KS4 Curriculum Plan Maths HIGHER TIER

Year 9		
Autumn Term 1 **Unit 1: Number**	**Topic** **1.1 Number problems and reasoning**	**Brief description** **Work out the total number of ways of performing a series of tasks.**
	1.2 Place value and estimating	
	1.3 HCF and LCM	**Estimate an answer.** **Use place value to answer questions.**
	1.4 Calculating with powers (indices)	**Write a number of the product of its prime factors.** **Find the HCF and LCM of two numbers.**
	1.5 Zero, negative and fractional indices	**Use powers and roots in calculations.**
	1.6 Powers of 10 and standard form	**Multiply and divide using index laws.** **Work out a power raised to a power.**
	1.7 Surds	
Autumn Term 2 **Unit 2: Algebra**	**2.1 Algebraic indices**	**Use negative indices.** **Use fractional indices.**
	2.2 Expanding and factorising	**Write a number in standard form.** **Calculate with numbers in standard form.**
	2.3 Equations	
	2.4 Formulae	**Understand the difference between rational and irrational numbers.** **Simplify a surd.** **Rationalise a denominator.**
	2.5 Linear sequences	
	2.6 Non-linear sequences	**Use the rules of indices to simplify algebraic expressions.** **Expand brackets.** **Factorise algebraic expressions.**
	2.7 More expanding and factorising	**Solve equations involving brackets and numerical fractions.** **Use equations to solve problems.**
Unit 3a: Averages & Range	**3.5 Averages and range**	**Substitute numbers into formulae.** **Rearrange formulae.** **Distinguish between expressions, equations, formulae and identities.** **Find a general formula for the nth term of an arithmetic sequence.** **Determine whether a particular number is a term of a given arithmetic sequence.** **Solve problems using geometric sequences.** **Work out terms in Fibonnaci-like sequences.** **Find the nth term of a quadratic**

		sequence. Expand the product of two brackets. Use the difference of two squares. Factorise quadratics of the form $x^2 + bx + c$. Decide which average is best for a set of data. Estimate the mean and range from a grouped frequency table. Find the modal class and the group containing the median.
Spring Term 1 Unit 3b,c: Interpreting & Representing Data	**Topic** **3.1 Statistical diagrams 1** **3.2 Time series** **3.3 Scatter graphs** **3.4 Line of best fit** **3.6 Statistical diagrams 2**	**Brief description** Construct and use back-to-back stem and leaf diagrams. Construct and use frequency polygons and pie charts. Plot and interpret time series graphs. Use trends to predict what might happen in the future. Plot and interpret scatter graphs. Determine whether or not there is a linear relationship between two variables. Draw a line of best fit on a scatter graph. Use the line of best fit to predict values.
Unit 4a: Fractions	**4.1 Fractions**	Construct and use two-way tables. Choose appropriate diagrams to display data. Recognise misleading graphs.
Spring Term 2 Unit 4b,c: Fractions, Ratio & Percentages	**4.2 Ratios** **4.3 Ratio and proportion** **4.4 Percentages** **4.5 Fractions, decimals and percentages**	Add, subtract, multiply and divide fractions and mixed numbers. Find the reciprocal of an integer, decimal or fraction. Write ratios in the form 1 : n or n : 1. Compare ratios. Find quantities using ratios. Solve problems involving ratios.
Unit 5a: Angles	**5.1 Angle properties of triangles and quadrilaterals** **5.2 Interior angles of a polygon** **5.3 Exterior angles of a polygon**	Convert between currencies and measures. Recognise and use direct proportion. Solve problems involving ratios and proportion. Work out percentage increases and decreases. Solve real-life problems involving percentages.

		Derive and use the sum of angles in a triangle and in a quadrilateral. Derive and use the fact that the exterior angle of a triangle is equal to the sum of the two opposite interior angles. Calculate the sum of the interior angles of a polygon. Use the interior angles of polygons to solve problems. Know the sum of the exterior angles of a polygon. Use the angles of polygons to solve problems.
Summer Term 1 Unit 5b: Pythagoras & Trigonometry	**Topic** **5.4 Pythagoras' theorem 1**	**Brief description** **Calculate the length of the hypotenuse in a right-angled triangle.**
	5.4 Pythagoras' theorem 1	**Solve problems using Pythagoras' theorem.** **Calculate the length of a shorter side in a right-angled triangle.**
	5.6 Trigonometry 1	**Solve problems using Pythagoras' theorem.**
	5.7 Trigonometry 2	**Use trigonometric ratios to find lengths in a right-angled triangle.** **Use trigonometric ratios to solve problems.**
Unit 6b: Linear Graphs	**6.1 Linear graphs**	**Use trigonometric ratios to calculate an angle in a right-angled triangle.** **Find angles of elevation and angles of depression.**
	6.2 More linear graphs	**Use trigonometric ratios to solve problems.** **Know the exact values of the sine, cosine and tangent of some angles.**
Summer Term 2 Unit 6a,c: Graphs	**6.3 Graphing rates of change**	**Find the gradient and y-intercept from a linear equation.** **Rearrange an equation into the form y = mx + c.** **Compare two graphs from their equations.**
	6.4 Real-life graphs	**Plot graphs with equations ax + by = c.** **Sketch graphs using the gradient and intercepts.**
	6.5 Line segments	**Find the equation of a line, given its gradient and one point on the line.**
	6.6 Quadratic graphs	**Find the gradient of a line through two points.**
	6.7 Cubic and reciprocal graphs	**Draw and interpret distance–time graphs.** **Calculate average speed from a distance–time graph.**

	6.8 More graphs	Understand velocity–time graphs. Find acceleration and distance from velocity–time graphs. Draw and interpret real-life linear graphs. Recognise direct proportion.
Unit 7: Area	7.1 Perimeter and area 7.2 Units and accuracy	Draw and use a line of best fit. Find the coordinates of the midpoint of a line segment. Find the gradient and length of a line segment. Find the equations of lines parallel or perpendicular to a given line. Draw quadratic graphs. Solve quadratic equations using graphs. Identify the line of symmetry of a quadratic graph. Interpret quadratic graphs relating to real-life situations. Draw graphs of cubic functions. Solve cubic equations using graphs. Draw graphs of reciprocal functions. Recognise a graph from its shape. Interpret linear and non-linear real-life graphs. Draw the graph of a circle. Find the perimeter and area of compound shapes. Recall and use the formula for the area of a trapezium. Convert between metric units of area. Calculate the maximum and minimum possible values of a measurement.

KS4 Curriculum Plan Maths HIGHER TIER		
Year 10		
Autumn Term 1 Unit 7: Area & Volume	Topic 7.3 Prisms 7.4 Circles 7.5 Sectors of circles 7.6 Cylinders and spheres 7.7 Pyramids and cones	Brief description Convert between metric units of volume. Calculate volumes and surface areas of prisms. Calculate the area and circumference of a circle. Calculate area and circumference in terms of π. Calculate the perimeter and area of semicircles and quarter circles. Calculate arc lengths, angles and areas of sectors of circles. Calculate volume and surface area of a cylinder and a sphere. Solve problems involving volumes and surface areas.

Unit 8a: **Transformations**	**8.1 3D solids**	**Calculate volume and surface area of pyramids and cones.**
	8.2 Reflection and rotation	**Solve problems involving pyramids and cones.**
	8.3 Enlargement	**Draw plans and elevations of 3D solids.**
	8.4 Transformations and combinations of transformations	**Refl ect a 2D shape in a mirror line.**
		Rotate a 2D shape about a centre of rotation.
Autumn Term 2 **Unit 8b:** **Constructions, Loci & Bearings**	**8.5 Bearings and scale drawings**	**Describe refl ections and rotations.**
		Enlarge shapes by fractional and negative scale factors about a centre of enlargement.
	8.6 Constructions 1	**Translate a shape using a vector.**
		Carry out and describe combinations of transformations.
	8.7 Constructions 2	**Draw and use scales on maps and scale drawings.**
		Solve problems involving bearings.
	8.8 Loci	**Construct triangles using a ruler and compasses.**
Unit 9: Equations & **Inequalities**	**9.1 Solving quadratic equations 1**	**Construct the perpendicular bisector of a line.**
		Construct the shortest distance from a point to a line using a ruler and compasses.
	9.2 Solving quadratic equations 2	**Bisect an angle using a ruler and compasses.**
		Construct angles using a ruler and compasses.
	9.3 Completing the square	**Construct shapes made from triangles using a ruler and compasses.**
	9.4 Solving simple simultaneous equations	**Draw a locus.**
		Use loci to solve problems.
	9.5 More simultaneous equations	**Find the roots of quadratic functions.**
		Rearrange and solve simple quadratic equations.
	9.6 Solving linear and quadratic simultaneous equations	**Solve more complex quadratic equations.**
		Use the quadratic formula to solve a quadratic equation.
	9.7 Solving linear inequalities	**Complete the square for a quadratic expression.**
		Solve quadratic equations by completing the square.
		Solve simple simultaneous equations.
		Solve simultaneous equations for

		real-life situations. Use simultaneous equations to find the equation of a straight line. Solve linear simultaneous equations where both equations are multiplied. Interpret real-life situations involving two unknowns and solve them. Solve simultaneous equations with one quadratic equation. Use real-life situations to construct quadratic and linear equations and solve them. Solve inequalities and show the solution on a number line and using set notation.
Spring Term 1 **Unit 10: Probability**	**Topic** **10.1 Combined events**	**Brief description** **Use the product rule for finding the number of outcomes for two or more events.**
	10.2 Mutually exclusive events	**List all the possible outcomes of two events in a sample space diagram.** **Identify mutually exclusive outcomes and events.**
	10.3 Experimental probability	**Find the probabilities of mutually exclusive outcomes and events.** **Find the probability of an event not happening.**
	10.4 Independent events and tree diagrams	**Work out the expected results for experimental and theoretical probabilities.** **Compare real results with theoretical expected values to see if a game is fair.**
	10.5 Conditional probability	**Draw and use frequency trees.** **Calculate probabilities of repeated events.**
	10.6 Venn diagrams and set notation	**Draw and use probability tree diagrams.** **Decide if two events are independent.**
Unit 11: Multiplicative Reasoning	**11.1 Growth and decay**	**Draw and use tree diagrams to calculate conditional probability.** **Draw and use tree diagrams without replacement.**
	11.2 Compound measures	**Use two-way tables to calculate conditional probability.**
	11.3 More compound measures	**Use Venn diagrams to calculate conditional probability.**
	11.4 Ratio and proportion	**Use set notation.**
Unit 12: Similarity & Congruence	**12.1 Congruence**	**Find an amount after repeated percentage changes.** **Solve growth and decay problems.** **Calculate rates.**
	12.2 Geometric proof and	**Convert between metric speed**

	congruence	measures. Use a formula to calculate speed and acceleration. Solve problems involving compound measures.
	12.3 Similarity	
	12.4 More similarity	
	12.5 Similarity in 3D solids	Use relationships involving ratio. Use direct and indirect proportion.
Spring Term 2 Unit 13: Further Trigonometry	13.1 Accuracy	Show that two triangles are congruent. Know the conditions of congruence.
	13.2 Graph of the sine function	
	13.3 Graph of the cosine function	Prove shapes are congruent. Solve problems involving congruence. Use the ratio of corresponding sides to work out scale factors.
	13.4 The tangent function	Find missing lengths on similar shapes. Use similar triangles to work out lengths in real life.
	13.5 Calculating areas and the sine rule	Use the link between linear scale factor and area scale factor to solve problems.
	13.6 The cosine rule and 2D trigonometric problems	Use the link between scale factors for length, area and volume to solve problems.
	13.7 Solving problems in 3D	
	13.8 Transforming trigonometric graphs 1	Understand and use upper and lower bounds in calculations involving trigonometry.
Unit 14a: Statistics	13.9 Transforming trigonometric graphs 2 14.1 Sampling	Understand how to find the sine of any angle. Know the graph of the sine function and use it to solve equations. Understand how to find the cosine of any angle. Know the graph of the cosine function and use it to solve equations. Understand how to fi nd the tangent of any angle. Know the graph of the tangent function and use it to solve equations.
		Find the area of a triangle and a segment of a circle. Use the sine rule to solve 2D problems.

		Use the cosine rule to solve 2D problems. Solve bearings problems using trigonometry. Use Pythagoras' theorem in 3D. Use trigonometry in 3D. Recognise how changes in a function affect trigonometric graphs. Recognise how changes in a function affect trigonometric graphs. Understand how to take a simple random sample. Understand how to take a stratified sample.
Summer Term 1 **Unit 14b: Statistics**	**Topic** **14.2 Cumulative frequency** **14.3 Box plots** **14.4 Drawing histograms** **14.5 Interpreting histograms** **14.6 Comparing and describing populations**	**Brief description** **Draw and interpret cumulative frequency tables and diagrams.** **Work out the median, quartiles and interquartile range from a cumulative frequency diagram.** **Find the quartiles and the interquartile range from stem-and-leaf diagrams.** **Draw and interpret box plots.** **Understand frequency density.** **Draw histograms.** **Interpret histograms.**
Unit 15: **Quadratics,** **equations & Graphs**	**15.1 Solving simultaneous equations graphically** **15.2 Representing inequalities graphically** **15.3 Graphs of quadratic functions** **15.4 Solving quadratic equations graphically** **15.5 Graphs of cubic functions**	**Compare two sets of data.** **Solve simultaneous equations graphically.** **Represent inequalities on graphs.** **Interpret graphs of inequalities.** **Recognise and draw quadratic functions.** **Find approximate solutions to quadratic equations graphically.** **Solve quadratic equations using an iterative process.**
Summer Term 2 **Unit 16: Circle Theorems**	**16.1 Radii and chords** **16.2 Tangents**	**Find the roots of cubic equations.** **Sketch graphs of cubic functions.** **Solve cubic equations using an iterative process.**

	16.3 Angles in circles 1	**Solve problems involving angles, triangles and circles.** **Understand and use facts about chords and their distance from the centre of a circle.**
	16.4 Angles in circles 2	**Solve problems involving chords and radii.** **Understand and use facts about tangents at a point and from a point.**
	16.5 Applying circle theorems	**Give reasons for angle and length calculations involving tangents.** **Understand, prove and use facts about angles subtended at the centre and the circumference of circles.** **Understand, prove and use facts about the angle in a semicircle being a right angle.**
	Revision & Exam Preparation	**Find missing angles using these theorems and give reasons for answers.** **Understand, prove and use facts about angles subtended at the circumference of a circle.** **Understand, prove and use facts about cyclic quadrilaterals.** **Prove the alternate segment theorem.** **Solve angle problems using circle theorems.** **Give reasons for angle sizes using mathematical language.** **Find the equation of the tangent to a circle at a given point.**
		Preparation for Y10 GCSE Exam
KS4 Curriculum Plan Maths HIGHER TIER		
Year 11		
Autumn Term 1	**Topic** **Y10 GCSE Exam analysis & feedback**	**Brief description** **2 weeks Key topic focus based on question-level analysis of Y10 GCSE Exam**
Unit 17: Further Algebra	**17.1 Rearranging formulae**	**Change the subject of a formula where the power of the subject appears.**
	17.2 Algebraic fractions	**Change the subject of a formula where the subject appears twice.** **Add and subtract algebraic fractions.**
	17.3 Simplifying algebraic fractions	**Multiply and divide algebraic fractions.**
	17.4 More algebraic fractions	**Change the subject of a formula involving fractions where all the variables are in the denominators.**
	17.5 Surds	**Simplify algebraic fractions.**

		Add and subtract more complex algebraic fractions.
	17.6 Solving algebraic fraction equations	**Multiply and divide more complex algebraic fractions.**
		Simplify expressions involving surds.
	17.7 Functions	**Expand expressions involving surds.**
	17.8 Proof	
Unit 18: Vectors & Geometric Proof	**18.1 Vectors and vector notation**	**Rationalise the denominator of a fraction.**
	18.2 Vector arithmetic	**Solve equations that involve algebraic fractions.**
	18.3 More vector arithmetic	
		Use function notation.
		Find composite functions.
	18.4 Parallel vectors and collinear points	**Find inverse functions.**
		Prove a result using algebra.
	18.5 Solving geometric problems	
		Understand and use vector notation.
Autumn Term 2 Unit 19: Proportion & Graphs		**Work out the magnitude of a vector.**
	19.1 Direct proportion	**Calculate using vectors and**
	19.2 More direct proportion	**represent the solutions graphically.**
		Calculate the resultant of two vectors.
	19.3 Inverse proportion	**Solve problems using vectors.**
		Use the resultant of two vectors to solve vector problems.
	19.4 Exponential functions	**Express points as position vectors.**
		Prove lines are parallel.
	19.5 Non-linear graphs	**Prove points are collinear.**
		Solve geometric problems in two dimensions using vector methods.
	19.6 Translating graphs of functions	**Apply vector methods for simple geometric proofs.**
	19.7 Reflecting and stretching graphs of functions	**Write and use equations to solve problems involving direct proportion.**
		Solve problems involving square and cubic proportionality.
	Revision & Exam Preparation	**Write and use equations to solve problems involving inverse proportion.**
		Use and recognise graphs showing inverse proportion.
		Recognise graphs of exponential functions.
		Sketch graphs of exponential functions.
		Calculate the gradient of a tangent at a point.
		Estimate the area under a non-linear graph.
		Understand the relationship between translating a graph and the change in its function notation.

		Understand the effect stretching a curve parallel to one of the axes has on its function form. **Understand the effect reflecting a curve in one of the axes has on its function form.** **Preparation for December Trial Exam**
Spring Term 1 **Spring Term 2**	**Topic** **December Trial Exam analysis & feedback** **Revision of Key Topics & Past Exam Paper questions** **Revision of Key Topics & Past Exam Paper questions** **Exam preparation**	**Brief description** **Key topic focus based on question-level analysis of December Trial Exam** **Focus on:** **Number** **Algebra** **Ratio & Proportion** **Focus on:** **Geometry** **Probability** **Statistics** **Preparation for March Trial Exam**
Summer Term	**Topic** **March Trial Exam analysis & feedback** **Revision of Key Topics & Past Exam Paper questions** **Exam preparation for June GCSE**	**Brief description** **Key topic focus based on question-level analysis of March Trial Exam**