

# Edexcel Level 3 Advanced GCE in Mathematics (9MA0)

## Two-year Scheme of Work

Students studying A Level Mathematics will take 3 papers at the end of Year 13 as indicated below. All students will study Pure, Statistics and Mechanics.

A level Mathematics	
<b>Paper 1:</b> Pure Mathematics 33%, 2 hours, 100 marks	Any pure content can be assessed on either paper
<b>Paper 2:</b> Pure Mathematics 33%, 2 hours, 100 marks	
<b>Paper 3:</b> Statistics and Mechanics 33%, 2 hours, 100 marks	Section A: Statistics (50 marks) Section B: Mechanics (50 marks)

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**Year 1: AS Mathematics pure content**  
**Pure Mathematics**  
**TEXTBOOK – Edexcel Pure Mathematics Year 1/AS**

Unit	Title
<b>1</b>	<b>Algebra and functions</b>
	<u>a</u> Algebraic expressions – basic algebraic manipulation, indices and surds – CHAPTER 1
	<u>b</u> Quadratic functions – factorising, solving, graphs and the discriminants – CHAPTER 2
	<u>c</u> Equations – quadratic/linear simultaneous - CHAPTER 3
	<u>d</u> Inequalities – linear and quadratic (including graphical solutions) – CHAPTER 3
	<u>e</u> Graphs – cubic, quartic and reciprocal – CHAPTER 4
	<u>f</u> Transformations – transforming graphs – $f(x)$ notation – CHAPTER 4
<b>2</b>	<b>Coordinate geometry in the <math>(x, y)</math> plane</b>
	<u>a</u> Straight-line graphs, parallel/perpendicular, length and area problems – CHAPTER 5
	<u>b</u> Circles – equation of a circle, geometric problems on a grid – CHAPTER 6
<b>3</b>	<b>Further algebra</b>
	<u>a</u> Algebraic division, factor theorem and proof – CHAPTER 7
	<u>b</u> The binomial expansion – CHAPTER 8
<b>4</b>	<b>Trigonometry</b>
	<u>a</u> Trigonometric ratios and graphs – CHAPTER 9
	<u>b</u> Trigonometric identities and equations – CHAPTER 10
<b>5</b>	<b>Vectors (2D)</b>
	<u>a</u> Definitions, magnitude/direction, addition and scalar multiplication – CHAPTER 11
	<u>b</u> Position vectors, distance between two points, geometric problems – CHAPTER 11
<b>6</b>	<b>Differentiation</b>
	<u>a</u> Definition, differentiating polynomials, second derivatives – CHAPTER 12
	<u>b</u> Gradients, tangents, normals, maxima and minima – CHAPTER 12
<b>7</b>	<b>Integration</b>
	<u>a</u> Definition as opposite of differentiation, indefinite integrals of $x^n$ – CHAPTER 13
	<u>b</u> Definite integrals and areas under curves – CHAPTER 13
<b>8</b>	<b>Exponentials and logarithms:</b> Exponential functions and natural logarithms - CHAPTER 14

**Year 1: AS Mathematics applied content**  
**Statistics and Mechanics**  
**TEXTBOOK – Edexcel Applied Mathematics Year 1/AS**

Unit	Title
<b>Section A – Statistics</b>	
<b>1</b>	<b>Statistical sampling</b>
	<u>a</u> Introduction to sampling terminology; Advantages and disadvantages of sampling – CHAPTER 1
	<u>b</u> Understand and use sampling techniques; Compare sampling techniques in context – CHAPTER 1
<b>2</b>	<b>Data presentation and interpretation</b>
	<u>a</u> Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding – CHAPTER 2/3
	<u>b</u> Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers; Draw simple conclusions from statistical problems – CHAPTER 4
<b>3</b>	<b>Probability:</b> Mutually exclusive events; Independent events – CHAPTER 5
<b>4</b>	<b>Statistical distributions:</b> Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected) – CHAPTER 6
<b>5</b>	<b>Statistical hypothesis testing</b>
	<u>a</u> Language of hypothesis testing; Significance levels – CHAPTER 7
	<u>b</u> Carry out hypothesis tests involving the binomial distribution – CHAPTER 8
<b>Section B – Mechanics</b>	
<b>6</b>	<b>Quantities and units in mechanics</b>
	<u>a</u> Introduction to mathematical modelling and standard S.I. units of length, time and mass – CHAPTER 8
	<u>b</u> Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities – CHAPTER 8
<b>7</b>	<b>Kinematics 1 (constant acceleration)</b>
	<u>a</u> Graphical representation of velocity, acceleration and displacement – CHAPTER 9
	<u>b</u> Motion in a straight line under constant acceleration; <i>suvat</i> formulae for constant acceleration; Vertical motion under gravity – CHAPTER 9
<b>8</b>	<b>Forces &amp; Newton's laws</b>
	<u>a</u> Newton's first law, force diagrams, equilibrium, introduction to <b>i, j</b> system – CHAPTER 10
	<u>b</u> Newton's second law, ' $F = ma$ ', connected particles (no resolving forces or use of $F = \mu R$ ); Newton's third law: equilibrium, problems involving smooth pulleys – CHAPTER 10
<b>9</b>	<b>Kinematics 2 (variable acceleration)</b>
	<u>a</u> Variable force; Calculus to determine rates of change for kinematics – CHAPTER 11
	<u>b</u> Use of integration for kinematics problems i.e. $r = \int v dt$ , $v = \int a dt$ - CHAPTER 11

**Year 2: Remaining A Level Mathematics pure content**  
**Pure Mathematics**  
**TEXTBOOK – Edexcel Pure Mathematics Year 2**

Unit	Title
<b>1</b>	<b>Proof:</b> Examples including proof by deduction* and proof by contradiction – CHAPTER 1
<b>2</b>	<b>Algebraic and partial fractions</b> – CHAPTER 1
<u>a</u>	Simplifying algebraic fractions
<u>b</u>	Partial fractions
<b>3</b>	<b>Functions and modelling</b> – CHAPTER 2
<u>a</u>	Modulus function
<u>b</u>	Composite and inverse functions
<u>c</u>	Transformations
<u>d</u>	Modelling with functions* *examples may be Trigonometric, exponential, reciprocal etc.
<b>4</b>	<b>Series and sequences</b> – CHAPTER 3
<u>a</u>	Arithmetic and geometric progressions (proofs of ‘sum formulae’)
<u>b</u>	Sigma notation
<u>c</u>	Recurrence and iterations
<b>5</b>	<b>The binomial theorem</b> – CHAPTER 4
<u>a</u>	Expanding $(a + bx)^n$ for rational $n$ ; knowledge of range of validity
<u>b</u>	Expansion of functions by first using partial fractions
<b>6</b>	<b>Trigonometry</b>
<u>a</u>	Radians (exact values), arcs and sectors – CHAPTER 5
<u>b</u>	Small angles- CHAPTER 5
<u>c</u>	Secant, cosecant and cotangent (definitions, identities and graphs); - CHAPTER 6 Inverse trigonometrical functions; Inverse trigonometrical functions – CHAPTER 6
<u>d</u>	Compound* and double (and half) angle formulae – CHAPTER 7 *geometric proofs expected
<u>e</u>	$R \cos(x \pm \alpha)$ or $R \sin(x \pm \alpha)$ – CHAPTER 7
<u>f</u>	Proving trigonometric identities – CHAPTER 7
<u>g</u>	Solving problems in context (e.g. mechanics) – CHAPTER 7
<b>7</b>	<b>Parametric equations</b> – CHAPTER 8
<u>a</u>	Definition and converting between parametric and Cartesian forms
<u>b</u>	Curve sketching and modelling

Unit	Title
<b>8</b>	<b>Differentiation – CHAPTER 9</b>
<u>a</u>	Differentiating $\sin x$ and $\cos x$ from first principles –CHAPTER 9
<u>b</u>	Differentiating exponentials and logarithms -
<u>c</u>	Differentiating products, quotients, implicit and parametric functions.
<u>d</u>	Second derivatives (rates of change of gradient, inflections)
<u>e</u>	Rates of change problems* (including growth and kinematics) *see Integration (part 2) – Differential equations
<b>9</b>	<b>Numerical methods* - CHAPTER 10</b>
<u>a</u>	Location of roots
<u>b</u>	Solving by iterative methods (knowledge of ‘staircase and cobweb’ diagrams)
<u>c</u>	Newton-Raphson method
<u>d</u>	Problem solving
	*See Integration (part 2) for the trapezium rule
<b>10</b>	<b>Integration (part 1) – CHAPTER 11</b>
<u>a</u>	Integrating $x^n$ (including when $n = -1$ ), exponentials and trigonometric functions
<u>b</u>	Using the reverse of differentiation, and using trigonometric identities to manipulate integrals
<b>11</b>	<b>Integration (part 2) – CHAPTER 11</b>
<u>a</u>	Integration by substitution
<u>b</u>	Integration by parts
<u>c</u>	Use of partial fractions
<u>d</u>	Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation)
<u>e</u>	The trapezium rule
<u>f</u>	Differential equations (including knowledge of the family of solution curves)
<b>12</b>	<b>Vectors (3D):</b> Use of vectors in three dimensions; knowledge of column vectors and <b>i, j</b> and <b>k</b> unit vectors - CHAPTER 12

**Year 2: Remaining A Level Mathematics applied content**  
**Statistics and Mechanics**  
**TEXTBOOK – Edexcel Applied Mathematics Year 2**

Unit	Title
<b>Section A – Statistics</b>	
<b>1</b>	<b>Regression and correlation – CHAPTER 1</b>
<u>a</u>	Change of variable
<u>b</u>	Correlation coefficients Statistical hypothesis testing for zero correlation
<b>2</b>	<b>Probability – CHAPTER 2</b>
<u>a</u>	Using set notation for probability Conditional probability
<u>b</u>	Questioning assumptions in probability
<b>3</b>	<b>The Normal distribution – CHAPTER 3</b>
<u>a</u>	Understand and use the Normal distribution
<u>b</u>	Use the Normal distribution as an approximation to the binomial distribution Selecting the appropriate distribution
<u>c</u>	Statistical hypothesis testing for the mean of the Normal distribution
<b>4</b>	<b>Moments: Forces’ turning effect – CHAPTER 4</b>
<b>5</b>	<b>Forces at any angle – CHAPTER 5</b>
<u>a</u>	Resolving forces
<u>b</u>	Friction forces (including coefficient of friction $\mu$ )
<b>6</b>	<b>Applications of kinematics: Projectiles – CHAPTER 6</b>
<b>7</b>	<b>Applications of forces – CHAPTER 7</b>
<u>a</u>	Equilibrium and statics of a particle (including ladder problems)
<u>b</u>	Dynamics of a particle
<b>8</b>	<b>Further kinematics – CHAPTER 8</b>
<u>a</u>	Constant acceleration (equations of motion in 2D; the <b>i, j</b> system)
<u>b</u>	Variable acceleration (use of calculus and finding vectors $\dot{\mathbf{r}}$ and $\ddot{\mathbf{r}}$ at a given time)