A or B

$$P(A \text{ or } B) = P(A) + P(B) - P(A \text{ and } B)$$

For any two events A and B



Probability: A and B

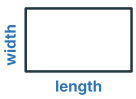
$$P(A \text{ and } B) = P(A \text{ given } B) \times P(B)$$

Conditional probability

2 Learn These by Heart

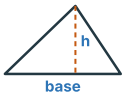
These are **not** given in the exam. Students lose marks on them every year, so learn them until you can write them from memory.

SHAPE AND SPACE



Area of a Rectangle

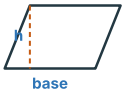
$$A = \text{length} \times \text{width}$$



Area of a Triangle

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

The height is perpendicular to the base

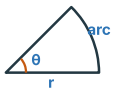


Area of a Parallelogram

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

Volume of a Cuboid

$$V = \text{length} \times \text{width} \times \text{height}$$



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

NUMBER AND MEASURES

Speed, Distance and Time

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

Cover the one you want in the triangle

Density and Pressure

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

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

Check the units match before you calculate

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

Surds

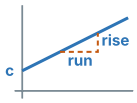
$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

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

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

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

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

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

Difference of Two Squares

$a^2 - b^2 = (a + b)(a - b)$

Completing the Square

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

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

Equation of a Circle

$x^2 + y^2 = r^2$

Centre at the origin, radius r

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

TRIGONOMETRY

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	$\sqrt{3}$	–

STATISTICS AND PROBABILITY

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

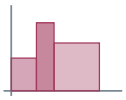
Independent Events

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

Only when one event does not affect the other

Interquartile Range

$$IQR = \text{upper quartile} - \text{lower quartile}$$



Histograms

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

Frequency = area of the bar

3 Usually Given in the Question

These are not on the formulae sheet, but exam questions usually print them when you need them. Learning them saves time.

Spheres, Cones and Pyramids

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

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

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

Often given in the question, but learn them in case

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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