STUDY FORMULA BOOKLET

Cambridge IGCSE Maths 0580 Extended list of formulas

The Extended list prints the Core formulae plus the quadratic formula, sine rule, cosine rule and triangle area. Pythagoras, trigonometry, circle theorems and statistics are not printed.

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

Based on the official **Cambridge IGCSE Mathematics 0580, List of formulas, printed in the question papers (from 2025)**, with what to learn and exam tips added by CuratedPrep.

Area and circumference

The first three formulas, also on the Core list.

Area of a triangle b is the base and h is the perpendicular height.	$A = \frac{1}{2}bh$	IN THE BOOKLET
Area of a circle r is the radius. Leave answers in terms of π when asked.	$A = \pi r^2$	IN THE BOOKLET
Circumference of a circle r is the radius. Equal to πd if you are given the diameter d.	$C = 2\pi r$	IN THE BOOKLET

Surface area

Cylinder and cone give the curved surface only.

Curved surface area of a cylinder r is the radius and h the height. The two flat circular ends are not included.	$A = 2\pi rh$	IN THE BOOKLET
Curved surface area of a cone r is the radius and l is the sloping edge (slant height), not the vertical 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

Volume of a prism A is the cross-sectional area and l is the length. A prism is any solid with a uniform cross-section.	$V = Al$	IN THE BOOKLET
Volume of a pyramid A is the area of the base and h is the perpendicular height.	$V = \frac{1}{3}Ah$	IN THE BOOKLET
Volume of a cylinder r is the radius and h the height. A cylinder is a prism with a circular cross-section.	$V = \pi r^2 h$	IN THE BOOKLET
Volume of a cone r is the radius and h the perpendicular height, not the sloping edge.	$V = \frac{1}{3}\pi r^2 h$	IN THE BOOKLET
Volume of a sphere r is the radius.	$V = \frac{4}{3}\pi r^3$	IN THE BOOKLET

Quadratic equation

Printed on the Extended list only.

Solution of a quadratic equation Solves ax² + bx + c = 0 where a is not zero. Rearrange to equal zero first, then read off a, b and c with their signs.	$x = \dfrac{-b \pm \sqrt{b^2 - 4ac}}{2a}$	IN THE BOOKLET

Triangle ABC

Printed with a labelled triangle: side a is opposite angle A, b opposite B and c opposite C.

Sine rule Triangle ABC with sides a, b, c opposite angles A, B, C. Use it when you know a matching side and angle pair.	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$	IN THE BOOKLET
Cosine rule Use it for two sides and the included angle, or rearrange it when you know all three sides.	$a^2 = b^2 + c^2 - 2bc\cos A$	IN THE BOOKLET
Area of a triangle with sine C is the angle between sides a and b.	$\text{Area} = \dfrac{1}{2}ab\sin C$	IN THE BOOKLET

Given in the question, not on the list

The syllabus says the formulas for these rates are given in the question when needed, so read the question stem. You do not need to memorise them.

Density Units such as g/cm³ follow from the units of mass and volume.	$\text{density} = \dfrac{\text{mass}}{\text{volume}}$	SEE NOTE
Pressure Check the units given in the question, for example N/m².	$\text{pressure} = \dfrac{\text{force}}{\text{area}}$	SEE NOTE
Population density For example people per km².	$\text{population density} = \dfrac{\text{population}}{\text{area}}$	SEE NOTE

Learn these: not in the booklet

Area and perimeter of a rectangle

$A = lw, \qquad P = 2(l + w)$

Area of a parallelogram

$A = bh$

h is the perpendicular height, not the slanting side.

Area of a trapezium

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

a and b are the parallel sides and h is the distance between them. It is not on the list.

Cuboid volume and surface area

$V = lwh, \qquad \text{surface area} = 2(lw + lh + wh)$

Total surface area of a closed cylinder

$A = 2\pi rh + 2\pi r^2$

Add the two circular ends to the curved area on the list.

Hemisphere

$V = \dfrac{2}{3}\pi r^3, \qquad \text{total surface area} = 3\pi r^2$

Half of the sphere volume, and half of the sphere area plus the flat circle πr².

Frustum of a cone

$V = V_{\text{large cone}} - V_{\text{small cone}}$

Subtract the small cone cut off from the large cone. Find the small cone's size using similar triangles.

Arc length and sector area

$l = \dfrac{\theta}{360} \times 2\pi r, \qquad A = \dfrac{\theta}{360} \times \pi r^2$

θ is the sector angle in degrees and can be any angle, including major sectors.

Pythagoras' theorem

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

c is the hypotenuse. In 3D use d² = l² + w² + h² for the diagonal of a cuboid.

Right-angled trigonometry (SOHCAHTOA)

$$\sin\theta = \frac{\text{opp}}{\text{hyp}}, \quad \cos\theta = \frac{\text{adj}}{\text{hyp}}, \quad \tan\theta = \frac{\text{opp}}{\text{adj}}$$

Also used for angles of elevation and depression and for the angle between a line and a plane.

Exact values for sine and cosine

$\sin 30^\circ = \cos 60^\circ = \frac{1}{2},\ \sin 45^\circ = \cos 45^\circ = \frac{\sqrt{2}}{2},\ \sin 60^\circ = \cos 30^\circ = \frac{\sqrt{3}}{2},\ \sin 0^\circ = \cos 90^\circ = 0,\ \sin 90^\circ = \cos 0^\circ = 1$

Exact values for tangent

$$\tan 0^\circ = 0, \quad \tan 30^\circ = \frac{\sqrt{3}}{3}, \quad \tan 45^\circ = 1, \quad \tan 60^\circ = \sqrt{3}$$

tan 30° can also be written 1/√3. tan 90° is not defined.

Cosine rule for an angle

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

Rearranged from the printed cosine rule. Use it when you know all three sides.

Sine rule for an angle

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

Put the unknown on top when finding an angle. Watch for the ambiguous case, where two triangles fit.

Graphs of sine, cosine and tangent

For 0° to 360°, sin x and cos x repeat every 360° between −1 and 1. tan x repeats every 180° and has asymptotes at 90° and 270°.

Completing the square

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

For a(x + p)² + q the turning point is (−p, q). The quadratic formula is printed but the method is not.

Special factorisations

$$a^2 - b^2 = (a - b)(a + b), \qquad a^2 + 2ab + b^2 = (a + b)^2$$

Rules of indices

$a^m \times a^n = a^{m+n}, \quad a^m \div a^n = a^{m-n}, \quad (a^m)^n = a^{mn}, \quad a^0 = 1$

Learn squares 1 to 15 and the cubes of 1, 2, 3, 4, 5 and 10.

Negative and fractional indices

$$a^{-n} = \frac{1}{a^n}, \qquad a^{\frac{1}{n}} = \sqrt[n]{a}, \qquad a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m$$

Surds

$$\sqrt{a} \times \sqrt{b} = \sqrt{ab}, \qquad \frac{1}{\sqrt{a}} = \frac{\sqrt{a}}{a}, \qquad \frac{1}{a + \sqrt{b}} = \frac{a - \sqrt{b}}{a^2 - b}$$

Multiply top and bottom by the conjugate to rationalise the denominator.

Standard form

$$A \times 10^n, \qquad 1 \le A < 10$$

n is a positive or negative integer.

Recurring decimals to fractions

Let x be the decimal, multiply by 10 or 100 to line up the repeat, subtract, then divide. For 0.777..., 10x − x = 7 gives x = 7/9.

Straight-line graphs

$$y = mx + c, \qquad m = \frac{y_2 - y_1}{x_2 - x_1}$$

Parallel lines have equal gradients. Rearrange ax + by = c into y = mx + c to read the gradient.

Length and midpoint of a line segment

$$\text{length} = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}, \qquad \text{midpoint} = \left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$$

Perpendicular lines

$$m_1 m_2 = -1$$

The perpendicular gradient is the negative reciprocal. For a perpendicular bisector use the midpoint and this gradient.

Direct and inverse proportion

$$y \propto x \Rightarrow y = kx, \quad y \propto x^2 \Rightarrow y = kx^2, \quad y \propto \frac{1}{x} \Rightarrow y = \frac{k}{x}$$

Find k from the given pair of values. The same method works for square root, cube and cube root proportion.

Speed, distance and time

$$\text{speed} = \frac{\text{distance}}{\text{time}}$$

Average speed is total distance over total time. Acceleration is change in speed divided by time, and distance is the area under a speed-time graph.

Compound interest and growth

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

Use 1 − r/100 for depreciation and decay. Simple interest is PRT/100.

Reverse percentages

$$\text{original} = \frac{\text{new value}}{\text{multiplier}}$$

For a 20% increase the multiplier is 1.2. Never take 20% off the new value.

Percentage change

$$\frac{\text{new} - \text{old}}{\text{old}} \times 100$$

Limits of accuracy

$$\text{lower} = x - \frac{u}{2}, \qquad \text{upper} = x + \frac{u}{2}$$

For a+b add upper bounds. For a − b use upper of a minus lower of b. For a ÷ b use upper of a over lower of b.

Similar shapes

$$\text{area scale factor} = k^2, \qquad \text{volume scale factor} = k^3$$

k is the length scale factor. It applies to surface areas and volumes of similar solids.

Polygon angles

$$\text{angle sum} = (n - 2) \times 180^\circ, \qquad \text{exterior angle (regular)} = \frac{360^\circ}{n}$$

Interior angle plus exterior angle is 180°.

Circle theorems I

The angle in a semicircle is 90° and the tangent meets the radius at 90°. The angle at the centre is twice the angle at the circumference. Angles in the same segment are equal. Opposite angles of a cyclic quadrilateral add to 180°. The alternate segment theorem links the tangent-chord angle to the angle in the alternate segment.

Circle theorems II

Equal chords are the same distance from the centre. The perpendicular bisector of a chord passes through the centre. Tangents from an external point are equal in length.

Probability rules

$P(A') = 1 - P(A), \qquad P(A \cap B) = P(A) \times P(B) \text{ (independent)}, \qquad P(A \cup B) = P(A) + P(B) - P(A \cap B)$

For mutually exclusive events the last term is zero. Without replacement, reduce the denominator on the second branch.

Conditional probability

$$P(\text{A given B}) = \frac{\text{outcomes in both A and B}}{\text{outcomes in B}}$$

Find it from a table, Venn diagram or tree diagram. The syllabus does not require the P(A|B) notation.

Sets

$n(A \cup B) = n(A) + n(B) - n(A \cap B)$

Learn the symbols: ∈, ∉, A′, ∅, ⊆, ∪ and ∩.

Mean from a table

$$\bar{x} = \frac{\sum fx}{\sum f}$$

For grouped data use the midpoint of each class as x to give an estimate of the mean.

Quartiles and interquartile range

$\text{IQR} = Q_3 - Q_1$

On a cumulative frequency diagram read the lower quartile at ¼n, the median at ½n and the upper quartile at ¾ of the total.

Histograms

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

The area of each bar is the frequency.

Sequences

$T_n = dn + (a - d), \qquad T_n = ar^{n-1}$

The first is linear and the second is exponential (geometric), for example 3, 6, 12, 24. A quadratic nth term $an^2 + bn + c$ has second difference 2a.

Vectors

$$\left|\begin{pmatrix} x \\ y \end{pmatrix}\right| = \sqrt{x^2 + y^2}, \qquad \overrightarrow{AB} = \mathbf{b} - \mathbf{a}$$

Parallel vectors are scalar multiples of each other. Use this to show points are collinear.

Functions

$fg(x) = f\big(g(x)\big)$

Do g first. For the inverse $f^{-1}(x)$, write y = f(x), swap x and y, and make y the subject.

Differentiation

$$\frac{d}{dx}\left(ax^n\right) = anx^{n-1}$$

Set dy/dx = 0 for turning points. Positive second derivative is a minimum and negative is a maximum.

Using the booklet in the exam

- Open page 2 at the start of Paper 2 and Paper 4 and tick off what is printed, so you only recall what is missing.
- The sine rule, cosine rule and area formula use lowercase sides opposite capital angles, so label the triangle before substituting.
- Rearrange the cosine rule to find an angle before the exam, because only the side form is printed.
- Paper 2 has no calculator, so learn the exact trigonometric values and leave answers in surd form or in terms of π when asked.
- For the quadratic formula, write a, b and c with their signs first, and use brackets around negative b.

Based on: Cambridge IGCSE Mathematics 0580 (Extended), List of formulas, page 2 of Paper 2 and Paper 4, printed in the question papers from 2025; Cambridge IGCSE Mathematics 0580 syllabus for 2025, 2026 and 2027, Details of the assessment: List of formulas, Extended. 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.