FORMULA SHEET

A Level maths formula booklet: what is given and what to learn

The Edexcel 9MA0 booklet prints series sums, addition identities, some derivatives and integrals, the SUVAT equations and a few statistics results. You must still recall most standard rules.

IN THE BOOKLET printed in the official booklet or sheet in the exam LEARN IT students must recall it

Algebra, sequences and series

The booklet prints the series sums and both binomial expansions, but not the nth term formulas.

Binomial expansion, positive integer n n is a positive integer. The binomial coefficient is also written nCr.	$(a+b)^n = a^n + \binom{n}{1}a^{n-1}b + \binom{n}{2}a^{n-2}b^2 + \cdots + \binom{n}{r}a^{n-r}b^r + \cdots + b^n$	IN THE BOOKLET
Binomial coefficient	$\binom{n}{r} = {}^nC_r = \frac{n!}{r!\,(n-r)!}$	IN THE BOOKLET
Binomial expansion, any n Valid for |x| < 1 and any real n. For (a+bx)^n, take out a^n first.	$(1+x)^n = 1 + nx + \frac{n(n-1)}{1\times 2}x^2 + \cdots + \frac{n(n-1)\cdots(n-r+1)}{1\times 2\times\cdots\times r}x^r + \ldots$	IN THE BOOKLET
Arithmetic series, sum of n terms a is the first term, d the common difference, l the last term.	$S_n = \frac{1}{2}n(a+l) = \frac{1}{2}n\left[2a+(n-1)d\right]$	IN THE BOOKLET
Geometric series, sum of n terms r is the common ratio.	$S_n = \frac{a(1-r^n)}{1-r}$	IN THE BOOKLET
Geometric series, sum to infinity Only valid when the series converges.	$S_\infty = \frac{a}{1-r} \quad \text{for } \lvert r\rvert < 1$	IN THE BOOKLET
Arithmetic progression, nth term	$u_n = a + (n-1)d$	LEARN IT
Geometric progression, nth term	$u_n = ar^{n-1}$	LEARN IT

Quadratics, indices and logarithms

Only the change of base and the exponential identity are printed. The log laws are not.

Quadratic formula For $ax^2+bx+c=0$. Not in the booklet.	$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$	LEARN IT
Laws of indices	$a^x a^y = a^{x+y}, \quad a^x \div a^y = a^{x-y}, \quad (a^x)^y = a^{xy}$	LEARN IT
Change of base	$\log_a x = \frac{\log_b x}{\log_b a}$	IN THE BOOKLET
Exponential identity	$e^{x\ln a} = a^x$	IN THE BOOKLET
Definition of a logarithm	$x = a^n \iff n = \log_a x \quad (a>0,\ x>0)$	LEARN IT
Sum and difference of logs	$\log_a x + \log_a y = \log_a(xy), \quad \log_a x - \log_a y = \log_a\left(\frac{x}{y}\right)$	LEARN IT
Power law of logs	$k\log_a x = \log_a(x^k)$	LEARN IT

Trigonometry

The addition and sum to product identities are printed. The sine rule, cosine rule and double angle identities are not.

Sine addition	$\sin(A \pm B) = \sin A \cos B \pm \cos A \sin B$	IN THE BOOKLET
Cosine addition Note the sign flips.	$\cos(A \pm B) = \cos A \cos B \mp \sin A \sin B$	IN THE BOOKLET
Tangent addition	$\tan(A \pm B) = \dfrac{\tan A \pm \tan B}{1 \mp \tan A \tan B} \quad \left(A \pm B \neq (k + \frac{1}{2})\pi\right)$	IN THE BOOKLET
Sum of sines	$\sin A + \sin B = 2 \sin \dfrac{A+B}{2} \cos \dfrac{A-B}{2}$	IN THE BOOKLET
Difference of sines	$\sin A - \sin B = 2 \cos \dfrac{A+B}{2} \sin \dfrac{A-B}{2}$	IN THE BOOKLET
Sum of cosines	$\cos A + \cos B = 2 \cos \dfrac{A+B}{2} \cos \dfrac{A-B}{2}$	IN THE BOOKLET
Difference of cosines	$\cos A - \cos B = -2 \sin \dfrac{A+B}{2} \sin \dfrac{A-B}{2}$	IN THE BOOKLET
Small angle approximations Only when θ is in radians.	$\sin\theta \approx \theta, \quad \cos\theta \approx 1 - \dfrac{\theta^2}{2}, \quad \tan\theta \approx \theta$	IN THE BOOKLET
Sine rule	$\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$	LEARN IT
Cosine rule	$a^2 = b^2 + c^2 - 2bc\cos A$	LEARN IT
Area of a triangle	$\text{Area} = \frac{1}{2}ab\sin C$	LEARN IT
Pythagorean identities	$\cos^2 A + \sin^2 A = 1, \quad \sec^2 A = 1 + \tan^2 A, \quad \operatorname{cosec}^2 A = 1 + \cot^2 A$	LEARN IT
Double angle identities	$\sin 2A = 2\sin A \cos A, \quad \cos 2A = \cos^2 A - \sin^2 A, \quad \tan 2A = \dfrac{2\tan A}{1 - \tan^2 A}$	LEARN IT
Arc length and sector area Angle θ in radians.	$s = r\theta, \quad A = \frac{1}{2}r^2\theta$	LEARN IT

Differentiation

The booklet prints first principles, the reciprocal trig derivatives and the quotient rule. The basic derivatives, product rule and chain rule are not printed.

First principles	$f'(x) = \lim\limits_{h \to 0} \dfrac{f(x+h) - f(x)}{h}$	IN THE BOOKLET
Tangent	$f(x) = \tan kx \;\Rightarrow\; f'(x) = k\sec^2 kx$	IN THE BOOKLET
Secant	$f(x) = \sec kx \;\Rightarrow\; f'(x) = k\sec kx \tan kx$	IN THE BOOKLET
Cotangent	$f(x) = \cot kx \;\Rightarrow\; f'(x) = -k\operatorname{cosec}^2 kx$	IN THE BOOKLET
Cosecant	$f(x) = \operatorname{cosec} kx \;\Rightarrow\; f'(x) = -k\operatorname{cosec} kx \cot kx$	IN THE BOOKLET
Quotient rule	$\dfrac{d}{dx}\left(\dfrac{f(x)}{g(x)}\right) = \dfrac{f'(x)g(x) - f(x)g'(x)}{(g(x))^2}$	IN THE BOOKLET
Power of x	$\dfrac{d}{dx}(x^n) = nx^{n-1}$	LEARN IT
Sine and cosine	$\dfrac{d}{dx}(\sin kx) = k\cos kx, \quad \dfrac{d}{dx}(\cos kx) = -k\sin kx$	LEARN IT

Exponential and log	$\frac{d}{dx}(e^{kx}) = ke^{kx}, \quad \frac{d}{dx}(\ln x) = \frac{1}{x}$	LEARN IT
Exponential with base a Stated in the specification guidance as a result students are expected to know.	$\frac{d}{dx}(a^{kx}) = ka^{kx}\ln a$	LEARN IT
Sum rule	$\frac{d}{dx}[f(x)+g(x)] = f'(x)+g'(x)$	LEARN IT
Product rule	$\frac{d}{dx}[f(x)g(x)] = f'(x)g(x)+f(x)g'(x)$	LEARN IT
Chain rule	$\frac{d}{dx}[f(g(x))] = f'(g(x))\,g'(x)$	LEARN IT

Integration

The booklet prints the trig integrals and integration by parts. The standard integrals of powers, sine, cosine and exponentials are not printed.

Secant squared	$\int \sec^2 kx\,dx = \frac{1}{k}\tan kx + c$	IN THE BOOKLET
Tangent	$\int \tan kx\,dx = \frac{1}{k}\ln\lvert\sec kx\rvert + c$	IN THE BOOKLET
Cotangent	$\int \cot kx\,dx = \frac{1}{k}\ln\lvert\sin kx\rvert + c$	IN THE BOOKLET
Cosecant Two equivalent forms are printed.	$\int \operatorname{cosec} kx\,dx = -\frac{1}{k}\ln\lvert\operatorname{cosec} kx+\cot kx\rvert + c = \frac{1}{k}\ln\left\lvert\tan\left(\frac{1}{2}kx\right)\right\rvert + c$	IN THE BOOKLET
Secant Two equivalent forms are printed.	$\int \sec kx\,dx = \frac{1}{k}\ln\lvert\sec kx+\tan kx\rvert + c = \frac{1}{k}\ln\left\lvert\tan\left(\frac{1}{2}kx+\frac{1}{4}\pi\right)\right\rvert + c$	IN THE BOOKLET
Integration by parts	$\int u\frac{dv}{dx}\,dx = uv - \int v\frac{du}{dx}\,dx$	IN THE BOOKLET
Power of x	$\int x^n\,dx = \frac{1}{n+1}x^{n+1} + c \quad (n \neq -1)$	LEARN IT
Cosine and sine	$\int \cos kx\,dx = \frac{1}{k}\sin kx + c, \quad \int \sin kx\,dx = -\frac{1}{k}\cos kx + c$	LEARN IT
Exponential and 1 over x	$\int e^{kx}\,dx = \frac{1}{k}e^{kx} + c, \quad \int \frac{1}{x}\,dx = \ln\lvert x\rvert + c\ (x \neq 0)$	LEARN IT
Reverse chain rule	$\int f'(g(x))\,g'(x)\,dx = f(g(x)) + c$	LEARN IT
Area under a curve	$\text{Area} = \int_a^b y\,dx \quad (y \geq 0)$	LEARN IT

Numerical methods

Trapezium rule n is the number of strips, so there are n+1 ordinates.	$\int_a^b y\,dx \approx \frac{1}{2}h\{(y_0+y_n)+2(y_1+y_2+\cdots+y_{n-1})\}, \quad h = \frac{b-a}{n}$	IN THE BOOKLET
Newton-Raphson iteration Solves f(x)=0. It fails if f'(x_n) is zero or close to zero.	$x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$	IN THE BOOKLET

Coordinate geometry, vectors and mensuration

Only the sphere and cone areas are printed. Everything else here is recall.

Surface area of a sphere	$A = 4\pi r^2$	IN THE BOOKLET
Curved surface area of a cone	$A = \pi r \times \text{slant height}$	IN THE BOOKLET
Circle	$C = 2\pi r = \pi d, \quad A = \pi r^2$	LEARN IT
Trapezium a and b are the parallel sides, h the perpendicular distance between them.	$\text{Area} = \frac{1}{2}(a+b)h$	LEARN IT
Prism	$\text{Volume} = \text{area of cross section} \times \text{length}$	LEARN IT
Equation of a straight line Gradient m, passing through (x1, y1).	$y - y_1 = m(x - x_1)$	LEARN IT
Perpendicular lines	$m_1 m_2 = -1$	LEARN IT
Magnitude of a vector	$\lvert x\mathbf{i} + y\mathbf{j} + z\mathbf{k}\rvert = \sqrt{x^2 + y^2 + z^2}$	LEARN IT

Statistics

The booklet also prints the binomial cumulative tables, normal percentage points, product moment correlation critical values and random numbers.

Complement	$P(A') = 1 - P(A)$	IN THE BOOKLET
Addition law	$P(A \cup B) = P(A) + P(B) - P(A \cap B)$	IN THE BOOKLET
Multiplication law	$P(A \cap B) = P(A)\,P(B \mid A)$	IN THE BOOKLET
Conditional probability (Bayes form)	$P(A \mid B) = \dfrac{P(B \mid A)P(A)}{P(B \mid A)P(A) + P(B \mid A')P(A')}$	IN THE BOOKLET
Independent events	$P(B \mid A) = P(B), \quad P(A \mid B) = P(A), \quad P(A \cap B) = P(A)P(B)$	IN THE BOOKLET
Standard deviation	$\text{Standard deviation} = \sqrt{\text{Variance}}$	IN THE BOOKLET
Interquartile range	$\text{IQR} = Q_3 - Q_1$	IN THE BOOKLET
Sxx	$S_{xx} = \sum (x_i - \bar{x})^2 = \sum x_i^2 - \dfrac{(\sum x_i)^2}{n}$	IN THE BOOKLET
Standard deviation from Sxx	$\sigma = \sqrt{\dfrac{S_{xx}}{n}}$ or $\sqrt{\dfrac{\sum x^2}{n} - \bar{x}^2}$	IN THE BOOKLET
Binomial distribution, probability X is B(n, p).	$P(X = x) = \binom{n}{x} p^x (1-p)^{n-x}$	IN THE BOOKLET
Binomial distribution, mean and variance	$E(X) = np, \quad \text{Var}(X) = np(1-p)$	IN THE BOOKLET
Sample mean of a normal population For a random sample of n observations from N(μ, sigma squared).	$\dfrac{\bar{X} - \mu}{\sigma/\sqrt{n}} \sim N(0,1)$	IN THE BOOKLET
Mean of a data set	$\bar{x} = \dfrac{\sum x}{n} = \dfrac{\sum fx}{\sum f}$	LEARN IT
Standardising a normal variable	$Z = \dfrac{X - \mu}{\sigma} \quad \text{where } X \sim N(\mu, \sigma^2)$	LEARN IT

Mechanics

Only the constant acceleration equations are printed. The force and variable acceleration results are not.

Constant acceleration: velocity u initial velocity, v final velocity, a acceleration, t time, s displacement.	$v = u + at$	IN THE BOOKLET
Constant acceleration: displacement from u	$s = ut + \frac{1}{2}at^2$	IN THE BOOKLET
Constant acceleration: displacement from v	$s = vt - \frac{1}{2}at^2$	IN THE BOOKLET
Constant acceleration: no time	$v^2 = u^2 + 2as$	IN THE BOOKLET
Constant acceleration: average velocity	$s = \frac{1}{2}(u + v)t$	IN THE BOOKLET
Variable acceleration Use when acceleration changes with time. Do not use the equations of constant acceleration.	$v = \frac{dr}{dt}, \quad a = \frac{dv}{dt} = \frac{d^2r}{dt^2}, \quad r = \int v\,dt, \quad v = \int a\,dt$	LEARN IT
Newton's second law	$F = ma$	LEARN IT
Weight g is 9.8 m s^{-2} unless the question says otherwise.	$W = mg$	LEARN IT
Friction Equality when the object is moving or on the point of moving (limiting friction).	$F \leq \mu R$	LEARN IT
Moment of a force Not listed in the specification formulae, but needed for moments questions.	$\text{Moment} = \text{force} \times \text{perpendicular distance}$	LEARN IT

How the Edexcel IAL and AQA booklets differ

All three are the same course in spirit but the booklets are not identical. Check the one printed for your exam. The 'given' column below refers to the Edexcel 9MA0 booklet.

Cosine rule Printed in the Edexcel IAL booklet (Pure P1). Not printed in the 9MA0 or AQA booklets.	$a^2 = b^2 + c^2 - 2bc\cos A$	LEARN IT
Poisson distribution Printed in the Edexcel IAL booklet (Statistics S2). Not part of 9MA0 A Level Mathematics.	$P(X = x) = e^{-\lambda}\frac{\lambda^x}{x!}, \quad E(X) = \text{Var}(X) = \lambda$	LEARN IT
Normal probability density function Printed in the Edexcel IAL booklet (Statistics S1). Not printed in the 9MA0 or AQA booklets.	$f(x) = \frac{1}{\sigma\sqrt{2\pi}}e^{-\frac{1}{2}\left(\frac{x-\mu}{\sigma}\right)^2}$	LEARN IT
Integral of f dash over f Printed in the AQA booklet. Not printed in the 9MA0 booklet.	$\int \frac{f'(x)}{f(x)}\,dx = \ln\lvert f(x)\rvert + c$	LEARN IT
Change of base for logs In the 9MA0 and IAL booklets. Not in the AQA booklet.	$\log_a x = \frac{\log_b x}{\log_b a}$	IN THE BOOKLET
Sum to product identities In the 9MA0 and IAL booklets. Not in the AQA booklet.	$\sin A + \sin B = 2\sin\frac{A+B}{2}\cos\frac{A-B}{2}$	IN THE BOOKLET

Small angle approximations In the 9MA0 and AQA booklets. Not found in the IAL booklet.	$\sin\theta \approx \theta,\ \cos\theta \approx 1 - \frac{\theta^2}{2}$	IN THE BOOKLET

Learn these: not in the booklet

Quadratic formula

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

Laws of indices

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

Laws of logarithms

$$\log_a x + \log_a y = \log_a(xy),\ \log_a x - \log_a y = \log_a(x/y),\ k\log_a x = \log_a x^k$$

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

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

Double angle

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

Pythagorean identities

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

Arc length and sector area (radians)

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

nth terms

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

Straight line

$$y - y_1 = m(x - x_1), \quad m_1 m_2 = -1$$

The second result is the condition for perpendicular lines.

Derivatives

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

Product and chain rules

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

Integrals

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

Standardising

$$Z = \frac{X - \mu}{\sigma};\ mean\bar{x} = \frac{\sum fx}{\sum f}$$

Mechanics

$$F = ma,\ W = mg,\ F \le \mu R,\ v = \frac{dr}{dt},\ a = \frac{dv}{dt}$$

Using the sheet in the exam

- Learn the not-given list first: the booklet will not rescue you on the quadratic formula or the cosine rule.
- Open the booklet at the start and mark the pages for series, trig identities and integrals so you can find them in seconds.
- Check signs for cos(A plus or minus B) and the tan addition formula. The sign flips between the two sides.
- Use the trapezium rule and Newton-Raphson formulae from the booklet, then write each substitution on its own line to protect method marks.
- For mechanics, check whether acceleration is constant before choosing the SUVAT equations. If it varies, differentiate or integrate instead.

Checked against the official documents: Pearson Edexcel A Level Mathematics 9MA0 (main board), Mathematical Formulae and Statistical Tables, Issue 1, July 2017 (Pearson Edexcel Level 3 Advanced Subsidiary and Advanced GCE in Mathematics and Further Mathematics, code P54458A); Pearson Edexcel A Level Mathematics 9MA0 specification, Specification Issue 4, February 2020, Appendix 1: Formulae; Pearson Edexcel International A Level Mathematics, Mathematical Formulae and Statistical Tables, Issue 2, January 2021; AQA A Level Mathematics 7357, Formulae for A-level Mathematics, v1.2, August 2017. Updated 31 October 2026. Boards update their booklets from time to time: always practise with the version your exam uses. More free sheets and topic worksheets at curatedprep.com.