STUDY FORMULA BOOKLET

AQA A Level Mathematics 7357 formulae booklet

The AQA booklet prints binomial, series, trig identities, derivatives, integrals, SUVAT and statistics results. The quadratic formula, sine rule and basic calculus are not printed.

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

Based on the official **AQA Formulae for A-level Mathematics: AS Mathematics (7356), A-level Mathematics (7357), v1.2, first issued August 2017 (MFB8)**, with what to learn and exam tips added by CuratedPrep.

Binomial series

Pure mathematics section of the booklet.

Binomial expansion, positive integer n Pure mathematics. Valid for every a and b.	$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \cdots + \binom{n}{r}a^{n-r}b^r + \cdots + b^n \quad (n \in \mathbb{N})$	IN THE BOOKLET
Binomial coefficient Also on your calculator as nCr.	$\binom{n}{r} = {}^nC_r = \frac{n!}{r!\,(n-r)!}$	IN THE BOOKLET
Binomial expansion, any rational n Needs |x| < 1. For a bracket like (a + bx) raised to a power, take out the constant factor first to reach the (1 + x) form.	$(1+x)^n = 1 + nx + \frac{n(n-1)}{1\times 2}x^2 + \cdots + \frac{n(n-1)\ldots(n-r+1)}{1\times 2\times\cdots\times r}x^r + \ldots \quad (\lvert x\rvert < 1,\ n \in \mathbb{Q})$	IN THE BOOKLET

Arithmetic series

Sum of n terms a is the first term, l the last term, d the common difference.	$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\left[2a + (n-1)d\right]$	IN THE BOOKLET

Geometric series

Sum of n terms a is the first term, r the common ratio (r not equal to 1).	$S_n = \frac{a(1-r^n)}{1-r}$	IN THE BOOKLET
Sum to infinity Only exists when the series converges.	$S_\infty = \frac{a}{1-r} \quad \text{for } \lvert r\rvert < 1$	IN THE BOOKLET

Trigonometry: small angles

Small angle sine θ in radians and small.	$\sin\theta \approx \theta$	IN THE BOOKLET
Small angle cosine θ in radians and small.	$\cos\theta \approx 1 - \frac{\theta^2}{2}$	IN THE BOOKLET
Small angle tangent θ in radians and small.	$\tan\theta \approx \theta$	IN THE BOOKLET

Trigonometric identities

sin of a sum or difference	$\sin(A \pm B) = \sin A\cos B \pm \cos A\sin B$	IN THE BOOKLET
cos of a sum or difference The sign flips: cos (A + B) has a minus.	$\cos(A \pm B) = \cos A\cos B \mp \sin A\sin B$	IN THE BOOKLET

tan of a sum or difference Again the sign in the denominator flips.	$\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B} \quad \left(A \pm B \neq \left(k + \frac{1}{2}\right)\pi\right)$	IN THE BOOKLET

Differentiation

Derivative of tan x Pure mathematics. f(x) = tan x gives f'(x) = sec squared x.	$\dfrac{d}{dx}(\tan x) = \sec^2 x$	IN THE BOOKLET
Derivative of cosec x	$\dfrac{d}{dx}(\operatorname{cosec} x) = -\operatorname{cosec} x \cot x$	IN THE BOOKLET
Derivative of sec x	$\dfrac{d}{dx}(\sec x) = \sec x \tan x$	IN THE BOOKLET
Derivative of cot x	$\dfrac{d}{dx}(\cot x) = -\operatorname{cosec}^2 x$	IN THE BOOKLET
Quotient rule Differentiate the top times the bottom, minus the top times the differentiated bottom, all over the bottom squared.	$\dfrac{d}{dx}\left(\dfrac{f(x)}{g(x)}\right) = \dfrac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$	IN THE BOOKLET

Differentiation from first principles

Definition of the derivative Used when a question says differentiate from first principles.	$f'(x) = \lim_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$	IN THE BOOKLET

Integration

Integration by parts Choose u so that du/dx is simpler than u.	$\displaystyle\int u \frac{dv}{dx}\,dx = uv - \int v \frac{du}{dx}\,dx$	IN THE BOOKLET
Integral of f' over f Numerator is the derivative of the denominator.	$\displaystyle\int \frac{f'(x)}{f(x)}\,dx = \ln\lvert f(x)\rvert + c$	IN THE BOOKLET
Integral of tan x Equivalent to minus ln |cos x|.	$\displaystyle\int \tan x\,dx = \ln\lvert\sec x\rvert + c$	IN THE BOOKLET
Integral of cot x	$\displaystyle\int \cot x\,dx = \ln\lvert\sin x\rvert + c$	IN THE BOOKLET

Numerical solution of equations

Newton-Raphson iteration Solves f(x) = 0. Fails if the derivative at the current estimate is zero or close to it.	$x_{n+1} = x_n - \dfrac{f(x_n)}{f'(x_n)}$	IN THE BOOKLET

Numerical integration

Trapezium rule n is the number of strips, so there are n + 1 ordinates, y0 to yn.	$\displaystyle\int_a^b y\,dx \approx \tfrac{1}{2}h\{(y_0 + y_n) + 2(y_1 + y_2 + \cdots + y_{n-1})\}, \quad h = \dfrac{b-a}{n}$	IN THE BOOKLET

Constant acceleration

Mechanics section of the booklet. Valid only when acceleration is constant.

Displacement, using u Mechanics. Scalar form, straight line motion.	$s = ut + \tfrac{1}{2}at^2$	IN THE BOOKLET

Displacement, using u (vector) Vector form.	$\mathbf{s} = \mathbf{u}t + \frac{1}{2}\mathbf{a}t^2$	IN THE BOOKLET
Displacement, using v Starts from the final velocity.	$s = vt - \frac{1}{2}at^2$	IN THE BOOKLET
Displacement, using v (vector) Vector form.	$\mathbf{s} = \mathbf{v}t - \frac{1}{2}\mathbf{a}t^2$	IN THE BOOKLET
Final velocity Scalar form.	$v = u + at$	IN THE BOOKLET
Final velocity (vector) Vector form.	$\mathbf{v} = \mathbf{u} + \mathbf{a}t$	IN THE BOOKLET
Displacement, using the average velocity Scalar form.	$s = \frac{1}{2}(u + v)t$	IN THE BOOKLET
Displacement, using the average velocity (vector) Vector form.	$\mathbf{s} = \frac{1}{2}(\mathbf{u} + \mathbf{v})t$	IN THE BOOKLET
Velocity without time Scalar form only: there is no vector version.	$v^2 = u^2 + 2as$	IN THE BOOKLET

Probability

Addition rule Probability and statistics section of the booklet.	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	IN THE BOOKLET
Multiplication rule If A and B are independent, P(B | A) = P(B).	$P(A \cap B) = P(A) \times P(B \mid A)$	IN THE BOOKLET

Standard deviation

Standard deviation Population form, dividing by n. The second form is quicker with a table.	$\sqrt{\frac{\Sigma(x - \bar{x})^2}{n}} = \sqrt{\frac{\Sigma x^2}{n} - \bar{x}^2}$	IN THE BOOKLET

Discrete distributions

Binomial B(n, p): probability The booklet's table of discrete distributions lists binomial only (no Poisson at A Level Mathematics).	$P(X = x) = \binom{n}{x} p^x (1 - p)^{n - x}$	IN THE BOOKLET
Binomial B(n, p): mean n is the number of trials, p the probability of success.	$E(X) = np$	IN THE BOOKLET
Binomial B(n, p): variance	$\mathrm{Var}(X) = np(1 - p)$	IN THE BOOKLET

Sampling distributions

Distribution of the sample mean For a random sample of n observations from N(μ, σ²). Use it for hypothesis tests on a mean with known σ.	$\frac{\bar{X} - \mu}{\frac{\sigma}{\sqrt{n}}} \sim N(0, 1)$	IN THE BOOKLET

Learn these: not in the booklet

Quadratic formula

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

Laws of indices

$$a^x \times a^y = a^{x+y},\ a^x \div a^y = a^{x-y},\ (a^x)^y = a^{xy}$$

Logarithms

$$x = a^n \Leftrightarrow n = \log_a x\ (a > 0,\ x > 0)$$

Laws of logarithms

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

Straight line

$$y - y_1 = m(x - x_1)$$

Line through (x1, y1) with gradient m.

Perpendicular lines

$$m_1 m_2 = -1$$

Parallel lines have equal gradients.

Arithmetic nth term

$$u_n = a + (n-1)d$$

Geometric nth term

$$u_n = ar^{n-1}$$

Sine rule

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

Cosine rule

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

Area of a triangle

$$\tfrac{1}{2}ab\sin C$$

Pythagorean identities

$$\cos^2 A + \sin^2 A \equiv 1,\ \sec^2 A \equiv 1 + \tan^2 A,\ \operatorname{cosec}^2 A \equiv 1 + \cot^2 A$$

Double angle

$$\sin 2A \equiv 2\sin A\cos A,\ \cos 2A \equiv \cos^2 A - \sin^2 A,\ \tan 2A \equiv \frac{2\tan A}{1 - \tan^2 A}$$

Tangent identity

$$\tan\theta = \frac{\sin\theta}{\cos\theta}$$

Circle

$$C = 2\pi r = \pi d,\ A = \pi r^2$$

Pythagoras

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

Trapezium and prism

$$\text{Area of trapezium} = \tfrac{1}{2}(a+b)h,\ \text{Volume of prism} = \text{area of cross section} \times \text{length}$$

Arc and sector (radians)

$$s = r\theta,\ A = \tfrac{1}{2}r^2\theta$$

Derivatives

$$\frac{d}{dx}x^n = nx^{n-1},\ \frac{d}{dx}\sin kx = k\cos kx,\ \frac{d}{dx}\cos kx = -k\sin kx,\ \frac{d}{dx}e^{kx} = ke^{kx},\ \frac{d}{dx}\ln x = \frac{1}{x}$$

Product and chain rules

$$(fg)' = f'g + fg',\quad \frac{d}{dx}f(g(x)) = f'(g(x))\,g'(x)$$

The quotient rule is printed in the booklet; these two are not.

Integrals

$$\int x^n\,dx = \frac{x^{n+1}}{n+1} + c\ (n \neq -1),\ \int \cos kx\,dx = \frac{\sin kx}{k} + c,\ \int \sin kx\,dx = -\frac{\cos kx}{k} + c,\ \int e^{kx}dx = \frac{e^{kx}}{k} + c,\ \int \frac{1}{x}dx = \ln|x| + c\ (x \neq 0)$$

Area under a curve

$$\text{Area} = \int_a^b y\,dx \quad (y \geq 0)$$

Magnitude of a vector

$$|x\mathbf{i} + y\mathbf{j} + z\mathbf{k}| = \sqrt{x^2 + y^2 + z^2}$$

Forces

$$\text{Weight} = mg,\ F \leq \mu R,\ F = ma$$

Variable acceleration

$$v = \frac{dr}{dt},\ a = \frac{dv}{dt} = \frac{d^2r}{dt^2},\ r = \int v\,dt,\ v = \int a\,dt$$

Mean of data

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

Standard normal variable

$$Z = \frac{X - \mu}{\sigma} \text{ where } X \sim N(\mu, \sigma^2)$$

Exact trigonometric values

$$\sin\tfrac{\pi}{6} = \tfrac{1}{2},\ \cos\tfrac{\pi}{6} = \tfrac{\sqrt{3}}{2},\ \tan\tfrac{\pi}{6} = \tfrac{1}{\sqrt{3}},\ \sin\tfrac{\pi}{4} = \cos\tfrac{\pi}{4} = \tfrac{1}{\sqrt{2}},\ \sin\tfrac{\pi}{3} = \tfrac{\sqrt{3}}{2},\ \cos\tfrac{\pi}{3} = \tfrac{1}{2},\ \tan\tfrac{\pi}{3} = \sqrt{3}$$

Using the booklet in the exam

- Learn the recall list first: the quadratic formula, sine and cosine rules, double angles and the basic derivatives and integrals are not printed.
- Tab the booklet before the exam: trigonometric identities, the differentiation table and SUVAT are the pages you will use most.
- The booklet prints the quotient rule but not the product or chain rule, so check which rule a question needs before looking anything up.

- The cos and tan identities flip the sign: cos (A + B) has a minus between its terms. Write the sign line out carefully.
- For the Newton-Raphson and trapezium rule questions, write the printed formula first and substitute after: marks are given for the method as well as the answer.

Based on: AQA A Level Mathematics 7357 (and AS 7356), Formulae for A-level Mathematics, v1.2, first issued August 2017; AQA A Level Mathematics 7357 specification, Appendix B: mathematical formulae and identities. 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.