Subject: **Maths** KS4 Curriculum Mapping

	Year 10 Foundation	Year 10 Higher
HT1	**Calculations** - Multiplying and divide a fraction by an integer, by a unit fraction and by a general fraction - Solve problems involving calculating with negative numbers. - Increase and decrease a number by a % using a decimal or fraction multiplier. **The number system** - Convert improper and mixed fractions to decimals and percentages. - Estimate answers to check if an answer if of the correct size. - Use the answer to a given calculation to determine the answer to another.	**Calculations** -Solve problems involving repeated proportional or percentage changes, including compound interest -Represent repeated proportional change using a multiplier raised to a power. **The number system** -Understand and use the difference between rational and irrational numbers -Simplify surds, rationalise the denominator and expand brackets involving surds.
HT2	**Indices** - Write functions from words and diagrams using function notation and substitute in positive and negative integers, fractions and decimals - Rearrange formulae expressed in algebraic form where the subject appears only once - Use and understand prime decomposition for LCM and HCF. **Equations and formulae** - Expand the product of two linear expressions and simplify - Factorise quadratic expressions by identifying a common factor - Solve fractional equations and equations with unknowns on both sides using balancing correctly	**Indices** - Solve problems involving calculating with integer powers, roots and numbers in standard form -Check answers for correct order of magnitude - Use all necessary functions of a scientific calculator appropriately **Equations and formulae** - Solve linear inequalities in two variables and identify correct regions on a graph - Manipulate algebraic expressions including algebraic fractions, using expansion, factorising, rearranging and simplifying - Rearrange harder formulae including cases where the subject appears twice or a power of the subject appears.
HT3	**Proportion** - Use equality of ratios to solve problems and represent ratios as linear equations and draw their graphs. - Understand and use fractions, decimals and percentages as multipliers when calculating the original amount after a % change, including improper fractions. **Mensuration** - Derive, recall and use formulae for area and circumference of circles and parts of circles, using pi in exact calculations. - Change freely between standard and compound units. - Use compound measures e.g. speed and density.	**Proportion** -Understand direct and inverse proportion including reciprocal graphs -Form and use equations to solve word and other problems involving direct or inverse proportion including relating algebraic solutions to graphical representations of the equations. **Mensuration** - Understand the difference between formulae for perimeter, area and volume by considering dimensions of formulae. - Solve a variety of problems involving Pythagoras' theorem and right angled trigonometry, including with bearings.
HT4	**Graphs and sequences** - Plot graphs of quadratic functions and identify their turning points, intercepts and lines of symmetry. - Understand y = mx + c represents a straight line and the effects of changing m and c, including interpreting the gradient as a rate of change and the y intercept as the starting value in a real life graph. - Use the intersection of graphs to solve linear simultaneous equations. **Transformations** - Understand congruence in the context of reflections, rotations and translations. - Translate shapes by a given column vector and describe translations using vector notation.	**Graphs and sequences** - Understand and use the gradient properties of parallel and perpendicular lines. -Construct graphs of quadratic, cubic, circular and exponential functions - Solve problems involving intersection of a line with a curve (including circles). **Transformations** - Calculate and represent graphically the sum of two vectors, the difference of two vectors and a scalar multiple of a vector - Calculate the resultant of two vectors - Understand and use the commutative and associative properties of vector addition - Enlarge by any scale factor and understand the effect of enlargement on area and volume

HT5	**Angles** - Solve problems using properties of angles, of parallel and intersecting lines, and of triangles and other polygons, justifying inferences and explaining reasoning with diagrams and text - Derive the sum of angles in a triangle - Use bearings to describe position and draw given bearings. **Probability** - Solve probability problems involving theoretical models and relative frequency and calculate expected outcomes. - Construct tree diagrams and write the probability on the branches.	**Angles** - Solve problems involving angle facts for 2D shapes and between parallel lines - Use the Circle Theorems and know and use their proofs - INCLUDING alternate segment theorem, and problems involving tangents meeting] **Probability** - Solve complex problems involving probability, including those requiring algebraic manipulation and complex conditional probability. - Interpret, connect and use multiple representations of outcomes including sample space diagrams, Venn diagrams and tree diagrams.
HT6	**Statistics** - Draw and interpret graphs including scatter graphs. Know that correlation does not mean causation. - Identify modal class and median class and estimate the mean of grouped data. - Draw conclusions from data and consider outliers when drawing these conclusions. **Constructions** - Use straight edge and compasses to produce standard constructions including the midpoint and perpendicular bisector of a line segment, the perpendicular from a point to a line, and the bisector of an angle.	**Statistics** - Use and interpret the median, inter-quartile range and range for discrete data presented in a frequency table, to include the drawing of box plots. - Draw and interpret cumulative frequency tables and diagrams and box plots for grouped data; find the median, quartiles, percentiles and interquartile range. **Constructions** - Apply loci to spatial problems involving shapes and paths - Use straight edge and compasses to produce standard constructions including the midpoint and perpendicular bisector of a line segment, the perpendicular from a point to a line, and the bisector of an angle.

	Year 11 Foundation	Year 11 Higher
HT1	**Calculations** - Use multipliers to solve problems involving repeated percentage change, compound interest and reverse percentages. - Convert between fractions, decimals and percentages to find the most appropriate method to use in a calculation. **The number system** - Solve problems involving numbers expressed in standard index form with and without a calculator. - Recognise that measurements given to the nearest whole unit may be inaccurate by up to half a unit in either direction.	**Calculations** - Use iterative processes - Understand and generate recursive sequences - Set up solve and interpret Growth and Decay problems **The number system** - Identify the upper and lower bounds of measures provided to a given degree of accuracy - Use upper and lower bounds to identify the range in values of a compound measure - Use the product rule for counting. - Use a formal algebraic method to convert a recurring decimal into a fraction.
HT2	**Indices** - Understand that even powers and roots are always positive but odd can be positive or negative. - Substitute values into complex expressions and formulae involving powers and roots - Simplify algebraic expressions using multiplication and division of integer powers. - Use algebraic manipulation skills to prove simple identities (using 2n and 2n+1 to represent odd and even numbers) and multiples. **Equations and formulae** - Factorise and solve quadratic expressions including the difference of two squares. - Solve pairs of linear simultaneous equations through elimination and substitution.	**Indices** - Use fractional, negative and zero powers in simplifying numerical expressions, including using inverse operations - Solve equations involving indices and different bases and rearrange formulae where the subject is non-linear - Use algebraic manipulation skills to prove identities and form arguments (using 2n and 2n+1 to represent odd and even numbers) - Use fractional, negative and zero powers in simplifying numerical expressions, including using inverse operations - Solve equations involving Indices and different bases and rearrange formulae where the subject is non-linear. **Equations and formulae** - Rearrange quadratic equations and solve by completing the square and using the quadratic formula - Use generalisations and algebraic proofs to solve problems - Manipulate algebraic fractions and solve related equations

		- Expand the product of more than two binomials - Solve equations with algebraic fractions - Solve a pair of simultaneous equations where one is quadratic or in the form $x^2 + y^2 = r^2$ - Solve quadratic inequalities - Deduce, use and interpret inverse and composite functions
HT3	**Proportion** - For problems involving direct and inverse proportion, write relationships and recognise graphs. **Mensuration** - Know and use formulae for volume and surface area of all prisms, pyramids, spheres and cones, including frustums. - Investigate Pythagoras' theorem, using a variety of media, through its historical and cultural roots, including 'picture' proofs.	**Proportion** - Solve multi-stage geometric and algebraic problems using an understanding of proportionality. **Mensuration** - Solve complex problems involving volume and surface area of pyramids, cylinders, cones, frustums and spheres - Solve problems involving sectors, arc lengths and segments, including those requiring complex algebraic manipulation and trigonometry
HT4	**Graphs and sequences** - Find gradient and intercept of line given in the form $y = mx + c$ and other forms such as $3x + 2y = 12$. - Find the equation of a line or the midpoint given two coordinates. - Find the equation of a line from a single coordinate and the equation of a parallel line. - Plot simple quadratic, cubic and reciprocal functions. Solve a quadratic by identifying its roots on a graph. **Transformations** - Recognise, visualise and construct enlargements using positive and fractional scale factors; identify the centre and scale factor of enlargement. - Understand and use column vectors. - Transform 2D shapes by a combination of reflection, rotation and translation including the use of vector notation. - Describe the resultant image as a **single** transformation.	**Graphs and sequences** - Find the nth term of a quadratic sequence - Recognise and use geometric sequences (including common ratio of a surd) - Locate turning points of a quadratic function by completing the square - Apply the concept of instantaneous and average rates of change by looking at gradients of tangents and chords to a curve, including circles - Interpret areas under graphs and gradients of graphs in real life contexts e.g. area under velocity-time graph is displacement - Understand and use speed and acceleration calculations. **Transformations** - Apply vector methods for simple geometric proofs - Recognise when lines are parallel using vectors - Recognise when three or more points are co-linear using vectors, vectors to show three or more points are collinear - Transform the graph of any function f(x): f(x) + a, f(x + b), af(x) and f(ax) where a and b are integers - Recognise transformations of functions and be able to express a transformed function in algebraic form - Apply transformations to the graphs of sine and cosine functions.
HT5	**Angles** - Explore the angle and side ratios of equilateral and isosceles right angles triangles. - Use an understanding of similar shapes to find missing sides and angles within right angled triangles. - Know exact values of sin cos tan 30 45 60 and 90. **Probability** - Use Venn diagrams to solve problems with probability. - Use tree diagrams to calculate probabilities of successive or combined events. - Apply the AND/OR rule for combined or successive events.	**Angles** - Use the sine and cosine rules to solve 2-D problems - Know and apply 1/2abSinC to any triangle. - Solve multi-stage Trigonometric Problems - Use trigonometric relationships in 3-D contexts, including finding the angles between a line and a plane - Use the sine and cosine rules to solve 2-D and 3-D problems. **Statistics** - Draw and interpret histograms for grouped data - Understand frequency density - Identify seasonality and trends in time series, from tables or diagrams - Interpret graphs modelling real situations - Select a representative sample from a population using random and stratified sampling - Criticise a range of sampling methods.

HT6	**Statistics** - Select, construct and modify, on paper and using ICT suitable graphical representation to progress an enquiry including trends in time series and lines of best fit on scatter graphs. **Constructions** Understand and use SSS, SAS, ASA and RHS condition to prove the congruence of triangles - Use congruence to show that translations, reflections and rotations preserve length and angle. - Use standard constructions to create a scale drawing.	Revision of all units and completion of past paper questions