

AS and A-Level Overview and SOW – September 2018

Year 1: AS Mathematics pure content Pure Mathematics

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

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Year 1: AS Mathematics applied content Statistics and Mechanics

Unit	Title	Estimated hours
Section A – Statistics		
1	Statistical sampling	
a	Introduction to sampling terminology; Advantages and disadvantages of sampling	1
b	Understand and use sampling techniques; Compare sampling techniques in context	2
2	Data presentation and interpretation	
a	Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding	4
b	Interpret diagrams for single-variable data; Interpret scatter diagrams and regression lines; Recognise and interpret outliers; Draw simple conclusions from statistical problems	8
3	Probability: Mutually exclusive events; Independent events	3
4	Statistical distributions: Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected)	5
5	Statistical hypothesis testing	
a	Language of hypothesis testing; Significance levels	2
b	Carry out hypothesis tests involving the binomial distribution	5
		30 hours
Section B – Mechanics		
6	Quantities and units in mechanics	
a	Introduction to mathematical modelling and standard S.I. units of length, time and mass	1
b	Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities	2
7	Kinematics 1 (constant acceleration)	
a	Graphical representation of velocity, acceleration and displacement	4
b	Motion in a straight line under constant acceleration; derive formulae for constant acceleration; Vertical motion under gravity	6
8	Forces & Newton's laws	
a	Newton's first law, force diagrams, equilibrium, introduction to i, j system	4
b	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	6
9	Kinematics 2 (variable acceleration)	
a	Variable force; Calculus to determine rates of change for kinematics	4
b	Use of integration for kinematics problems i.e. $r = \int v dt$, $v = \int a dt$	3
		30 hours