



Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
<p>Topics</p>	<p>Algebra and Functions 1; Coordinate Geometry in the (x, y) plane</p>	<p>Algebra and Functions 2; Further Algebra; Statistical Sampling; Data presentation and interpretation 1</p>	<p>Trigonometry 1; Vectors 1 (2D); Quantities and Units in Mechanics; Kinematics 1 (Constant Acceleration)</p>	<p>Differentiation 1 ; Data presentation and interpretation 2; Probability 1</p>	<p>Exponentials and Logarithms; Integration 1; Statistical Distributions 1; Forces and Newton's Law;</p>	<p>Statistical Hypothesis Testing 1; Kinematics 2 (Variable acceleration); Revision for Y12 mock exams Y13 content – Algebraic and partial fractions; Functions and modelling</p>
<p>Content</p>	<p>Algebraic expressions – basic algebraic manipulation, indices and surds</p> <p>Quadratic functions – factorising, solving, graphs and discriminants</p> <p>Equations – quadratic/linear simultaneous equations</p> <p>Inequalities – linear and quadratic (including graphical solutions)</p> <p>Straight-line graphs, parallel/perpendicular lines, length and area problems</p>	<p>Graphs – cubic, quartic and reciprocal</p> <p>Transformations – transforming graphs – f(x) notation</p> <p>Algebraic division, factor theorem and proof</p> <p>The binomial expansion</p> <p>Introduction to sampling terminology; Advantages and disadvantages of sampling</p> <p>Understand and use sampling techniques; Compare sampling techniques in context</p>	<p>Trigonometric ratios and graphs</p> <p>Trigonometric identities and equations</p> <p>Definitions, magnitude/direction, addition and scalar multiplication</p> <p>Position vectors, distance between two points, geometric problems</p> <p>Introduction to mathematical modelling and standard S.I. units of length, time and mass</p>	<p>Differentiating to find the gradient of a curve, differentiating from first principles, differentiating polynomials, second derivatives</p> <p>Gradients, tangents, normals, maxima and minima</p> <p>Interpret diagrams for single-variable data cumulative frequency, histograms, box plots); Interpret scatter diagrams and regression lines; Recognise and interpret outliers; Draw simple conclusions from statistical problems</p>	<p>Exponential functions, laws of logarithms and natural logarithms</p> <p>Integrating to find the area under a curve, integration as opposite of differentiation, indefinite integrals, definite integrals</p> <p>Use discrete distributions to model real-world situations; Identify the discrete uniform distribution; Calculate probabilities using the binomial distribution (calculator use expected)</p>	<p>Language of hypothesis testing; Significance levels</p> <p>Carry out hypothesis tests involving the binomial distribution</p> <p>Variable force; Calculus to determine rates of change for kinematics</p> <p>Use of integration for kinematics problems i.e. $r = \int v dt$ $v = \int a dt$</p> <p>Revision and exams</p> <p>Simplifying algebraic fractions</p>



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Content continued	<p>Circles – equation of a circle, geometric problems on a grid</p>	<p>Calculation and interpretation of measures of location; Calculation and interpretation of measures of variation; Understand and use coding</p> <p>Introduction to the large data set</p>	<p>Definitions of force, velocity, speed, acceleration and weight and displacement; Vector and scalar quantities</p> <p>Graphical representation of velocity, acceleration and displacement</p> <p>Motion in a straight line under constant acceleration; <i>suvat</i> formulae for constant acceleration; Vertical motion under gravity</p>	<p>Two-way tables, Venn diagrams, tree diagrams, Mutually exclusive events; Independent events</p>	<p>Newton's first law, force diagrams, equilibrium, introduction to \mathbf{i}, \mathbf{j} system</p> <p>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</p>	<p>Partial fractions</p> <p>Modulus function, Composite and inverse functions</p>
Rationale/ Linking	<p>Links from: GCSE - indices, surds, algebraic expressions, quadratics, equations, simultaneous equations, straight line graphs, equation of a circle. Level 2 FM - simultaneous equations, equation of a circle</p> <p>Links to algebra and functions 2 and is a basis for many of the A-level topics</p>	<p>Links from: GCSE - graphs, transforming graphs, functions, factorising, long division, proof, averages and spread. Level 2 FM – factorising, factor theorem, polynomial long division, binomial expansion, functions. Y12 Algebra and Functions 1</p> <p>Links to Algebra and partial fractions, proof</p>	<p>Links from: GCSE - trigonometry, vectors. Level 2 FM – trigonometrical equations and identities, Links to trigonometry 2, differentiation 2, integration 2, kinematics 2 and Vectors 2</p>	<p>Links from: GCSE - equations of a line, statistical diagrams, probability, Level 2 FM – differentiation Y12 – Algebra and Functions 1, Coordinate Geometry in the (x, y) plane, Data presentation and interpretation 1</p> <p>Links to Y13 differentiation, probability</p>	<p>Links from: Y12 Quantities and Units in Mechanics; Kinematics 1, Probability</p> <p>Links to Y13 differentiation, integration, normal distribution, forces and friction</p>	<p>Links from: Y12 Statistical distributions, Probability, Kinematics 1, integration, Algebra and Functions 2, Data presentation and interpretation 2</p> <p>Links to Y13 Algebra and Partial Fractions; Proof; Functions and Modelling; Integration, hypothesis testing, further kinematics</p>
Assessment	<p>Assessment Point 1 – October Assessment Point 2 – December Assessment Point 3 – February Assessment Point 4 – April Assessment Point 5 – June – End of Year Exam</p>			Learning Resources		<p>Pure Mathematics Book 1 Statistics and Mechanics Book 1 A-Level Scientific Calculator (fx-991EX or fx-991CW)</p>



Term	Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic	Algebra and Partial Fractions; Proof; Functions and Modelling; Trigonometry 2; Parametric Equations; Differentiation 2	Integration 2; Correlation and Regression 2; Probability 2	Moments; Forces and Friction; Projectiles; Statistical Distributions 2; Binomial Theorem 2;	Numerical Methods; Applications of Forces; Further Kinematics; Sequences and Series;	Vectors 2 (3D); Revision	
Content	Algebra and Partial Fractions - Simplifying algebraic fractions, Partial fractions Proof - proof by deduction and proof by contradiction Functions and Modelling - Modulus function, Composite and inverse functions, Transformations, Modelling with functions* (*examples may be Trigonometric, exponential, reciprocal etc) Trigonometry - Radians (exact values), arcs and sectors, Small angles, Sec, cosec, cot (definitions, identities and graphs); Inverse trigonometrical functions	Integration - Integrating x^n (including when $n = -1$), exponentials and trigonometric functions, Using the reverse of differentiation, and using trigonometric identities to manipulate integrals, Integration by substitution, Integration by parts, Use of partial fractions, Areas under graphs or between two curves, including understanding the area is the limit of a sum (using sigma notation), The trapezium rule, Differential equations (including knowledge of the family of solution curves)	Moments - Forces' turning effect Forces and Friction - Resolving forces, Friction forces (including coefficient of friction μ) Projectiles Statistical Distributions 2 - Understand and use the Normal distribution, Use the Normal distribution as an approximation to the binomial distribution, Selecting the appropriate distribution, Statistical hypothesis testing for the mean of the Normal distribution	Numerical Methods - Location of roots, Solving by iterative methods (knowledge of 'staircase and cobweb' diagrams), Newton-Raphson method, Problem solving Applications of Forces - Equilibrium and statics of a particle (including ladder problems), Dynamics of a particle Further Kinematics - Constant acceleration (equations of motion in 2D; the i, j system), Variable acceleration (use of calculus and finding vectors \dot{r} at a given time)	Vectors - Use of vectors in three dimensions; knowledge of column vectors and i, j and k unit vectors	



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Content continued	<p>Differentiation – Differentiating $\sin x$ and $\cos x$ from first principles, Differentiating exponentials and logarithms, Differentiating products, quotients, implicit and parametric functions, Rates of change problems* (including growth and kinematics)</p> <p>Parametric Equations - Definition and converting between parametric and Cartesian forms, Curve sketching and modelling</p>	<p>Correlation and Regression - Change of variable, correlation coefficients, Statistical hypothesis testing for zero correlation</p> <p>Probability - Using set notation for probability, Conditional probability, Questioning assumptions in probability</p>	<p>Binomial Theorem - Expanding $(a + bx)^n$ for rational n; knowledge of range of validity, Expansion of functions by first using partial fractions</p>	<p>Sequences and Series – Arithmetic and geometric progressions (proofs of 'sum formulae'), Sigma notation, Recurrence and iterations</p>		
Rationale/ Linking	<p>Links from – Algebra and Functions 1, Algebra and Functions 2, Trigonometry 1, Differentiation 1, Trigonometry 2</p>	<p>Links from – Integration 1, Differentiation 2, Trigonometry 2, Data presentation and interpretation 2; Probability 1</p>	<p>Links from – Quantities and Units in Mechanics, Kinematics 1, Forces and Newton's Law, Kinematics 2, Statistical Distributions 1, Further Algebra (Binomial Theorem 1)</p>	<p>Links from –Algebra and Functions 2, Trigonometry , Integration 2, Kinematics 1, Kinematics 2, Moments, Forces and Friction,</p>	<p>Links from – Vectors 1, Further Kinematics</p>	
Assessment	<p>Assessment Point 1 – November Mock exam Assessment Point 2 – January Assessment Point 3 – February Assessment Point 4 – March Assessment Point 5 – April</p>			Learning Resources	<p>Pure Mathematics Book 2 Statistics and Mechanics Book 2 A-Level Scientific Calculator (fx-991EX or fx-991CW)</p>	