Curriculum Plan

Department/subject: Mathematics - Year 12 Further Autumn Term

Our Vision: **We take opportunities and aspire to excellence**

Our Intent:

- All students will experience a curriculum richness, breadth and depth
- The curriculum equips every student with the knowledge and skills for the future in our local area and beyond
- The curriculum builds on prior knowledge and creates a 'web of knowledge'
- Gaps in knowledge and skills are identified and addressed quickly

Year	Autumn 1	Autumn 2
Knowledge to be taught	Pure: Complex Numbers – imaginary and complex numbers, multiplying complex numbers, complex conjugation, roots of quadratic equations, solving cubic and quartic equations Argand Diagrams – argand diagrams, modulus and argument, modulus-argument form of complex numbers, loci in the argand diagram, regions in the argand diagram Series – sum of natural numbers, sums of squares and cubes. Applied: Algorithms – using and understanding algorithms, flows charts, bubble sort, quick sort, bin-packing algorithms, order of an algorithm. Graphs and Networks – modelling with graphs, graph theory, special types of graph, representing graphs and networks using matrices, the planarity algorithm	Pure: Roots of polynomials – roots of a quadratic equation, roots of a cubic equation, roots of a quartic equation, expressions relating to the roots of a polynomial, linear transformations of roots Volumes of revolution – volumes of revolution around the x and y axis, adding and subtracting volumes, modelling with volumes of revolution Matrices – matrix multiplication, determinants, inverting a 2x2 and 3x3 matrix, solving systems of equations using matrices Applied: Algorithms on Graphs – Kruskals Algorithm, Prims Algorithm, Dijkstras algorithm, Floyds algorithm. Route inspection – Eularian Graphs, Using the route inspection Algorithm, Networks with more than four odd nodes.
Key Words	Pure: Complex Numbers – imaginary, complex, discriminant, conjugate, polynomial, coefficient.	Pure: Roots of polynomials – coefficients, roots, reciprocal, products of powers, transformation

	Argand Diagrams – complex, Cartesian, modulus, argument, quadrant, perpendicular bisector, locus, regions Series – sigma, sum, natural Applied: Algorithms – Algorithms, flowchart , order, ascending, descending, bin-packing Graphs and Networks – tree, edge, arc, node, vertex, order, isomorphic.	Volumes of revolution – volume, revolution, radians Matrices – elements, matrix, scalar, determinants, inverse, transpose Applied: Algorithms on Graphs – stage, node, vertex, arc Route inspection – stage, node, vertex, arc
Links to prior knowledge	Pure: Complex Numbers – develops GCSE solving quadratics. Argand Diagrams – complex numbers (Year 12 Autumn 1). Series – develops GCSE sequences Applied: Algorithms – connects with computer science GCSE for those who studied it.	Pure: Roots of polynomials – quadratics and other polynomials (Year 12 Pure Autumn 1) Matrices – develops GCSE vectors and simultaneous equations. Applied: Algorithms on Graphs – graphs and networks (Year 12 Autumn 1) Route inspection - graphs and networks (Year 12 Autumn 1), algorithms on graphs (Year 12 Autumn 2)
How knowledge is assessed	Knowledge is assessed through both a formative and a summative approach. Teachers will use some of the following: ● Baseline assessments ● Quizzes ● Retrieval Starter questions ● Teacher questioning throughout the lessons ● Mini white boards ● True or false activities ● Student's discussion and presentations At the end of teaching every topic students complete a fundamentals test that is either self, peer or teacher	Knowledge is assessed through both a formative and a summative approach. Teachers will use some of the following: ● Baseline assessments ● Quizzes ● Retrieval Starter questions ● Teacher questioning throughout the lessons ● Mini white boards ● True or false activities ● Student's discussion and presentations At the end of teaching every topic students complete a fundamentals test that is either self, peer or teacher

	assesses. This highlights gaps in knowledge so that these can be recapped prior to their end of topic test. Teachers mark and feedback the challenge test which is recorded on SIMs. Students sit a mock exam which is teacher marked and feedback to students. This is based on all content covered so far.	assesses. This highlights gaps in knowledge so that these can be recapped prior to their end of topic test. Teachers mark and feedback the challenge test which is recorded on SIMs.
How gaps will be addressed	Staff have GCSE results which gives an indication of where students currently are and identifies students who will need more support. Students sit a baseline test at the beginning of the year to identify key areas of concern for early intervention. Staff analyse fundamentals test results and will provide in lesson intervention where necessary to develop students understanding of the key concepts. Staff highlight areas of concern and discuss focus points with students following their challenge tests.	Staff have students mock results which gives an indication of where students currently are and identifies students who will need more support and this support is provided in the form of intervention. Staff analyse fundamentals test results and will provide in lesson intervention where necessary to develop students understanding of the key concepts. Staff highlight areas of concern and discuss focus points with students following their challenge tests. Staff provide re-tests for students that needed to do more work on a given topic.
Cultural capital lessons	Problem solving will be embedded into lessons where students will learn to UNPACK problems pulling together different mathematical skills. Links to 'real life' maths will be made to give concept to mathematical skills. This is particularly clear in the applied mathematics involving Decision Maths where we are primarily looking at improving profit and loss, and how to move around a network in the most efficient manner.	Problem solving will be embedded into lessons where students will learn to UNPACK problems pulling together different mathematical skills. Links to 'real life' maths will be made to give concept to mathematical skills. This is particularly clear in the applied mathematics involving Decision Maths where we are primarily looking at improving profit and loss, and how to move around a network in the most efficient manner.