

What are the aims and intentions of this curriculum?

The aim of our Key Stage 4 Curriculum is to enable students to:

- Develop fluent knowledge, skills and understanding of mathematical methods and concepts
- To make the connection with the KS3 curriculum
- Acquire, select and apply mathematical techniques to solve problems
- Reason mathematically, make deductions and inferences and draw conclusions
- Comprehend, interpret and communicate mathematical information in a variety of forms appropriate to the information and context.

Throughout KS4: Students will need to keep working on key skills as they occur within other topics, as well as when the skills are being explicitly addressed. These include: Addition, subtraction, multiplication and division; order of operations; fractions, decimals and percentages; rounding and estimation; and algebraic notation.

Term	Topics	Knowledge and key terms	Skills developed	Assessment
Summer 2	<ul style="list-style-type: none"> ➤ Handling Data <ul style="list-style-type: none"> • Averages recap • Scatter Diagram ➤ SSM • Area, Perimeter, Surface Area and Volume 	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Describe, interpret and compare observed distributions of a single variable through measures of central tendency (mean, mode, median) and spread (range, consideration of outliers) • To draw scatter diagram to compare data • find the areas of parallelograms and trapezia • find the areas and perimeters of composite plane figures • Find the volumes of cubes and cuboids • Find the volumes of prisms, including cylinders • Explore the surface area of cubes and cuboids • Explore the surface area of prisms • Convert between measures of area and volume • Solve worded problems involving area and perimeter 	<ul style="list-style-type: none"> • select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems. • apply statistics to describe a population • use and interpret scatter graphs of bivariate data; recognise correlation and know that it does not indicate causation; • draw estimated lines of best fit; make predictions; interpolate and extrapolate apparent trends whilst knowing the dangers of doing so. 	<ul style="list-style-type: none"> • All Students will be sitting an End of term assessment. • Students will be assessed additionally as best seen fit by their subject teacher. • Mathswatch •

	<ul style="list-style-type: none"> Transformation (Review) 	<ul style="list-style-type: none"> Translate a shape by a given vector Reflect a shape in a line, including on coordinate axes Rotate a shape about a center, including on coordinate axes 	<ul style="list-style-type: none"> Identify the type of transformation carried out by comparing an object and image 	
Autumn 1	<ul style="list-style-type: none"> Number <ul style="list-style-type: none"> Indices, Powers and roots Most Able: <ul style="list-style-type: none"> **Fractional Indices Surds, Operations with surds Algebra <ul style="list-style-type: none"> Changing the Subject of the formula Simplifying and Factorizing Algebraic expressions Solving Equations Changing the subject of the formula 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Apply to and use in solving problems: Build on the knowledge gained on Indices seen in KS3 Basic Laws of Indices. Understanding Surds and their operations. Employ knowledge acquired in KS3 to use the Inverse operations of formulae Use with great fluency: Basic Algebra facts Employ and build on KS3 knowledge in Collecting Like terms, multiplying brackets and factorizing linear and quadratic expressions. Factorise quadratic expressions of the form $x^2 + bx + c$ Factorise difference of two squares Factorise quadratic expressions of the form $ax^2 + bx + c$, when $a > 1$ simplify and manipulate algebraic expressions (including those involving surds {and algebraic fractions}) rearrange formula to change the subject To solve Linear equations and simultaneous equation. Linear/linear Understand and use the concepts and vocabulary of expressions, equations, formulae, terms and factors. 	<ul style="list-style-type: none"> Make and use connections, which may not be immediately obvious, between different parts of mathematics Perform routine single and multi-step procedures effectively Accurately recall facts, terminology and definitions Accurately carry out complex procedures or set tasks requiring multi-step solutions Generate strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes Recognise and calculate with square numbers and cube numbers, knowing square and cube roots as appropriate Understand the meaning of higher powers and know how to find these Understand the meaning of roots and how to find these, including through approximation Efficiently use of a calculator, when appropriate Understand the meaning of higher powers and know how to find these. Understand, derive and use the rules of indices with integer values. 	<ul style="list-style-type: none"> Pixi Maths RAG Maths Takeaway Maths watch homework AO1: Use and apply standard techniques AO3: Solve problems within mathematics and in other contexts
Autumn 2	<ul style="list-style-type: none"> Number <ul style="list-style-type: none"> Fractions Percentages 	<p>Students will be able to:</p> <ul style="list-style-type: none"> Build on KS3 knowledge in working with Fraction operations, which include algebraic fractions. 	<ul style="list-style-type: none"> Perform routine single and multi-step procedures effectively Identify and work with fractions in ratio problems 	<ul style="list-style-type: none"> Pixi Maths RAG Maths Takeaway

	<ul style="list-style-type: none"> • Algebra <ul style="list-style-type: none"> ➤ Expanding & Factorising ➤ Solving quadratic equations • SSM <ul style="list-style-type: none"> ➤ Pythagoras and basic Trigonometry ➤ Upper and lower bounds 	<ul style="list-style-type: none"> • To find percentage of an amount, Percentage Increase and decrease. • Complete the square of a quadratic expression • Introduce the quadratic formula • Rearrange and solve quadratic equations by factorisation, completing the square or the use of the quadratic formula • Find missing angles and lengths of right-angled triangles of right angles triangles using Pythagoras and Trigonometry. • Use sine rule and cosine rule to find missing side and angle for non-right angled triangles. • Area of triangles using Trig • Find the upper and lower bounds of a calculation using numbers that have been rounded to a given degree of accuracy • Understand the difference between the bounds of discrete and continuous quantities 	<ul style="list-style-type: none"> • Accurately carry out complex procedures or set tasks requiring multi-step solutions • Use Pythagoras' theorem to find missing sides in right-angled triangles • Put in use, the knowledge developed on their understanding of the trigonometric ratios • Solve associated problems in other shapes where right-angled triangles exist. • Put in use, the knowledge gained in to problem solve problems using trigonometric ratios in right-angled triangles • Deduce whether a triangle is right-angled by considering its sides • Apply and interpret limits of accuracy when rounding or truncating, {including upper and lower bounds}. 	<ul style="list-style-type: none"> • Maths watch homework • AO1: Use and apply standard techniques • AO3: Solve problems within mathematics and in other contexts
Spring 1	<ul style="list-style-type: none"> • Algebra (Review and Build) <ul style="list-style-type: none"> ➤ Transformation ➤ Proportion • SSM <ul style="list-style-type: none"> ➤ Polygons (Review) 	<p>Students will be able to:</p> <ul style="list-style-type: none"> • Review the concepts on: Rotation, Reflection, Enlargement and Translation. • Describe and transform a given shape by reflection, rotation, translation and enlargement (fractional and negative scale) • Direct and Inverse Proportion • Compare lengths, areas and volumes using ratio notation and/or scale factors. • Make links to similarity • Angle properties • Angles between parallel lines • Interior and Exterior angles of polygons 	<ul style="list-style-type: none"> • Perform routine single and multi-step procedures effectively • Generate strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes • Understand that X is inversely proportional to Y is equivalent to X is proportional to 1/ Y • Construct and interpret equations that describe direct and inverse proportion • To be able to find interior and Exterior angles of a regular polygon 	<ul style="list-style-type: none"> • Pixi Maths RAG • Maths Takeaway • Maths watch homework • AO1: Use and apply standard techniques

	<ul style="list-style-type: none"> ➤ Recurring decimals 	<ul style="list-style-type: none"> • Apply algebra to prove recurring decimals 	<ul style="list-style-type: none"> • Understand and use Corresponding and Alternate angles between parallel lines. • Use the known properties of triangles and quadrilaterals to follow and to derive simple proofs in rectilinear figures, including key angle and area facts Building on students' experience in Year 9, and where necessary Consolidation of prior units. • Use angle facts to justify results in simple and complicated proofs 	<ul style="list-style-type: none"> • AO2: Reason, interpret and communicate mathematically • AO3: Solve problems within mathematics and in other contexts
Spring 2	<ul style="list-style-type: none"> • Algebra <ul style="list-style-type: none"> ➤ Quadratic sequences • SSM <ul style="list-style-type: none"> ➤ Loci and Construction ➤ Bearings 	<p>Student will be able to:</p> <ul style="list-style-type: none"> • Review Linear sequences • Find the formula for the nth term of a quadratic sequence • Find missing terms in, and find the formula for the nth term of geometric sequences with ratios that are surds • Investigate the development and structure of quadratic sequences, including the method of second differences to find a rule for the general term. • Geometric sequences will be extended to explicitly include surds. <ul style="list-style-type: none"> • Perpendicular and Angle bisectors • Construct triangles, bisect angles and construct the perpendicular bisector of a line. • Apply the 4 concepts of Loci to problem solve. • Draw and use scales on maps and scale drawings. • Solve problems involving bearings • Consider right-angled triangles formed in bearing problems, as well as the general meaning and use of bearings. 	<ul style="list-style-type: none"> • Generate strategies to solve complex mathematical and non-mathematical problems by translating them into a series of mathematical processes • Generate terms of sequences from either term to term or position to term rule • recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0 or a surd) and other sequences <ul style="list-style-type: none"> • Solve problems involving bearings. • Develop their skills of reasoning and justification to include proofs involving more angle facts <ul style="list-style-type: none"> • Use vectors in more abstract situations away from the coordinate grid. 	<ul style="list-style-type: none"> • Pixi Maths RAG • Maths Takeaway • Maths watch homework • AO1: Use and apply standard techniques • AO3: Solve problems within mathematics and in other contexts

	<ul style="list-style-type: none"> • Algebra ➤ Introduction to Vectors ➤ **Vector proofs ➤ Algebraic Proofs ➤ Trigonometry graphs • Straight lines • Equations of parallel and perpendicular lines • Further Inequalities 	<ul style="list-style-type: none"> • Represent a two-dimensional vector as a column vector -Translation <ul style="list-style-type: none"> ➤ Add and subtract vectors • Multiply a vector by a scalar <ul style="list-style-type: none"> ➤ Use vectors to prove geometric arguments ➤ Use algebra to construct proofs of arguments ➤ recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function $y = 1/x$ with $x \neq 0$, exponential functions, and the trigonometric functions, ➤ Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form $y = mx + c$ to identify parallel and perpendicular lines ➤ Find the equation of the line through two given points, or through one point with a given gradient ➤ solve linear inequalities in one or two variable(s) 	<ul style="list-style-type: none"> • Extend their understanding of algebraic proof to include proofs such as the sum of three consecutive integers is always a multiple of 3. • identify and interpret gradients and intercepts of linear functions graphically and algebraically • Solve several inequalities in two variables, representing the solution set on a graph • Solving equations and inequalities 	
Summer 1	<ul style="list-style-type: none"> • Handling Data (Review) • SSM ➤ Properties of 3-D shapes; their plans and elevations ➤ Surface area and volume of pyramids, cones and 	<ul style="list-style-type: none"> • Averages, charts and diagrams • Solve a variety of problems both in numerical and algebraic form • Understand and use the relationship between lengths, areas and volumes of 	<ul style="list-style-type: none"> • Averages from frequency tables, Construct and interpret diagrams including Cumulative frequency curve, Box plots and Histograms. 	<p>Pixi Maths RAG</p> <p>Maths Takeaway</p> <p>Maths Watch homework</p> <ul style="list-style-type: none"> • AO1: Use and apply standard technique

spheres (including exact answers)

Most Able:

- Similar areas and volumes

- Construction

- Geometric proof

- Bounds

similar shapes building also on investigation work in KS3, students will discover what happens to the areas/volumes of enlarged 2D/3D shapes when the lengths are enlarged and deduce the corresponding relationships.

- Apply ruler and compass constructions to construct figures
- Understand the term equidistant
- Identify the loci of points and use these to solve real-world problems
- **Prove pairs of triangles are congruent using SSS, ASA, AAS and RHS**
- Find the upper and lower bounds of a calculation using numbers that have been rounded to a given degree of accuracy
- Understand the difference between the bounds of discrete and continuous quantities

apply the concepts of congruence and similarity, including the relationships between lengths, **areas and volumes** in similar figures

- Develop their skills from the previous unit, and their knowledge of Pythagoras' theorem from KS3 to solve a wide variety of problems involving right-angled triangles and situations that can be modelled by using right-angled triangles

- Select appropriate concepts, methods and techniques to apply to unfamiliar and non-routine problems; interpret their solution in the context of the given problem.

- **AO2: Reason, interpret and communicate mathematically**
- **AO3: Solve problems within mathematics and in other contexts**