

KS5 Mathematics Curriculum Mapping

Year 12 – A Level Mathematics						
Term	Autumn (1)	Autumn (2)	Spring (1)	Spring (2)	Summer (1)	Summer (2)
Topic(s)/ Subjects(s)	Pure Chpt1 - Algebraic Expressions Pure Chpt2 - Quadratics Pure Chpt3 - Equations and Inequalities Pure Chpt4 - Graphs and Transformations	Pure Chpt5 - Straight Line Graphs Pure Chpt7a - Algebraic Methods Pure Chpt11 – Vectors Mechanics Chpt8 - Modelling in mechanics Statistics Chpt1 - Data Collection Statistics Chpt2 - Measures of location	Pure Chpt6 - Circles Pure Chpt12 - Differentiation Pure Chpt9b - Trigonometric Graphs Mechanics Chpt9 - Constant acceleration Statistics Chpt3 - Representations of data Statistics Chpt4 - Correlation	Pure Chpt9a - Trigonometric Ratios Pure Chpt10 - Trigonometric Identities Pure Chpt13 - Integration Statistics Chpt5 - Probability Mechanics Chpt10 - Forces & Motion Statistics Chpt6 - Statistical Distributions Statistics Chpt7 - Hypothesis Testing	Pure Chpt14 - Exponentials and Logarithms Pure Chpt8 - Binomial Expansion Mechanics Chpt11 - Variable Acceleration Statistics Chpt1 - Data Collection	Pure Chpt7b - Mathematical Proof Pure Chpt1 (Year 2) - Algebraic Methods
Knowledge and skills (Content)	Expanding and factorising brackets, simplifying indices, simplifying and rationalising surds	Algebraic fractions, straight line equations, vector notation. Introduction of statistics data collection and averages. Introduction of mechanics with velocity time graphs	Equations of circles and circle geometry. Expanding on trigonometry, drawing and using the graphs. Scatter graphs, histograms and box plots. Application of SUVAT.	Applying the cosine and sine rule. Solving trigonometric equations using the algebra and graphs. Discrete random variables, venn diagrams and probability notation.	Solving exponentials using logarithms. Recognising exponential and log graphs. Exponential modelling. Variable acceleration, sampling methods	Proof by exhaustion and counter example. Y13 algebraic fractions and partial fractions
Assessment	Baseline test – first lesson Test 1 – Linear equations, quadratics and graphs	Test 2 – Vectors, linear equations, inequalities, algebraic methods and trigonometry	Test 3 – Circles, standard deviation, mean, coding, velocity time graphs and variable acceleration	Test 4 – Differentiation and trigonometry	Progress exams	Test 5 – Integration, binomial distribution, hypothesis testing and kinematics
Cross Curricular Links		Geography – Standard Deviation and Variance Physics – SUVAT equations	Biology, Chemistry and Physics – Representation of data	Physics – Forces and motion	Chemistry – Arrhenius equation Geography – Log graphs	
SMSC, British Values, Cultural Capital	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters
CEIAG	Urban regeneration SUMS Magazine	Actuary Maths in action, SUMs Magazine Large data set investigations	Software engineer SUMS Magazine	Location planning SUMS Magazine	SUMS Magazine	Data detective SUMS Magazine
Learning outside the classroom	Homework - HT1 Skills Check. 5 recall and retention questions based on GCSE content required for the course.	Homework – HT2 Skills Check and 1 pure exam question. 5 recall and retention questions based on previously taught content from Autumn 1. Introduction of 1 exam question. Maths in action, Senior Maths Challenge, Senior Team Challenge	Homework – HT3 Skills Check, 1 pure exam question and 1 Statistics & Mechanics exam question. 5 recall and retention questions based on previously taught content from Autumn 1&2. Introduction of 1 applied exam question.	Homework – HT4 Skills Check, 1 pure exam question and 1 Statistics & Mechanics exam question. 5 recall and retention questions based on previously taught content from Autumn 1&2 and Spring 1. Revision – Structured maths genie revision sheets.	Revision – Structured differentiated BSG revision sheets.	Homework – HT6 Skills Check, 1 pure exam question and 1 Statistics & Mechanics exam question. 5 recall and retention questions based on previously taught content from Autumn 1&2 and Spring 1&2
Additional Subject Specific Information – Next steps	Year 12 - P7a Year 13 - P1, P2	Year 12 - M8, M10, M11 Year 13 - P1, P2, P12 Year 12 - M9, S6 Year 13 – M6. M8. S3	Year 12 - M11 Year 13 - P2, P9, Year 13 - S2 Year 13 - M7	Year 13 - P6, P7 Year 12 - M11 Year 13 - P11 Year 13 - S3	Year 13 - P6, P7, S1 Year 13 - P1, P4 Year 13 - M8	Year 13 - S1

Year 13 – A Level Mathematics					
Term	Autumn (1)	Autumn (2)	Spring (1)	Spring (2)	Summer (1)
Topic(s)/ Subjects(s)	Pure Chpt2 - Functions and graphs Pure Chpt5 - Radians Pure Chpt6&7 - Trigonometry Mechanics Chpt6 - Projectiles Statistics Chpt2 - Probability	Pure Chpt3 - Sequences and Series Pure Chpt9 - Differentiation Pure Chpt8 - Parametric Equations Statistics Chpt3 - The Normal Distribution Mechanics Chpt4 - Moments	Pure Chpt11 - Integration Pure Chpt4 - Binomial Expansion Mechanics Chpt5 - Resolving Forces Mechanics Chpt7 - Applications of forces	Pure Chpt10 - Numerical Methods Pure Chpt12 - Vectors Mechanics Chpt8 - Further kinematics Statistics Chpt1 - Correlation	Revision
Knowledge and skills (Content)	Range and domain, modulus function, sketching graphs of harder functions, applications of modelling. Radian measure; arc length, area of a sector, small angle approximation Introduction of reciprocal functions, solving trigonometric equations, proving identities Probability distributions, venn diagrams, conditional probability. Projectiles	Arithmetic and geometric sequences, sigma notation, summation of series, recurrence relation Differentiation of trigonometric functions, chain rule, product rule and quotient rule, implicit differentiation. Introduction of parametric equations, changing to Cartesian, differentiation parametric functions. Normal distribution and hypothesis testing. Approximation from binomial to normal	Integration of trigonometric functions, integration by substitution, integration using partial fractions, integration by parts, by recognition. Applying the binomial expansion, factorising out coefficients, approximating values	Newton-Raphson method, iteration, locating roots, 3D vectors Regression lines and PMCC	Working through past papers and topic based questions
Assessment	Baseline test – first lesson Recall assessment – Trigonometry, functions, differentiation and algebraic methods Recall assessment - Trigonometry proof, algebraic methods and differentiation	Mock exams Recall assessment - Parametric Equations, functions, co-ordinate geometry, vectors, proof, differentiation and integration	Recall assessment – Algebraic methods, calculus, trigonometry and parametric equations Recall assessment – Sequences and series, binomial expansion, trigonometry, algebraic methods, vectors and integration	Recall assessment – Algebraic fractions, sequences and series, integration, parametric equations, functions and differentiation	Practice papers
Cross Curricular Links	Geography – Probability distributions Physics - Projectiles	Psychology & Biology – Normal distribution Physics - Moments	Physics – Resolving forces	Biology - Correlation	
SMSC, British Values, Cultural Capital	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters
CEIAG	Climate scientist SUMS Magazine	Astronaut SUMS Magazine	Orthotics and prosthetics SUMS Magazine	SUMS Magazine	SUMS Magazine
Learning outside the classroom	Homework - HT1 Skills Check. 5 recall and retention questions based on previously taught content. 2 exam questions from Y12 topics	Homework – HT2 Skills Check. 5 recall and retention questions based on previously taught content. 2 exam questions from Y12 topics. Maths in action, Senior Maths Challenge Senior Team Maths Challenge	Homework – HT3 Skills Check. 5 recall and retention questions based on previously taught content. 2 exam questions from Y12 topics	Revision – Structured topic based revision sheets.	Revision – Structured topic based revision sheets
Additional Subject Specific Information - Prerequisites	GCSE Chpt2, 17 Year 12 - P4, P9, P10 Year 13 - P5, P6 GCSE Chpt2 Year 12 - P14, P6	Year 13 - P2, P7 Year 12 - P12 Year 13 - P6, P8	Year 12 - P13 Year 13 - P1, P9 Year 12 - P13 Year 13 - P1, P9	GCSE Chpt17 Year 12 - P8, P12 Year 13 - P1, P3, P9 Year 12 - P11	

Year 12 – Further Mathematics						
Term	Autumn (1)	Autumn (2)	Spring (1)	Spring (2)	Summer (1)	Summer (2)
Topic(s)/ Subject(s)	Core Chpt1 - Complex Numbers Core Chpt2 - Argand Diagrams D1 Chpt6: Linear Programming D1 Chpt2: Graphs and Networks D1 Chpt3: Algorithms on Graphs	Core Chpt6 - Matrices Core Chpt4 - Roots of Polynomials D1 Chpt1: Algorithms D1 Chpt4: Route Inspection D1 Chpt8: Critical Path Analysis	Core Chpt7 - Linear Transformations Core Chpt3 - Series D2 Chpt2: Allocation Problems D2 Chpt7: Game Theory D2 Chpt3: Flows in Networks	Core Chpt8 - Proof by Induction Core Chpt9 - Vectors D2 Chpt7: First Order Recurrence	Core Chpt5 - Volumes of Revolutions D2 Chpt1: Transportation Problems	Pre teach some integration and differentiation topics to prepare for Y13 Preparations for University entrance exams TMUA D1 Chpt7: Simplex Algorithm
Knowledge and skills (Content)	C1.1 - Add, subtract, multiply and divide complex numbers in the form $x + iy$ with x and y real. Use the complex conjugate and convert to modulus-argument form C1.2 - Use and interpret Argand diagrams. D1.6 - GCSE plotting inequalities and forming algebraic expressions, formulating linear programming problems, solve two variable problems using a ruler and vertex method, integer Value solutions. D1.2 - Terminology and notation, modelling using graphs D1.3 - Prims and Kruskals algorithms to find the MST, Dijkstra's algorithm to find the shortest distance between two nodes, Floyds algorithm to find the shortest path, Planarity algorithm	C1.6 - Add, subtract and multiply conformable matrices, understand and use zero and identity matrices. Solve three linear simultaneous equations in three variables by use of the inverse matrix and interpret geometrically C1.4 - Understand and use the relationship between roots and coefficients of polynomial equations up to quartic equations. D1.1- Written / flowchart algorithms, bubble and quick sort, bin packing algorithms, order of an algorithm D1.4 - Route Inspection algorithm to find Eulerian and Semi Eulerian Cycles (Chinese postman) D1.8 - Precedence tables (dummies), Critical path analysis algorithm to identify the critical activities and floats. Gantt charts and scheduling, resource histograms	C1.7 - Use matrices to represent linear transformations, including invariant points and lines, in 2D and 3D C1.3 – Using formulas for the sum of series or r , r^2 , and r^3 . D2.2 - Cost matrix reduction, use of Hungarian algorithm to find the least cost allocation, modification to deal with a maximum profit allocation, formulate Hungarian as a LP problem. D2.7 - Two person zero sum games, play safe strategies and stable solutions, dominance arguments, optimal mixed strategies, formulate game theory as LP. D2.3 - Algorithm for finding the maximum flow, cuts and their capacities, flow augmenting routes and backflow, use of max flow – min cut theorem	C1.8 - Construct proofs using Mathematical induction. Contexts include sums of series, divisibility and powers of matrices. C1.9 - Understand and use the vector and Cartesian forms of an equation of a straight line and a plane. Calculate the scalar product and use it to express the equation of a plane, and to calculate the angle between two lines, the angle between two planes and the angle between a line and a plane. Find the intersection of a line and a plane. in 3-D. D2.7 - Forming recurrence relations, solving first order recurrence (homogeneous and non-homogeneous)	C1.5 - Derive formulae for and calculate volumes of revolution. D2.1 – North west corner method to find an initial basic feasible solution, dummies, degeneracy, stepping stone to find and improved solution, improvement indices, entering and exiting cells, formulating the transportation problem as LP.	D1.7 – Formulating LP, the simplex method, integer value solutions, two stage simplex, the big M method
Assessment	Baseline test – first lesson	Core and Decision assessment	Core and Decision assessment	AS Course is now complete	SAS Exams / AS Exam	
Cross Curricular Links	Computer Science – Graph terminology and Dijkstras	Geography – Standard Deviation and Variance Physics – SUVAT equations Computer Science – Written/flowchart algorithms, develop algorithms, bubble sort and quick sort, order of an algorithm Business – Critical Path Analysis	Biology, Chemistry and Physics – Representation of data	Physics – Forces and motion	Chemistry – Arrhenius equation Geography – Log graphs	
SMSC, British Values, Cultural Capital	Mathematician of the Month and Diversion and Inclusion posters	Cryptography Mathematician of the Month and Diversion and Inclusion posters Bridges of Konigsberg	NSPCC Number Day Mathematician of the Month and Diversion and Inclusion posters Prisoners Dilemma	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters	Mathematician of the Month and Diversion and Inclusion posters

CEIAG	SUMS Magazine	Green engineer SUMS Magazine	Critical analysis SUMS Magazine	SUMS Magazine	SUMS Magazine	TMUA – Preparation for entrants exam SUMS Magazine
Learning outside the classroom	Homework – Manipulation of surds. 5 practice exam questions based on previous topics covered.	Homework – 5 practice exam questions based on previous topics covered. Senior Maths Challenge Senior Team Maths Challenge	Homework – 5 practice exam questions based on previous topics covered.	Homework – 5 practice exam questions based on previous topics covered. Revision – Structured maths genie revision sheets.	Revision – Structured practice topic papers	Homework – 5 practice exam questions based on previous topics covered.
Additional Subject Specific Information – Next steps	Linear programming in Transportation, Allocation, Game Theory and Simplex Algorithm, Core - Complex numbers in exponential form, De Moivre's Theorem	Using MST in Travelling Salesman Problems	D2 Chpt4 – Flows in Networks 2 Core – Maclaurin series, method of differences	D2 Chpt7 – Second Order Recurrence	Core – Volumes of revolution of parametrically defined curves	D2 Chpt6 – Solving Game Theory Problems with three choices

Year 13 – Further Mathematics					
Term	Autumn (1)	Autumn (2)	Spring (1)	Spring (2)	Summer (1)
Topic(s)/ Subject(s)	Core Chpt2 – Series Core Chpt1 – Complex numbers D1 Chpt5 – Travelling Salesman D2 Chpt4 – Further Flows	Core Chpt6 – Hyperbolic functions Core Chpt3 – Methods in Calculus (not whole chapter) D2 Chpt5 – Dynamic Programming	Core Chpt5 – Polar Coordinates Core Chpt3 – Methods in Calculus (not whole chapter) D2 Chpt8 – Decision Analysis D2 Chpt7 – Recurrence	Core Chpt4 – Volumes of revolution Core Chpt7 – Methods in differential equations	Core Chpt8 – Modelling with differential equations
Knowledge and skills (Content)	C2.2 - Understand and use the method of differences for summation of series including use of partial fractions. Find the Maclaurin series of a function including the general term. C2.1 - Understand de Moivre's theorem and use it to find multiple angle formulae and sums of series. Use complex roots of unity to solve geometric problems. D1.5: The classical and practical problem of finding an acceptable route which visits set destinations, holistic algorithms, using the MST x 2 and shortcuts to find the upper bound, nearest neighbour to find an upper bound, RMST to find lower bounds D2.4: Restricted capacity nodes, networks with minimum capacities, multiple sources and sinks.	C2.6 – Understand the definitions of hyperbolic functions $\sinh x$, $\cosh x$ and $\tanh x$, including their domains and ranges, and be able to sketch their graphs. Differentiate and integrate hyperbolic functions. C2.3 Differentiate inverse trigonometric functions and integrating with inverse functions. D2.5: Principles of dynamic programming, Bellman's principle of optimality, stage and state variables, use of tabulation to solve maximum, minimum, minmax or maxmin problems (network and table formats) D2.8: Using Decision Trees and Utility.	C2.5 - Understand and use polar coordinates and be able to convert between polar and Cartesian coordinates. Find the area enclosed by a polar curve. C2.3 - Evaluate improper integrals where either the integrand is undefined at a value in the range of integration or the range of integration extends to infinity. Understand and evaluate the mean value of a function. Integrate using partial fractions. D2.7: Forming and solving second order recurrence, homogeneous and non-homogeneous, complementary functions, particular solutions. D2.8: Using Decision Trees and Utility.	C2.4 - Derive formulae for and calculate volumes of revolution. C2.7 - Find and use an integrating factor to solve differential equations. Find both general and particular solutions to differential equations.	C2.8 - Use differential equations in modelling in kinematics and in other contexts. Solve the equation for simple harmonic motion. Model damped oscillations using second order differential equations and interpret their solutions.
Assessment	Decision 1 Course Complete	Mock Exams			
Cross Curricular Links		Business Studies- Decision Trees			Physics – Differential equations, simple harmonic motion
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CEIAG	SUMS Magazine	SUMS Magazine	SUMS Magazine	SUMS Magazine	SUMS Magazine
Learning outside the classroom	Homework – 5 practice exam questions based on previous topics covered.	Homework – 5 practice exam questions based on previous topics covered. Maths in action Senior Maths Challenge Senior Team Maths Challenge	Homework – 5 practice exam questions based on previous topics covered.	Homework – 5 practice exam questions based on previous topics covered.	Revision – Structured topic papers and past papers
Additional Subject Specific Information – Prerequisites	Year 12 - C3 Year 13 - P3, P9 Year 12 - P8, C1	Year 12 - P14 Year 13 - P1, P6, P9, P11	Year 12 - C2 Year 13 - P9, P11 Year 13 - P1, P9, P11	Year 12 - C5 Year 13 - P11	