OCL MATHS 5 YEAR PLAN – 2021/22

YEAR 7 (MATHS MASTERY 2021/22 SoL)

In this year we reinforce and build on the knowledge and skills students have developed in the primary curriculum, and begin to extend the big ideas from the Primary curriculum into our core concepts. In Autumn 1, we use **multiple representations** to build **conceptual understanding** of number and number properties in students schemas. Moving through to Autumn 2, for many students this is the first time they will be introduced to algebra formally. In their Primary education they will have seen and understood the idea of a "missing number" or "unknown", and may have seen inequality signs, but tier 2 and tier 3 language like "co-efficient, variable, equation, inequality, expression, term, constant" will be new, so careful attention to modelling **mathematical language and notation**, and a focus on building **fluency** in basic algebra skills will be crucial. Moreover, a **conceptual understanding** of algebra as a generalised version of arithmetic will develop by building on the work done in Autumn 1. In Spring 1 and Spring 2 students learn about Geometry for the first time at Secondary. They build on their understanding of shape, space, and basic transformations to understand more formal ideas like the Cartesian plane. In this term students will properly encounter many of the of the higher-level core concepts like **mathematical reasoning** and **problem-solving**. In Summer 1, students build on the **conceptual understanding** that was built in Y7 Autumn 1 to develop **fluency** in operations on fractions. Finally, in Summer 2, students' **mathematical thinking** is focused on, as students are required to **think proportionally** in different scenarios, and with different **mathematical language and notation**.

Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
Topic: Making generalisations about the number system (1) **Number**	**Topic: Making generalisations about the number system (2)** **Algebra**	**Topic: 2D Geometry** Geometry	**Topic: The Cartesian plane** Geometry	**Topic: Fractions** **Number**	**Topic: Ratio and proportion** **Ratio and Proportion**
Knowledge and skills covered:	**Knowledge and skills covered:**	**Knowledge and skills covered:**	**Knowledge and skills covered:**	**Knowledge and skills covered:**	**Knowledge and skills covered:**
Unit 1 – numbers and numerals Unit 2 – axioms and arrays Unit 3 – factors and multiples Unit 4 – order of operation	Unit 5 – positive and negative numbers Unit 6 – expressions, equations, inequalities	Unit 7 – angles Unit 8 – classifying 2D shapes Unit 9 – constructing triangles and quadrilaterals	Unit 10 – co-ordinates Unit 11 – area of 2D shapes Unit 12 – transforming 2D figures	Unit 13 – prime factor decomposition Unit 14 – equivalent fractions Unit 15 – all operations acting on fractions	Unit 16 – ratio Unit 17 - percentages

YEAR 8 (MATHS MASTERY 2021/22 SoL)					
In year 8, we build on the strong foundations of **fluency** and **conceptual understanding** built in Y7 to explore some of the more advanced core concepts, and brand-new mathematical ideas. In Autumn 1, students explore sequences, and develop their **conceptual understanding** of algebra as a generalised arithmetic, by understanding how to algebraically describe the number sequences they encountered in their Primary education. Later in the half term, students build on the fluency in algebra they built in Y7 Autumn 2 to *form* and solve equations and inequalities, and in doing so build their **mathematical reasoning**, and **problem-solving** abilities. In Autumn 2, students' schemas around algebra are extended to include geometric interpretations of the equations they have been solving so far. This unit is also an application of the knowledge they have about the cartesian plane from Y7 Spring 2. In teaching students how to link these ideas, **mathematical language, representation and notation** will be crucial, as will a **conceptual understanding** of graphs as an infinity of individual coordinates. In Spring 1, students revisit the core concept of **proportional thinking** (from Y7 Summer 2), and apply the knowledge about graphs they have just learned in Y8 Autumn 2, to come to develop their **mathematical reasoning** in the arena of direct and inverse proportion. As with many units concerning ratio and proportion, fluency in the fundamental skills will be an important 'barrier to entry'. To support with this, the use of **multiple representations**, a focus on **mathematical language**, to build **conceptual understanding** will be important to teaching. In Spring 2, students encounter the curriculum area of probability and statistics for the first time in their lives. This is no longer covered in the Primary curriculum, and therefore, an extreme clarity in the **mathematical language** we introduce will be crucial to developing strong foundational understanding. Finally, in Summer 1 and Summer 2, students build on the 2 half-terms of geometry they learned in Y7, deepening their **fluency** and **mathematical thinking**, and extending these ideas to yet more formal contexts. This term will be an important term in developing students **problem-solving** skills, and supporting students to present their work in a way that supports clarity in their **mathematical reasoning.**					
Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Topic: Equations and inequalities **Number + Algebra** **Knowledge and skills covered:** Unit 1 – Sequences Unit 2 - Forming and Solving Equations Unit 3 – forming and solving inequalities *NB: The sequences unit here should cover everything needed on the KS3 curriculum, as the Y9 unit was removed due to repetition.	**Topic: Graphs** **Algebra** **Knowledge and skills covered:** Unit 4 – linear graphs and identify key features of linear graphs Unit 5 – accuracy and estimation	**Topic: Proportional Reasoning** **Ratio and Proportion** **Knowledge and skills covered:** Unit 6 – ratio Unit 7 - Real life graphs and rate Unit 8 – direct and inverse proportion	**Topic: Representations and reasoning with data** **Probability & Statistics** **Knowledge and skills covered:** Unit 9 – univariate data (construct and interpret charts and graphs, mean, mode, median, range) Unit 10 – bivariate data (scatter graphs)	**Topic: Angles** **Geometry** **Knowledge and skills covered:** Unit 11 – angles in parallel lines and polygons Unit 12 – bearings	**Topic: Area, volume and surface area** **Geometry** **Knowledge and skills covered:** Unit 13 – circles and composite shapes Unit 14 – volume of prisms Unit 15 – surface area of prisms.

YEAR 9 (OCL SoL 2021-22)					
In year 9, students have spent 2 years developing a **conceptual understanding** of many of the central ideas in number, algebra, and ratio, as well as **fluency** in many of the skills necessary to achieve at KS4. This year, this knowledge and these skills are utilised to explore more advanced and 'exotic' areas of Mathematics, as students prepare to begin studying the formal Mathematics of GCSE Maths next year. In Autumn 1, students are exposed to a variety of curriculum areas which cement their **fluency** and **conceptual understanding** in preparation for the more advanced ideas in the rest of Y9. In Autumn 2, students' understanding of algebra is deepened and extended as they reason with purely abstract ideas, including changing the subject, and algebraic factorisation. In this half term, **mathematical thinking** and **mathematical reasoning** feature prominently. These algebraic ideas are built on in Spring 2, when graphs are studied as an alternative **representation** of the equations and inequalities they have come to manipulate **fluently**. In Spring 1, and Summer 1, students' build on the large maps of geometry knowledge they have built over their education to encounter more nuanced **problem-solving** in spring 1, including forming and solving equations, before brand new ideas are introduced in Trigonometry. Students need to **reason mathematically** and have a **fluent, conceptual understanding** of many previous areas of the curriculum to access this well – including congruence and similarity from Y9 Spring 1, equations and algebraic manipulation from Y9 Autumn 2, and on all occasions before that as their algebraic skills developed, and number skills from across Y7 and Y8. Finally, in Summer 2, students' meet mathematical Probability for the first time. They build on their understanding of data from Y8 Spring 2 to develop a **conceptual understanding** of the difference between experimental and theoretical probability, and develop **fluency** in using the different tables and graphs which **represent** the data.					
Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
Topic: Coordinates, Linear Graphs, Proportion, and Standard Form **Number + Algebra** **Ratio and Proportion**	**Topic: Algebraic Expressions** **Algebra**	**Topic: 2D geometry** **Geometry**	**Topic: Equations and Inequalities** **Algebra**	**Topic: Trigonometry** **Geometry**	**Topic: Statistics** **Probability & Statistics**
Knowledge and skills covered: Unit 1 – Coordinates Unit 2 – Linear Graphs Unit 3 – Direct, Inverse Proportion Unit 4 – Standard Form	**Knowledge and skills covered:** Unit 5 – Algebra Recap Unit 6 – Expanding and Factorising Unit 7 – Algebraic Manipulation *NB: Unit 5: Sequences was originally here, but I have replaced it with algebra recap, as sequences is covered in Y8.	**Knowledge and skills covered:** Unit 8 – Constructions Unit 9 – Congruence and Similarity Unit 10 – Triangles and Quadrilaterals *NB: Unit 11: Angles in Polygons was removed, as it is repeated in the new Y8 curriculum.	**Knowledge and skills covered:** Unit 12 – Linear equations and Inequalities Unit 13 – Simultaneous Equations Unit 14 – Quadratic and other Graphs	**Knowledge and skills covered:** Unit 15 – Pythagoras Unit 16 – Trigonometry Unit 17 – Proof	**Knowledge and skills covered:** Unit 18 – Probability Unit 19 – Mean from Grouped Data Unit 20 – Comparing Distributions Unit 21 – Cumulative Frequency and Box Plots *NB: We switched out scatter graphs for the unit on cumulative frequency and box plots, as scatter graphs is a repeat from Y8.

YEAR 10 (OCL SoL 2021-22)						
In Y10, students enter the first year of formal study for their GCSE. In many schools, students have been tiered into foundation or higher according to how well they fared with the more advanced topics in Y9. For students on both tiers, but particularly those on the foundation tier, core knowledge and skills are revisited, to ensure that students have the **fluency** and **conceptual understanding** necessary to access the entire KS4 curriculum. Having revisited knowledge and skills from KS3, students are equipped to fully explore the core concepts of **mathematical thinking**, **mathematical reasoning**, and **problem-solving**. This is done in every half term, as students build up to answering exam-style questions, and teachers model **mathematical language and notation** which is suitably formal for KS4.						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
FOUNDATION	**Topic: Number** **Number** **Knowledge and skills covered:** Unit 1 – factors, multiples and primes Unit 2 – powers and roots Unit 3 – indices Unit 4 – standard form Unit 6 - sequences	**Topic: Algebra** **Algebra** **Knowledge and skills covered:** Unit 6 – algebra (KS3 review) Unit 7 – quadratics Unit 8 – quadratic graphs Unit 9 – simultaneous equations	**Topic: Percentages and probability** **Number + Probability & Statistics** **Knowledge and skills covered:** Unit 10 – fractions, decimals and percentages Unit 11 – percentages Unit 12 – probability, sets and Venn diagrams	**Topic: Geometry** Geometry **Knowledge and skills covered:** Unit 13 – transformations Unit 14 – 2D shapes including circle geometry Unit 15 – 3D shapes Unit 16 – volume and surface area	**Topic: Similarity** **Ratio and Proportion** + Geometry **Knowledge and skills covered:** Unit 17 – ratio review Unit 18 – compound measure and direct and indirect proportion Unit 19 – Pythagoras' Theorem review Unit 20 – similarity and Trigonometry	**Topic: Data handling** **Probability & Statistics** **Knowledge and skills covered:** Unit 21 – averages and range Unit 22 – data collection and sampling Unit 23 – presenting data including scatter graphs
HIGHER	**Topic: Number** **Number** **Knowledge and skills covered:** Unit 1 – powers and roots Unit 2 – surds and irrational numbers Unit 3 – indices Unit 4 – standard form Unit 5 – sequences	**Topic: Algebra** **Algebra** **Knowledge and skills covered:** Unit 6 – quadratics Unit 7 – quadratic graphs Unit 8 – algebraic fractions Unit 9 – simultaneous equations	**Topic: Percentages and probability** **Number + Probability & Statistics** **Knowledge and skills covered:** Unit 10 – fractions, decimals and percentages Unit 11 – percentages Unit 12 – probability, sets and Venn diagrams	**Topic: Geometry** Geometry **Knowledge and skills covered:** Unit 13 – transformations Unit 14 – upper and lower bounds Unit 15 – 2D shapes including circle geometry Unit 16 – 3D shapes Unit 17 – volume and surface area	**Topic: Similarity** **Ratio and Proportion** + Geometry **Knowledge and skills covered:** Unit 18 – ratio review Unit 19 – compound measure and direct and indirect proportion Unit 20 – Pythagoras' Theorem review Unit 21 – similarity and Trigonometry Unit 22 – 3D Trigonometry and Pythagoras	**Topic: Data handling** **Probability & Statistics** **Knowledge and skills covered:** Unit 23 – averages and range Unit 24 – data collection and sampling Unit 25 – presenting data including scatter graphs Unit 26 – further statistical diagrams
	End of Year exam: AQA November 2020 Paper 1, 2 and 3 (FOUNDATION or HIGHER)					

YEAR 11 (OCL SoL 2021-22)						
In our students' final year of study, we begin by drawing on all of the knowledge and skills they have developed over their 4 years with us to introduce some the most challenging GCSE content, including vectors, construction and loci, and geometric reasoning at foundation tier, and trigonometric graphs, algebraic proof, and functions at higher tier. Students are now refining and fully developing their **problem-solving** and **mathematical reasoning** skills in preparation for their exam. In the periods of revision that are scheduled, teachers identify gaps in knowledge and underdeveloped skills in their students, and revisit elements of the KS4 curriculum accordingly. Often, these areas of weakness will not be in **fluency**, but in students' ability to **reason mathematically** with the knowledge they have, or **problem-solve** in unseen situations. They will use this time to hone these core concepts fully.						
	Autumn 1	**Autumn 2**	**Spring 1**	**Spring 2**	**Summer 1**	**Summer 2**
FOUNDATION	**Topic: Reasoning and Proof** Geometry **Knowledge and skills covered:** Unit 24 – vectors Unit 25 – geometric reasoning Unit 26 – bearings Unit 27 – congruence Unit 28 – construction and loci	**Topic: Inequalities and graphs** **Algebra** **Knowledge and skills covered:** Unit 29 – linear inequalities Unit 30 – linear graphs Unit 31 – non-linear graphs	**Topic: REVISION**	**Topic: REVISION**	**Topic: REVISION**	
HIGHER	**Topic: Reasoning and Proof** Geometry **Knowledge and skills covered:** Unit 27 - vectors Unit 28 – geometric reasoning Unit 29 – circle theorems Unit 30 – bearings Unit 31 – congruence Unit 32 – construction and loci	**Topic: Inequalities and graphs** **Algebra** **Knowledge and skills covered:** Unit 33 – linear inequalities Unit 34 – linear graphs Unit 35 – non-linear graphs Unit 36 – trigonometric graphs	**Topic: Algebra and graphs** **Algebra** **Knowledge and skills covered:** Unit 37 – algebraic proof and reasoning Unit 38 – recurrence relations Unit 39 – functions Unit 40 – transformation of graphs Unit 41 – further graphs	**Topic: REVISION**	**Topic: REVISION**	
	MOCK EXAM 1: AQA June 2019 Paper 1, 2 and 3 (FOUNDATION or HIGHER) **MOCK EXAM 2: AQA November 2019 Paper 1, 2 and 3 (FOUNDATION or HIGHER)**					