STUDY FORMULA BOOKLET

Cambridge IGCSE and O Level Additional Maths 0606 and 4037 list of formulas

The list prints the circle equation, cone and sphere formulae, quadratic formula, binomial theorem, series and triangle formulae. You must learn logs, calculus, radians, vectors, permutations and straight-line work.

IN THE BOOKLET printed in the official booklet LEARN IT not printed: students must recall it

Based on the official **List of formulas, Cambridge IGCSE Additional Mathematics 0606 syllabus for 2025, 2026 and 2027, page 22 (also in the 4037 syllabus)**, with what to learn and exam tips added by CuratedPrep.

Equation of a circle

Equation of a circle Centre (a, b) and radius r.	$(x-a)^2+(y-b)^2=r^2$	IN THE BOOKLET

Surface area and volume

Printed on the list, so no need to memorise them.

Curved surface area of a cone r is the radius and l is the sloping edge (slant height).	$A=\pi rl$	IN THE BOOKLET
Surface area of a sphere r is the radius.	$A=4\pi r^2$	IN THE BOOKLET
Volume of a pyramid or cone A is the base area and h is the height.	$V=\frac{1}{3}Ah$	IN THE BOOKLET
Volume of a sphere r is the radius.	$V=\frac{4}{3}\pi r^3$	IN THE BOOKLET

Quadratic equation

Quadratic formula For $ax^2 + bx + c = 0$. Rearrange to equal zero first.	$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$	IN THE BOOKLET

Binomial theorem

Binomial expansion n is a positive integer. The general term is the one with the r-th power of b.	$(a+b)^n=a^n+\binom{n}{1}a^{n-1}b+\binom{n}{2}a^{n-2}b^2+\cdots+\binom{n}{r}a^{n-r}b^r+\cdots+b^n$	IN THE BOOKLET
Binomial coefficient Also written nCr. Check your calculator has an nCr key.	$\binom{n}{r}=\frac{n!}{(n-r)!\,r!}$	IN THE BOOKLET

Arithmetic series

nth term a is the first term and d is the common difference.	$u_n=a+(n-1)d$	IN THE BOOKLET
Sum of n terms l is the last term. Use the first form when you know the last term.	$S_n=\frac{1}{2}n(a+l)=\frac{1}{2}n\{2a+(n-1)d\}$	IN THE BOOKLET

Geometric series

nth term a is the first term and r is the common ratio.	$u_n = ar^{n-1}$	IN THE BOOKLET
Sum of n terms Equivalent to a(rⁿ - 1)/(r - 1), which is easier when r > 1.	$S_n = \frac{a(1-r^n)}{1-r} \quad (r \neq 1)$	IN THE BOOKLET
Sum to infinity Exists only when |r| < 1.	$S_\infty = \frac{a}{1-r} \quad (\lvert r \rvert < 1)$	IN THE BOOKLET

Identities

Pythagorean identity Holds for any angle A.	$\sin^2 A + \cos^2 A = 1$	IN THE BOOKLET
Secant identity Divide the first identity by cos² A.	$\sec^2 A = 1 + \tan^2 A$	IN THE BOOKLET
Cosecant identity Divide the first identity by sin² A.	$\operatorname{cosec}^2 A = 1 + \cot^2 A$	IN THE BOOKLET

Formulas for triangle ABC

Sine rule Use it with a matching side and angle pair.	$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$	IN THE BOOKLET
Cosine rule Two sides and the included angle, or all three sides.	$a^2 = b^2 + c^2 - 2bc\cos A$	IN THE BOOKLET
Area of a triangle C is the angle between sides a and b. No diagram is printed with it.	$\Delta = \frac{1}{2}ab\sin C$	IN THE BOOKLET

Learn these: not in the booklet

Discriminant conditions

$b^2 - 4ac > 0$ (two real roots), $b^2 - 4ac = 0$ (equal roots), $b^2 - 4ac < 0$ (no real roots)

A line is a tangent to a curve when the resulting quadratic has equal roots, intersects when it has two real roots and misses when it has none.

Completing the square

$$ax^2 + bx + c = a\left(x + \frac{b}{2a}\right)^2 + c - \frac{b^2}{4a}$$

Gives the turning point and the maximum or minimum value.

Sum and product of roots

$$\alpha + \beta = -\frac{b}{a}, \qquad \alpha\beta = \frac{c}{a}$$

Remainder and factor theorems

$f(x) \div (x-a)$ has remainder $f(a)$; $f(a) = 0 \iff (x-a)$ is a factor

For (ax - b) use x = b/a.

Laws of logarithms

$$\log_a xy = \log_a x + \log_a y, \quad \log_a \frac{x}{y} = \log_a x - \log_a y, \quad \log_a x^k = k\log_a x$$

Change of base

$$\log_a x = \frac{\log_b x}{\log_b a}, \qquad \log_a b = \frac{1}{\log_b a}$$

Also log a of a is 1 and log a of 1 is 0.

Exponentials and logarithms as inverses

$$y = e^x \iff x = \ln y, \qquad a^x = b \iff x = \frac{\lg b}{\lg a}$$

Solve a^x = b by taking logs of both sides.

Straight line

$$y = mx + c, \qquad y - y_1 = m(x - x_1)$$

Gradient, distance and midpoint

$$m = \frac{y_2 - y_1}{x_2 - x_1}, \quad d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}, \quad \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Parallel and perpendicular lines

$m_1 = m_2$ (parallel), $m_1 m_2 = -1$ (perpendicular)

A perpendicular bisector passes through the midpoint with the perpendicular gradient.

Straight-line form for curves

$y = Ax^n \Rightarrow \lg y = n \lg x + \lg A, \qquad y = Ab^x \Rightarrow \lg y = x \lg b + \lg A$

Plot lg y against lg x or against x; the gradient and intercept give the constants. Also y = Ax³ + B is a line in y against x³.

General equation of a circle

$x^2 + y^2 + 2gx + 2fy + c = 0$

Centre (-g, -f) and radius √(g² + f² - c).

Radians

$\pi \text{ rad} = 180^\circ$

Use radians for arc length, sector area and all calculus with trigonometry.

Arc length

$s = r\theta$

θ in radians. Formulas are not given.

Area of a sector

$A = \frac{1}{2} r^2 \theta$

θ in radians.

Reciprocal trigonometric functions

$\sec\theta = \frac{1}{\cos\theta}, \quad \operatorname{cosec}\theta = \frac{1}{\sin\theta}, \quad \cot\theta = \frac{1}{\tan\theta} = \frac{\cos\theta}{\sin\theta}, \quad \tan\theta = \frac{\sin\theta}{\cos\theta}$

Exact trig values

$\sin 30^\circ = \frac{1}{2},\ \cos 60^\circ = \frac{1}{2},\ \sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2},\ \sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2},\ \tan 30^\circ = \frac{1}{\sqrt{3}},\ \tan 45^\circ = 1,\ \tan 60^\circ = \sqrt{3}$

Also in radians: π/6, π/4, π/3.

Amplitude and period

$y = a\sin bx + c:\ \text{amplitude } a,\ \text{period } \frac{360^\circ}{b} \text{ or } \frac{2\pi}{b}$

y = a tan bx + c has period 180 degrees or π divided by b, with asymptotes to label.

Permutations

${}^nP_r = \frac{n!}{(n-r)!}$

Order matters. 0! = 1.

Combinations

${}^nC_r = \binom{n}{r} = \frac{n!}{(n-r)!\,r!}$

Order does not matter. The coefficient is printed on the list, but you must know when to use it.

Vector magnitude and unit vector

$|\mathbf{a}| = \sqrt{x^2 + y^2}, \qquad \hat{\mathbf{a}} = \frac{\mathbf{a}}{|\mathbf{a}|}$

For a = xi + yj, or the column vector with entries x and y.

Vector between two points

$\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$

a and b are the position vectors of A and B.

Velocity vectors

$\text{position} = \mathbf{r}_0 + t\mathbf{v}$

Compose and resolve velocities by adding vectors.

Derivatives of standard functions

$\frac{d}{dx}x^n = nx^{n-1},\ \frac{d}{dx}\sin x = \cos x,\ \frac{d}{dx}\cos x = -\sin x,\ \frac{d}{dx}\tan x = \sec^2 x,\ \frac{d}{dx}e^x = e^x,\ \frac{d}{dx}\ln x = \frac{1}{x}$

n can be any rational number. Angles in radians. No calculus formulas are printed.

Chain rule

$\frac{dy}{dx} = \frac{dy}{du} \times \frac{du}{dx}$

Gives for example d/dx of sin(ax + b) = a cos(ax + b) and of e^(ax) = a e^(ax).

Product rule

$\frac{d}{dx}(uv) = u\frac{dv}{dx} + v\frac{du}{dx}$

Quotient rule

$\frac{d}{dx}\left(\frac{u}{v}\right) = \frac{v\frac{du}{dx} - u\frac{dv}{dx}}{v^2}$

Connected rates of change

$\frac{dy}{dt} = \frac{dy}{dx} \times \frac{dx}{dt}$

Small increments

$\delta y \approx \frac{dy}{dx}\,\delta x$

Use it for small changes and approximations.

Stationary points

$\frac{dy}{dx} = 0; \quad \frac{d^2y}{dx^2} > 0 \Rightarrow \text{minimum}, \ \frac{d^2y}{dx^2} < 0 \Rightarrow \text{maximum}$

Points of inflexion are not included in this syllabus.

Tangent and normal

$m_{\text{normal}} = -\frac{1}{m_{\text{tangent}}}$

Integration of powers

$\int x^n\,dx = \frac{x^{n+1}}{n+1} + c \quad (n \neq -1), \qquad \int \frac{1}{x}\,dx = \ln|x| + c$

Integration of linear functions

$\int (ax+b)^n\,dx = \frac{(ax+b)^{n+1}}{a(n+1)} + c, \qquad \int \frac{1}{ax+b}\,dx = \frac{1}{a}\ln|ax+b| + c$

Integration of trigonometric and exponential functions

$\int \sin(ax+b)\,dx = -\frac{1}{a}\cos(ax+b) + c,\ \int \cos(ax+b)\,dx = \frac{1}{a}\sin(ax+b) + c,\ \int \sec^2(ax+b)\,dx = \frac{1}{a}\tan(ax+b) + c,\ \int e^{ax+b}\,dx = \frac{1}{a}e^{ax+b} + c$

Always add the constant c to an indefinite integral. Angles in radians.

Area under a curve

$\text{Area} = \int_a^b y\,dx$

Areas between a line and a curve, or two curves, use the difference of the two integrals. Split at x-intercepts so areas below the axis do not cancel.

Kinematics

$$v = \frac{ds}{dt}, \qquad a = \frac{dv}{dt} = \frac{d^2s}{dt^2}, \qquad s = \int v\,dt, \qquad v = \int a\,dt$$

Straight-line motion with variable acceleration. Speed is the magnitude of velocity; distance is the total path length.

Modulus function

$$|x| = x \ (x \geq 0), \qquad |x| = -x \ (x < 0)$$

For |ax + b| = c, solve ax + b = c and ax + b = -c. Check solutions against |ax + b| = cx + d.

Using the booklet in the exam

- Look at the list on page 2 of the paper first, then write nothing from memory that is already printed there.
- No calculus is printed, so make a one-page card of every derivative and integral, including ln x, e^x and tan x.
- Arc length and sector area need radians, so switch your calculator to radian mode for them, and for calculus with trigonometry.
- On the binomial theorem, write out the general term with n, r and the powers before simplifying coefficients.
- Read each question for the words 'exact' or 'without a calculator': Paper 1 has no calculator, so you need the exact trig values.

Based on: Cambridge IGCSE Additional Mathematics 0606, Syllabus for 2025, 2026 and 2027, List of formulas; Cambridge O Level Additional Mathematics 4037, Syllabus for 2025, 2026 and 2027, List of formulas. Statistical tables are calculated by CuratedPrep to the same layout. Updated 31 October 2026. Always practise with the version of the official booklet your exam uses. More free sheets and topic worksheets at curatedprep.com.