Further Mathematics Curriculum Outline 2023-2024

MAIDSTONE GRAMMAR SCHOOL
FOUNDED 1549

Year 13

Term 1	Term 2	Term 3	Term 4	Term 5
Unit Title: 1. A2 Pure 2. Core Further Pure 3. FM1 4. FS1 **Knowledge/skills:** 1a. Integration 1b. Differential Equations 2a. Series (Differencing, Maclaurin) 2b. 3D Methods (3x3 Matrices; Vectors & Planes) 3a. Impulse & Momentum in 1D 3b. Work, Energy & Power 4a. Discrete Probability Distributions 4b. The Poisson Distribution	**Unit Title:** 1. Core Further Pure 2. FM1 3. FS1 **Knowledge / Skills:** 1a. Calculus 1b. Polar Coordinates 2a. Elasticity 2b. Elastic Collisions in 1D 3a. Geometric and Negative Binomial Distributions. 3b. Central Limit Theorem.	**Unit Title:** 1. Core Further Pure 2. FM1 3. FS1 **Knowledge / Skills:** 1a. Hyperbolic Functions 1b. Methods of Differential Equations 1c. Complex Numbers 2a. Elastic Collisions in 2D 3a. Chi Squared Tests 3b. Probability Generating Functions	**Unit Title:** 1. Core Further Pure 2. FM1 3. FS1 **Knowledge / Skills:** 1a. Mock Exams 1b. Applications of Differential Equations 1c. Pure Revision 2a. Mock Exams 2b. Mechanics Revision 3a. Mock Exams 3b. Errors in Hypothesis Testing. 3c. Statistics Revision	**Unit Title:** Revision and Exam Practice

Year 12

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title: 1. AS Pure 2. AS Applied **Knowledge / Skills:** 1a. Indices & Surds 1b. Vectors 1c. Coordinate Geometry 1d. Quadratics. 1e. Inequalities 1f. Graphs/Transformations	**Unit Title:** 1. AS Pure 2. AS Applied **Knowledge / Skills:** 1a. Algebra (Proof, Factor Theorem, Binomial Expansion) 1b. Exponentials & Logarithms 1c. Differentiation	**Unit Title:** 1. A2 Pure 2. AS Core Further Pure 3. AS/A2 Applied **Knowledge / Skills:** 1a. Radian Measure 1b. Sequences & Series	**Unit Title:** 1. A2 Pure 2. AS Core Further Pure 3. A2 Applied **Knowledge / Skills:** 1a. Algebra (Partial fractions, binomial expansion, proof) 1b. Functions & Modulus	**Unit Title:** 1. A2 Pure 2. AS Core Further Pure 3. A2 Applied **Knowledge / Skills:** 1a. Trigonometry 1b. UCAS Exam 1c. Vectors	**Unit Title:** 5. A2 Pure 6. AS Core Further Pure 7. A2 Applied **Knowledge / Skills:** 1a. Differentiation 1b. Numerical Methods 1c. Parametric Equations

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
1h. Trigonometry 2a. Motion with Constant Acceleration 2b. Sampling Methods 2c. Measures of Average and Spread 2d. Representing Data 2e. Regression Lines	1d. Integration 2a. Force and Motion 2b. Probability 2c. Discrete Probability Distributions	2a. 2x2 matrices and transformations 2b. Complex Numbers 3a. Binomial Hypothesis testing (AS) 3b. Motion with Variable Acceleration (AS) 3c. Forces at Angles.	2a. Volumes of Revolution 2b. Roots of Polynomials. 2c. Summing Series – Standard Results 3a. Friction 3b. Correlation & Regression 3c. Conditional Probability	2a. Proof By Induction 2b. UCAS Exam 3a. Moments 3b. UCAS Exam 3c. Normal Distribution	2a. Vectors (Equation of Line; scalar product) 3a. Parabolic Motion 3b. Vectors In Mechanics

Year 11

Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Unit Title: 1. Algebra 2. Number 3. Calculus Knowledge / Skills: 1. Expanding three term brackets and three brackets. Challenging factorising. Simplifying algebraic fractions. Solving quadratics from fractions. Completing the square. Interpreting the completed square form. Quadratic identities and equating coefficients. 2. Complex expressions with indices. Solving equations using index rules. Rationalising two term denominators. 3. Differentiation of positive integer powers. Simplifying before differentiation. Stationary points. Sketching curves.	Unit Title: 1. Geometry 2. Coordinate Geometry Knowledge / Skills: 1. Solving simple trigonometric equations. Basic trigonometric identities, solving proving, simplifying. Angle between two planes. 2. Using ratio for points on a line, midpoint. Equation of line in new form. Equations of parallel and tangents using differentiation. Tangents and normals to circles. General circle equation. Completed square form of circle equation. Using circle theorems.	Unit Title: 1. Matrices 2. Algebra Knowledge / Skills: 1. Multiplication of matrices by scalar and matrix. The identity matrix. Transformation matrices. Combination of transformations. 2. Domain and range of function and excluded values. Piecewise functions. Limiting values of sequences. Factor theorem for integer values including cubics. Use factor theorem to factorise cubic expressions and solve cubic equations.	Unit Title: 1. Algebra 2. Revision Knowledge / Skills: 1. Continuation of term 3 algebra. 2. Revision scheme to prepare for public examinations.	Unit Title: 1. Revision Knowledge / Skills: 1. Revision scheme to prepare for public examinations.	

	Term 1	Term 2	Term 3	Term 4	Term 5	Term 6
Year 10	**Unit Title:** 1. Algebra 2. Statistics 3. Statistics 4. Number 5. Number **Knowledge / Skills:** 1. Linear inequalities, double inequalities. Number lines. Integer solutions. Representing areas of linear inequalities. 2. Sampling. Petersen capture-recapture. Back to back stem and leaf. Pie charts. Frequency polygons. Histograms. 3. Line graphs, time series, trends. Scatter diagrams, correlation, causality. 4. Fractional powers, estimating powers and roots, standard form calculations. 5. Set notation for linear inequalities. Upper and lower bounds. Surds, simplifying. Rationalising denominators.	**Unit Title:** 1. Geometry and measures 2. Geometry and measures 3. Geometry and measures 4. Geometry and measures **Knowledge / Skills:** 1. Similar shapes, lengths, areas and volumes. Units of area. Congruency. 2. Circle theorems, proof. 3. Areas of sectors and segments. Arc length. Volume and surface area for standard 3D shapes. 4. Exact values, Pythagoras' Theorem and trigonometry in 3D.	**Unit Title:** 1. Algebra 2. Probability **Knowledge / Skills:** 1. Factorising a not equal to 1. Simplifying algebraic fractions by factorisation. Multiplication and division of algebraic fractions. Solving quadratics by factorising and formula. 2. Product rule for counting. Probability rules for ME and Independent events. Tree diagrams. Vann diagrams. Set notation. Conditional probability.	**Unit Title:** 1. Algebra **Knowledge / Skills:** 1. Changing the subject of a formula including more than one term with new subject. Function notation, composite functions, inverse functions. Term to term sequences, subscript notation. Square and cube number sequences, triangular numbers, simple geometric. Position to term quadratic sequence.	**Unit Title:** 1. Ratio and proportion. 2. Algebra 3. Geometry and measures. 4. Algebra **Knowledge / Skills:** 1. Algebraic treatment of proportion. Graphs. Problem solving with ratio. Capture-recapture. 2. Midpoint and length of line segment. Finding equations of lines – various situations. Perpendicular and parallel lines Simultaneous equations one linear one quadratic. Circles. 3. Vector notation, laws of addition, subtraction, graphical representation. Resultants. Properties of vector addition. Basic problem solving. 4. Solving equations involving algebraic fractions. Algebraic proof.	**Unit Title:** 1. Algebra **Knowledge / Skills:** 1. Basic curved graphs, plotting and shape. Real life graphs. Exponential functions. Solving equations graphically using added lines. Graphs of trigonometric functions. Translations and reflections of graphs. Gradient being rate of change. Motion graphs – distance, velocity. Tangents to find gradient. Chords for average. Trapezium rule using max 4 strips.
Year 9	**Unit Title:** 1. Number 2. Number 3. Algebra 4. Number **Knowledge / Skills:** 1. Powers and roots, index notation,	**Unit Title:** 1. Ratio and proportion 2. Geometry and measures 3. Geometry and measures 4. Algebra	**Unit Title:** 1. Algebra 2. Algebra 3. Geometry and measures **Knowledge / Skills:** 1. Factorising into up to two brackets	**Unit Title:** 1. Statistics 2. Algebra **Knowledge / Skills:** 1. Averages and weighted means. Stem and leaf diagrams. Frequency	**Unit Title:** 1. Geometry and measures 2. Geometry and measures **Knowledge / Skills:** 1. Right angled triangle trigonometry. Two	**Unit Title:** 1. Geometry and measures 2. Algebra **Knowledge / Skills:** 1. Standard constructions with straight edge and

prime decomposition, order of operations. 2. Fraction and decimal arithmetic, recurring decimals. 3. Linear equations including brackets, formulae, identities, expressions. 4. Percentages full coverage	**Knowledge / Skills:** 1. Expressing ratios, direct and inverse proportion. 2. Imperial measures, compound measures. 3. Area and volume, quadrilaterals, circles and parts of circles, prisms and cylinders, exact values, plans and elevations, nets. 4. Expanding up to two brackets and simplifying.	including common factor. Difference of two squares. 2. Constructing, substituting into, and rearranging formula. Nth term linear and basic quadrilateral. 3. Polygon angle rules, properties of shapes, similar triangles, length scale factors.	tables. Grouped data. Quartiles and range. Cumulative frequency diagrams and uses. Box and whisker plots. Comparing data. 2. Solving simultaneous equations by elimination. Graphical solutions.	circle theorems. Bearings. 2. Shape transformations full GCSE coverage.	compass. Loci. Scale drawing and maps. 2. Solution of quadratics by factorisation. Plotting quadratics and solving. Turning points.

Key/Legend/Notes:

We aim to provide opportunities for students to develop key mathematical skills such as problem solving, reasoning and proof throughout the whole programme of study.