Maths Faculty Rationale

To make mathematics enjoyable, exciting and interesting for all students, regardless of ability, gender or ethnicity.
To create a balanced and supportive culture in which students can confidently apply logic and reasoning to mathematical problems; apply methods that are efficient and reliable without engendering a fear of failure or derision and to ensure that students can work collaboratively.
To engender in students an appreciation that mathematics is more than 'sums' so that they understand that mathematics appears all around us and how it can be used in everyday life.
To equip all students with functional mathematical tools that can be used throughout their lives, particularly to promote an interest in science, engineering and other linked areas.

National Curriculum Aims KS4

The national curriculum for mathematics aims to ensure that all pupils:

- become fluent in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- reason mathematically by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language
- can solve problems by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of simpler steps and persevering in seeking solutions.

Foundation	Content	Skills	Rationale / Link to NC
Unit 1 Number Year 9 Week 1-5	Place value, factors and multiples, squares, cubes and roots, index notation and prime factors	See SOW objectives column	This unit builds on prior knowledge. These topics are often seen interleaving with other later topics. Index notion is a pre requisite for standard form and index notation for negative indices in unit 18.
Unit 2 Algebra Year 9 Week 6-12	Algebraic expressions, substitution, formulae, expanding, factorising and using expressions and formulae		Formulae involves substitution, and so unit 1 ensures students have reviewed basic numeracy topics before covering this (eg BIDMAS, negatives, use of a calculator). Brackets (factorising and expanding).
Unit 3 Graphs, Tables & Charts Year 9 Week 13-15	Statistical Diagrams, Time Series and Scatter Graphs		Students are required to be able to interpret tables, graphs and data in various everyday life context and may have to present information within their work life and to interpret information given to them, for example in the media.
Unit 4 Fractions & Percentages Year 9 Week 16-18	Fractions (calculating) and Percentage calculations		This unit builds on prior KS3 knowledge and is always examined. It is covered again in various units of work.
Unit 5 Equations, Inequalities and Sequences Year 9 Week 19-24	Solving linear equations, inequalities, formulae, generating sequences, finding and using the nth term		Solving linear equations is a key skill that students need to be fluent in, in order to progress to more difficult topics, and is required within linear sequences and so needs to be covered first.

Unit 6 Angles Year 9 Week 25-30	Properties of shapes, angles in parallel lines, angles in triangles, exterior and interior angles and geometrical patterns		Angles in triangles and quadrilaterals builds on prior knowledge from KS3. Angles in polygons is then introduced next as questions combine the skills.
Unit 7 Averages and Range Year 9 Week 31-34	Mean, mode, median and range, types of averages, estimating the mean and sampling		Students will have the prior knowledge of averages and this will be developed by looking at averages from tables and graphs. Understanding of 'the mean' is required for estimating the mean and so is covered first.
Unit 8 Perimeter, Area and Volume Year 9 Week 35-39	Rectangles, parallelograms and triangles, trapezia and changing units, area of compound shapes, surface area of 3D solids, volume of prisms and volume and surface area problems		These topics develop problem solving techniques and link in to real life topics. Easier shapes are looked at first for volume and surface area, progressively getting harder. These units are covered first, then in unit 17 more challenging shapes are used.
Unit 9 Graphs Year 10 Week 1-5	Coordinates, linear graphs, gradient, y=mx+c, real-life graphs and distance-time graphs		Linear graphs are introduced first, which then gives students the understanding to find the equations of line. These skills can then be adapted to plotting and interpreting real life graphs. Quadratic, cubic and reciprocal graphs are introduced now as this follows on using the same skills as linear graphs. This is covered again in more detail in unit 16 and 20.
Unit 10 Transformations Year 10 Week 6-9	Translation, reflection, rotation, enlargement, describing enlargements and combining transformations		This unit is taught after looking at coordinates and graphs as the equation of a line is needed in order to reflect. This is also covered before similar shapes as knowledge of enlargement is a pre requisite.
Unit 11 Ratio and Proportion Year 10 Week 10-15	Writing ratios, using ratios, ratio and measures, using ratios, comparing using ratios, using proportion, proportion and graphs and proportion problems		Proportion is revisited in unit 14 and it is often seen interleaving with other later topics. Proportion is used in multiple real life situations. Students need an understanding of proportion before they move on to looking at it with graphs and problem solving questions.
Unit 12 Right-angled triangles Year 10 Week 16-19	Pythagoras, trigonometry ratios and finding lengths and angles using trigonometry.		Pythagoras introduces the right angle triangle and progresses on to trigonometry. The trigonometry ratios are taught before finding the lengths and angles because this understanding is essential to calculate these.

Unit 13 Probability Year 10 Week 20-24	Calculating probability, two events, experimental probability, venn diagrams, tree diagrams		Calculating probabilities is taught first because it is applied in the rest of this unit. This understanding makes students aware of the likelihood of certain events happening, which is frequently used in everyday life.
Unit 14 Multiplicative Reasoning Year 10 Week 25-28	Percentages, growth and decay, compound measures, distance, speed and time, direct and inverse proportion.		This unit is a continuation from previous topics and goes into more depth. Percentages are covered first, followed by growth and decay because it uses the same processes.
Unit 15 Constructions, Loci and Bearing Year 10 Week 29-32	3D Solids, plans and elevations, accurate drawings, scale drawings, constructions, loci and bearings		Bearings follows work on angles in unit 6. Constructions are a necessary prerequisite to loci, and loci follows these as it combines the sub topics, particularly with scale drawings.
Unit 16 Quadratic Equations and Graphs Year 10 Week 33-35	Expanding double brackets, plotting quadratic graphs, using quadratic graphs, factorising quadratic expression and solving quadratic equations algebraically		Factorising quadratics is taught before solving quadratics because for the foundation tier they need to factorise in order to solve.
Unit 17 Perimeter, Area and Volume 2 Year 10 Week 36-39	Circumference and area of a circle, semicircles and sectors, composite 2D shapes and cylinders, pyramids and cones, spheres and composite solids		Students need to be able to find the area and circumference of a whole circle first as these skills are adapted for semi circles and sectors. Similarly, with cylinders, students need to be able to find the circumference and area of a circle first before finding or using the volume and surface area of a cylinder.
Unit 18 Fractions, Indices and Standard Form Year 11 Week 1-5	Multiplying and dividing fractions, laws of indices, large and small numbers in standard form and calculating with standard form		Students will have an understanding of powers of 10 from unit 1; they will then look at larger numbers in standard form first then smaller due to the progress in difficulty. Calculating with standard form is then covered once they have the initial understanding.
Unit 19 Congruence Similarity and Vectors Year 11 Week 6-8	Similarity and enlargement, using similarity, congruence and vectors		An understanding of similarity and enlargement is needed before it is possible to move onto using similarity. Congruence uses angle rules e.g. corresponding and alternate angles, which are covered in unit 6. Vectors make students aware of both positive and negative movement in 2 dimensions.

Unit 20 More Algebra Year 11 Week 9-11	Graphs of cubic and reciprocal functions, non-linear graphs, solving simultaneous graphically, solving simultaneous equations algebraically, rearranging formulae and proof		This unit follows on from unit 2, 5, 9 & 16 and uses the same skills for plotting quadratics as plotting cubic, reciprocal and non-linear graphs. Students solve simultaneous equations graphically first to gain the understanding of what the answer means before moving on to just finding it algebraically.