



Topic name	Term	Skills developed	Prior learning	Next link in curriculum
Algebraic fractions and surds	Autumn	<ul style="list-style-type: none">Learn how to add, subtract, multiply and divide algebraic fractionsSolve equations involving algebraic fractionsBe able to form and solve equations and inequalities with fractionsUse algebraic proofPupils will understand how to use and calculate with surds and upper and lower bounds	<ul style="list-style-type: none">KS3 work on solving equationsY10 Autumn – work on solving equations and inequalities	<ul style="list-style-type: none">This topic is widening the array of equations and inequalities which pupils can solve. This is developed further at A level.
Trigonometry	Autumn	<ul style="list-style-type: none">Use sine, cosine and tangent ratios to calculate missing sides and angles in right-angled triangles.Calculate sides in right-angled triangles using Pythagoras' Theorem.Use Trigonometry and Pythagoras in 3D	<ul style="list-style-type: none">Y9 Similar shapes and enlargement	<ul style="list-style-type: none">Using trigonometry and Pythagoras/ Theorem to calculate missing sides and angles in any triangle.
Further Trigonometry	Autumn	<ul style="list-style-type: none">Accuracy and boundsGraphs of trigonometric functionsFurther trigonometry<ul style="list-style-type: none">Area of a triangle using $0.5 ab \sin C$Sine ruleCosine ruleTrigonometry without a calculator3D trigonometry	<ul style="list-style-type: none">Y9 legacy SOW - Trigonometry	<ul style="list-style-type: none">Using upper and lower bounds to complete calculations.Transformations of functions.Use sin cos and tan to calculate angles of any size.



<p>Further Algebra</p>	<p>Autumn</p>	<ul style="list-style-type: none"> • Understanding of inverse operations to rearrange formulae. • Apply understanding of the four basic operations to algebraic fractions. • Factorising expressions as parts of fractions and simplifying fractions involving algebra. • Learn new skills with surds such as rationalising the denominator, particularly the more challenging type where the denominator has more than one term. • Solving equations that have one, or more, algebraic fraction included in the problem. • Introduction to function notation. • Working with compound and inverse functions. • Using algebraic manipulation to prove certain mathematical statements are true. 	<ul style="list-style-type: none"> • Y8 Autumn – Multiplying and Dividing Fractions • Y9 Autumn – Forming and Solving Equations • Y10 Summer - Quadratics, expanding more than two brackets, sketching graphs, graphs of circles, cubes and quadratics 	<ul style="list-style-type: none"> • Solving increasingly challenging questions where rearranging complex formulas is necessary such as using the cosine rule. • Solving complex ratio and quadratic equations which include algebraic fractions. • Simplifying answers to a variety of questions involving surds, e.g. trigonometry problems in Paper 1 • Linking function notation and basic notation for graphs with the aim of realising they are interchangeable.
<p>Vectors and Proof</p>	<p>Autumn</p>	<ul style="list-style-type: none"> • Understand and use vector notation, including column notation, and understand and interpret vectors as displacement in the plane with an associated direction. • Understand that $2\mathbf{a}$ is parallel to \mathbf{a} and twice its length, and that \mathbf{a} is parallel to $-\mathbf{a}$ in the opposite direction. • Represent vectors, combinations of vectors and scalar multiples in the plane pictorially. 	<ul style="list-style-type: none"> • Y9 Autumn – Testing Conjectures • Y9 Spring – Pythagoras' Theorem 	<ul style="list-style-type: none"> • Developing understanding of Vectors at A Level. • Problem Solving with Vectors at A Level.



		<ul style="list-style-type: none"> • Calculate the sum of two vectors, the difference of two vectors and a scalar multiple of a vector using column vectors (including algebraic terms). • Find the length of a vector using Pythagoras' Theorem. • Calculate the resultant of two vectors. • Solve geometric problems in 2D where vectors are divided in a given ratio. • Produce geometrical proofs to prove points are collinear and vectors/lines are parallel. 		
<p>Proportion</p>	<p>Spring</p>	<ul style="list-style-type: none"> • Interpret and analyse transformations of graphs of functions and write the functions algebraically, e.g. write the equation of $f(x) + a$, or $f(x - a)$ • Apply to the graph of $y = f(x)$ the transformations $y = -f(x)$, $y = f(-x)$ for linear, quadratic, cubic function • Apply to the graph of $y = f(x)$ the transformations $y = f(x) + a$, $y = f(x + a)$ for linear, quadratic, cubic functions; • Estimate area under a quadratic or other graph by dividing it into trapezia 	<ul style="list-style-type: none"> • Y10 Autumn – Transformations • Y10 Autumn – Quadratic, Cubic and other Graphs • Y9 Summer – Solving Ratio and Proportion Problems 	<ul style="list-style-type: none"> • Develop understanding of transformations of graphs (including the modulus function) at A Level.



	<ul style="list-style-type: none">● Recognise and interpret graphs showing direct and inverse proportion;● Identify direct proportion from a table of values, by comparing ratios of values, for● x squared and x cubed relationships;● Write statements of proportionality for quantities proportional to the square, cube or other power of another quantity;● Set up and use equations to solve word and other problems involving direct proportion;● Use $y = kx$ to solve direct proportion problems, including questions where students find k, and then use k to find another value;● Solve problems involving inverse proportion using graphs by plotting and reading values from graphs;● Solve problems involving inverse proportionality;● Set up and use equations to solve word and other problems involving direct proportion or inverse proportion.		
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Key

Number	Geometry	Ratio & proportion	Algebra	Statistics
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West Kirby
Grammar School

Curriculum Map – Year 11 – Mathematics (2023-24)

