Year 11 Maths Overview

		HT1 USING NUMBER ALGEBRA	HT2 GRAPHS ALGEBRA	HT3 GRAPHS ALGEBRA	HT4 ALGEBRA REASONING	HT5 REVISION EXAMINATIONS	HT6 REVISION EXAMINATIONS
Learning outcomes/composite knowledge: Pupils will be able to…		**LO1: Types of Number and Sequences** To understand and recognise the different types of number and sequences **LO2: Indices and Roots** To calculate using indices and roots **LO3: Representing Solutions of Equations and Inequalities** To develop algebraic understanding of equations and inequalities	**LO1: Straight Line Graphs** To interpret and draw straight line graphs **LO2: Non-Linear Graphs** To be able to work with quadratic, cubic and reciprocal graphs **LO3: Using Graphs** To be able to construct and interpret graphs	**LO1: Changing the Subject** To understand how to change the subject of a formula **LO2: Simultaneous Equations (Y10)** To use algebraic skills to work with simultaneous equations	**LO1: Functions** To use formal function notation and recap quadratic functions and graphs **LO2: Multiplicative Reasoning** To develop multiplicative reasoning	• LO1 To recap key knowledge • LO2 To prepare for examinations and revise • LO3 To take the Maths GCSE examinations	• LO1 To recap key knowledge • LO2 To prepare for examinations and revise • LO3 To take the Maths GCSE examinations
Knowledge Components	Declarative Knowledge:	**LO1: Types of Number and Sequences** • I know what the difference is between factors and multiples • I know what a prime number is • I know what product means • I know what HCF and LCM stand for • I know what nth term means • I know what linear means **LO2: Indices and Roots** • I know what square and cube numbers are • I know what indices and roots are • I know the addition and subtraction rules for indices **LO3: Representing Solutions of Equations and Inequalities** • I know what the meaning of a solution is • I know what an inequality is • I can interpret representation on number lines as inequalities	**LO1: Straight Line Graphs** • I know what parallel means • I know what an equation is • I know what gradient means • I know what linear simultaneous equations are **LO2: Non-Linear Graphs** • I know what quadratic means • I know what reciprocal means • I recognise graph shapes • I know what roots are **LO3: Using Graphs** • I know what a reflection is • I know what a straight line graph is • I recognise graphs that illustrate direct and inverse proportion	**LO1: Changing the Subject** • I know what a linear equation is • I know what an inequality is **LO2: Simultaneous Equations (Y10)** • I know what an equation is • I know what a solution is • I understand that equations can have more than one solution • I know what simultaneous means • I know what substitute means • I know what a variable is	**LO1: Functions** • I know what a function machine is • I know what substitute means **LO2: Multiplicative Reasoning** • I know what a scale factor is • I understand direct and inverse proportion	•	•
	Procedural Knowledge (methods)	**LO1: Types of Number and Sequences** • I know how to express a number as a product of its prime factors • I know how to find the HCF and LCM of a set of numbers • I know how to describe and continue arithmetic and geometric sequences • I know how to explore other sequences • I know how to find the nth term of a linear sequence **LO2: Indices and Roots** • I know how to calculate higher powers and roots • I know how to calculate with powers of ten and standard form • I know how to use the power zero and negative indices • I know how to work with powers of powers **LO3: Representing Solutions of Equations and Inequalities** • I know how to form one-step and two-step equations and inequalities • I know how to show solutions to inequalities on a number line • I know how to draw straight line graphs	**LO1: Straight Line Graphs** • I know how to find equations of lines parallel to the axis • I know how to plot straight line graphs • I know how to interpret $y = mx + c$ • I know how to find the equation of a straight line from a graph • I know how to find the equation of a straight-line graph given one point and gradient • I know how to find the equation of a straight-line graph given two points • I can determine whether a point is on a line • I know how to solve linear simultaneous equations graphically **LO2: Non-Linear Graphs** • I know how to plot and read from: ○ Quadratic graphs ○ Cubic graphs ○ Reciprocal graphs • I can identify and interpret roots and intercepts of quadratics **LO3: Using Graphs** • I know how to reflect shapes in given lines • I know how to construct and interpret: ○ Conversion graphs	**LO1: Changing the Subject** • I know how to solve linear equations • I know how to solve inequalities • I know how to form and solve equations and inequalities in the context of shape • I know how to change the subject of a: ○ Simple formula ○ Known formula ○ Complex formula **LO2: Simultaneous Equations (Y10)** • I know how to determine whether a given (x, y) is a solution to a pair of linear simultaneous equations • I know how to solve a pair of linear simultaneous equations: ○ By substituting a known variable ○ By substituting an expression ○ Using graphs ○ By subtracting equations ○ By adding equations ○ By adjusting one equation ○ By adjusting both equations • I know how to use a given equation to derive related facts • I know how to form and solve a pair of linear simultaneous equations from given information	**LO1: Functions** • I know how to use a function machine • I know how to substitute into expressions and formulae • I know how to use function notation • I know how to draw and interpret graphs of quadratic functions **LO2: Multiplicative Reasoning** • I know how to use scale factors • I know how to calculate with pressure and density • I know how to solve ratio problems	•	•

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		• I know how to form and solve equations and inequalities with unknowns on both sides • I know how to form and solve more complex equations and inequalities	○ Real- life straight line graphs ○ Speed/time graphs ○ Piece-wise graphs • I know how to interpret distance/time graphs • I know how to interpret graphs that illustrate direct and inverse proportion • I know how to approximate solutions to equations using graphs				
National Curriculum reference		Link to Mathematics programme of study: key stage 4 – National curriculum in England: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/331882/KS4_maths_PoS_FINAL_170714.pdf					
Common misconceptions		**LO1: Types of Number and Sequences** • A sequence such as 1, 4, 7, 10 is often described as n + 3 rather than $3n - 2$. • Quadratic sequences can involve a linear as well as a quadratic component. • Calculating the product of negative numbers when producing a table of results can lead to difficulty. • The nth term for a geometric sequence is in the form ar^{n-1} rather than ar^n **LO2: Indices and Roots** • One is not a prime number since it only has one factor. • x^2 is often incorrectly taken as $2x$. • Students often have difficulty when dealing with negative powers. For instance, they assume, 1.2×10^{-2} to have a value of -120. **LO3: Representing Solutions of Equations and Inequalities** • Students tend not to interpret the less than/greater and equal signs correctly • Confusion often lies in understanding the notation using empty and full circles on a number line. • Students often find it difficult to identify the correct region for linear and quadratic inequalities on a grid. • Students can forget to apply the same operation to both sides of the equation therefore leaving it unbalanced. • Students often struggle knowing when to add or subtract the equations to eliminate the unknown. Review addition with negatives to address this. • Equations need to be aligned so that unknowns can be easily added or subtracted. If equations are not aligned students may add or subtract with non like variables. • Students often try to eliminate variables with their coefficients being equal.	**LO1: Straight Line Graphs** • Students often confuse linear graphs with having the same notation as statistical graphs. • The gradient can be calculated from any two points along the graph. Not necessarily from the origin. • A linear function does not have to pass through the origin. • It is beneficial to create a table of results when plotting a linear function. The coordinate pairs arise from the x and y values. **LO2: Non-Linear Graphs** • Students often have difficulty substituting negative values for complex equations. Encourage the use of mental arithmetic. • By identifying lines of symmetry in each function students will have a greater understanding of the typical shapes for each function. • By creating the table of results students will be more able to choose a suitable scale for their axes. **LO3: Using Graphs** • Density, pressure and time do not have to have fixed units. For instance, a speed can be m/s or mph; density can be g/cm3 or kg/3. • Students often have difficulty remembering which measure to divide by. The speed, pressure and density triangles are helpful to recall the relationship between the various measures.	**LO1: Changing the Subject** • Students often consider being incorrectly calculated as 2a3 as (2a)3. Recap the order of operations to avoid this. • Students often have difficult generating formulae from real life contexts. Encourage them to carefully break down the written descriptions to identify key words. **LO2: Simultaneous Equations (Y10)** • Students often struggle to know when to add or subtract the equations to eliminate the unknown. Review addition with negatives to address this. • Equations need to be aligned so that unknowns can be easily added or subtracted. If equations are not aligned students may add or subtract with non like variables. • Students often try to eliminate variables with their coefficients being equal	**LO1: Functions** • Students can forget to apply the same operation to both sides of the equation, therefore, leaving it unbalanced. • Students often struggle knowing when to add or subtract the equations to eliminate the unknown. Review addition with negatives to address this. • Equations need to be aligned so that unknowns can be easily added or subtracted. If equations are not aligned students may add or subtract with non like variables. • Students often try to eliminate variables with their coefficients being equal **LO2: Multiplicative Reasoning** • Ratio amounts are often confused with fractions involving the same digits. For instance, 2 : 3 is confused with 2/3 or 1 : 2 = 1/2. • When solving problems involving proportion students tend to struggle with forming a ratio. For instance, 3 apples cost 45p would form the ratio apples : cost. • When writing ratios into the form 1 : n students incorrectly assume that n has to be an integer or greater than 1.		