FORMULA SHEET

Cambridge IGCSE Mathematics (0580)

0580 (exams 2025–2030) · v2 Oct 2026

★ Learn it: not on the 0580 list of formulas 🕮 On the list of formulas Ext Extended tier only

Number

★ **Indices:** $a^m \times a^n = a^{m+n}$, $a^m \div a^n = a^{m-n}$, $(a^m)^n = a^{mn}$, $a^0 = 1$, $a^{-n} = \frac{1}{a^n}$

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★ **Fractional indices** Ext: $a^{\frac{1}{n}} = \sqrt[n]{a}$, $a^{\frac{m}{n}} = \left(\sqrt[n]{a}\right)^m$

★ **Standard form:** $A \times 10^n$, $1 \le A < 10$, $n \in \mathbb{Z}$

★ **Sets:** $n(A \cup B) = n(A) + n(B) - n(A \cap B)$

★ **Percentage change:** $\frac{\text{new} - \text{original}}{\text{original}} \times 100\%$

★ **Reverse percentage** Ext: $\text{original} = \frac{\text{new}}{1 \pm \frac{r}{100}}$

★ **Simple interest (rate r% a year, n years):** $I = \frac{Prn}{100}$

★ **Compound interest:** $A = P\left(1 + \frac{r}{100}\right)^n$

★ **Growth and decay** Ext: $y = a \times k^n$: $k > 1$ growth, $0 < k < 1$ decay

★ **Surds** Ext: $\sqrt{ab} = \sqrt{a}\sqrt{b}$, $\frac{a}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$, $\frac{1}{c+\sqrt{b}} = \frac{c-\sqrt{b}}{c^2-b}$

★ **Recurring decimal:** $x = 0.\dot{4}\dot{5}$, so $100x - x = 45$ and $x = \frac{45}{99} = \frac{5}{11}$ Ext

★ **Bounds:** a value to the nearest u lies in $\left[x - \frac{u}{2},\ x + \frac{u}{2}\right)$

★ **Bounds in calculations:** for the largest $a - b$ or $a \div b$ use the upper bound of a with the lower bound of b Ext

★ **Rates:** $\text{speed} = \frac{\text{distance}}{\text{time}}$, $\text{density} = \frac{\text{mass}}{\text{volume}}$, $\text{pressure} = \frac{\text{force}}{\text{area}}$

Algebra & graphs

🕮 Quadratic formula, $ax^2 + bx + c = 0$ Ext: $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

★ **Completing the square** Ext: $x^2 + bx + c = \left(x + \frac{b}{2}\right)^2 - \frac{b^2}{4} + c$

★ **Difference of two squares** Ext: $a^2 - b^2 = (a+b)(a-b)$

★ **Linear sequence, nth term:** $u_n = a + (n-1)d$

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★ **Exponential sequence** Ext: $u_n = ar^{n-1}$

★ **Proportion** Ext: $y \propto x^n \Rightarrow y = kx^n$; $y \propto \frac{1}{x^n} \Rightarrow y = \frac{k}{x^n}$

★ **Functions** Ext: $fg(x) = f\big(g(x)\big)$; f^{-1}: swap x, y and rearrange

★ **Inequalities:** multiplying or dividing by a negative number reverses the sign

★ **Straight line:** $y = mx + c$, gradient m, y-intercept c; vertical line $x = k$

★ **Gradient from two points** Ext: $m = \frac{y_2 - y_1}{x_2 - x_1}$

★ **Midpoint; length** Ext: $\left(\frac{x_1+x_2}{2}, \frac{y_1+y_2}{2}\right)$, $\sqrt{(x_2-x_1)^2 + (y_2-y_1)^2}$

★ **Parallel lines:** $m_1 = m_2$

★ **Perpendicular lines** Ext: $m_1 \times m_2 = -1$

★ **Differentiation** Ext: $y = ax^n \Rightarrow \frac{dy}{dx} = anx^{n-1}$

★ **Turning points:** $\frac{dy}{dx} = 0$; the gradient of the curve at $x = a$ is the value of $\frac{dy}{dx}$ at a Ext

Probability & statistics

★ **Probability:** $P(\text{not } A) = 1 - P(A)$; $\text{expected frequency} = n \times P(A)$

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★ **Relative frequency:** $\frac{\text{frequency of the outcome}}{\text{number of trials}}$

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

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

★ **Conditional** Ext: $P(A \mid B) = \frac{P(A \cap B)}{P(B)}$

★ **Tree diagrams:** multiply along branches, add the outcomes you want

★ **Without replacement:** the second-branch probabilities change (one fewer item) Ext

★ **Mean from a frequency table:** $\bar{x} = \frac{\sum fx}{\sum f}$

★ **Estimated mean, grouped data (class midpoints m)** Ext: $\bar{x} \approx \frac{\sum fm}{\sum f}$

★ **Median position (n values in order):** $\frac{n+1}{2}$th value

★ **Range:** largest − smallest

★ **Interquartile range** Ext: $Q_3 - Q_1$

★ **Histogram** Ext: $\text{frequency density} = \frac{\text{frequency}}{\text{class width}}$

Geometry & mensuration

★ **Angles:** on a straight line $180°$; around a point $360°$; in a triangle $180°$

★ **Polygons (n sides):** $\text{interior sum} = (n-2) \times 180°$, $\text{exterior angle (regular)} = \frac{360°}{n}$

★ **Circle theorems:** angle in a semicircle = 90°; tangent ⊥ radius

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★ **More circle theorems:** angle at centre = 2 × angle at circumference; angles in the same segment are equal; opposite angles of a cyclic quadrilateral sum to 180°; alternate segment theorem; tangents from a point are equal; the perpendicular bisector of a chord passes through the centre Ext

🕮 Triangle: $A = \frac{1}{2}bh$

★ **Parallelogram; trapezium:** $A = bh$; $A = \frac{1}{2}(a+b)h$

🕮 Circle: $A = \pi r^2$, $C = 2\pi r$

★ **Arc; sector (angle θ):** $\text{arc} = \frac{\theta}{360} \times 2\pi r$, $\text{sector} = \frac{\theta}{360} \times \pi r^2$

🕮 Curved surface: cylinder; cone (slant l): $A = 2\pi rh$; $A = \pi rl$

🕮 Sphere, surface area: $A = 4\pi r^2$

🕮 Prism; pyramid: $V = Al$; $V = \frac{1}{3}Ah$

🕮 Cylinder; cone: $V = \pi r^2 h$; $V = \frac{1}{3}\pi r^2 h$

🕮 Sphere, volume: $V = \frac{4}{3}\pi r^3$

★ **Similar shapes, scale factor k:** lengths $\times k$

★ **Similar shapes:** areas $\times k^2$, volumes $\times k^3$ Ext

Trigonometry & vectors

★ **Pythagoras:** $a^2 + b^2 = c^2$

★ **SOHCAHTOA:** $\sin\theta = \frac{\text{opp}}{\text{hyp}}$, $\cos\theta = \frac{\text{adj}}{\text{hyp}}$, $\tan\theta = \frac{\text{opp}}{\text{adj}}$

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★ **Bearings:** measured clockwise from north, written with 3 figures

★ **Exact values** Ext: $\sin 30° = \frac{1}{2}$, $\cos 60° = \frac{1}{2}$, $\tan 45° = 1$, $\sin 60° = \frac{\sqrt{3}}{2}$, $\sin 45° = \frac{\sqrt{2}}{2}$

🕮 Sine rule Ext: $\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$

🕮 Cosine rule Ext: $a^2 = b^2 + c^2 - 2bc\cos A$

🕮 Area of a triangle Ext: $\frac{1}{2}ab\sin C$

★ **Obtuse angles** Ext: $\sin(180° - x) = \sin x$, $\cos(180° - x) = -\cos x$

★ **Vectors:** add and subtract column vectors component by component; $k\begin{pmatrix}x\\y\end{pmatrix} = \begin{pmatrix}kx\\ky\end{pmatrix}$ Ext

★ **Magnitude; position vectors** Ext: $\left|\begin{pmatrix}x\\y\end{pmatrix}\right| = \sqrt{x^2+y^2}$, $\overrightarrow{AB} = \mathbf{b} - \mathbf{a}$

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