### MATHEMATICS DEPARTMENT KEY STAGE 4 CURRICULUM OVERVIEW

The Mathematics department key stage 4 curriculum is designed to implement the Academy's vision of "Deepening Learning, Raising Aspiration", in line with the OAT curriculum strategy of "Teach, Develop, Change". Our curriculum is carefully designed to build resilience, aspiration and independence in our learners. We carefully design the KS4 curriculum to further develop and build upon prior learning at KS3.

# **Purpose of Study**

Mathematics is a creative and highly inter-connected discipline that has been developed over centuries, providing the solution to some of history's most intriguing problems. It is essential to everyday life, critical to science, technology and engineering, and necessary for financial literacy and most forms of employment. A high-quality mathematics education therefore provides a foundation for understanding the world, the ability to reason mathematically, an appreciation of the beauty and power of mathematics, and a sense of enjoyment and curiosity about the subject.

Mathematics is an interconnected subject in which pupils need to be able to move fluently between representations of mathematical ideas. The programmes of study are, by necessity, organised into apparently distinct domains, but pupils should make rich connections across mathematical ideas to develop fluency, mathematical reasoning and competence in solving increasingly sophisticated problems. They should also apply their mathematical knowledge to science and other subjects.

The expectation is that the majority of pupils will move through the programmes of study at broadly the same pace. However, decisions about when to progress should always be based on the security of the pupils' understanding and their readiness to progress to the next stage. Pupils who grasp concepts rapidly should be challenged through being offered rich and sophisticated problems before any acceleration through new content. Those who are not sufficiently fluent with earlier material should consolidate their understanding, including through additional practice before moving on.

#### Aims

The national curriculum for mathematics aims to ensure that all pupils:

- Become *fluent* in the fundamentals of mathematics, including through varied and frequent practice with increasingly complex problems over time, so that pupils develop conceptual understanding and the ability to recall and apply knowledge rapidly and accurately.
- **Reason mathematically** by following a line of enquiry, conjecturing relationships and generalisations, and developing an argument, justification or proof using mathematical language.
- can **solve problems** by applying their mathematics to a variety of routine and non-routine problems with increasing sophistication, including breaking down problems into a series of similar steps and persevering in seeking solutions.

ORMISTON RIVERS ACADEMY- KEY STAGE 4 MATHS OVERVIEW - HIGHER (SET 2)

	Year 10	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
0	Number Diversity Algebra Diversity				Diversity		S	Assessment							
	Autumn	<ul> <li>Fractions</li> <li>Standard Index Form</li> <li>Index Laws</li> <li>Changing the subject formula</li> <li>Inequalities</li> </ul>				fy ect of the	<ul> <li>Sampling</li> <li>Averages</li> <li>Averages from tables</li> <li>of the</li> <li>Frequency diagrams</li> <li>Scatter diagrams</li> <li>Time Series</li> </ul>						<ul> <li>Revision of key material.</li> <li>End of term assessment</li> </ul>		
		Ratio and Proportion Diversity			Geometry			Algebra Geometry			Assessment				
	Spring	<ul><li>Ratio</li><li>Proportion - Recipes</li></ul>			<ul> <li>Straight line graphs</li> <li>Quadratic and cubic graphs</li> <li>Coordinate Geometry</li> <li>Speed, distance, time</li> <li>Real-life graphs</li> </ul>			• Py • Tr	<ul> <li>Alternate and corresponding angles</li> <li>Interior and exterior angles</li> </ul>			<ul> <li>Revise mate</li> <li>End casses</li> </ul>	ion of key rial. of term ssment		
				G	eomet	ry		Geometry Probab			bility	Assessment			
	Summer	<ul> <li>Bearings</li> <li>Plans and elevations</li> <li>Constructions</li> <li>Circles, Arcs and sectors</li> <li>Surface area and Volume</li> <li>Congruence/ Similar shapes</li> </ul>							<ul> <li>Transformations – enlargements, reflections, rotations and translations</li> <li>Probabilit</li> <li>Probabilit</li> <li>Probabilit</li> <li>Probabilit</li> <li>Probabilit</li> </ul>			ility ility Trees rts	<ul> <li>Revision of key material.</li> <li>End of term assessment</li> </ul>		

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ORMISTON RIVERS ACADEMY- KEY STAGE 4 MATHS OVERVIEW - HIGHER (SET 2)								
Autumn Half Term 1								
Block 1 – Weeks 1 to 3	Block 2 – Weeks 4 to 7							
<ul> <li>Add, subtract, multiply and divide fractions including integers, mixed numbers and improper fractions.</li> <li>Add, subtract, multiply and divide numbers in standard form.</li> <li>Use the laws of indices to simplify and calculate the value of numerical expressions involving multiplication and division of integer powers, fractions and powers of a power.</li> </ul>	<ul> <li>Expand and simplify single and double brackets involving positive and negative numbers and squaring a linear expression.</li> <li>Recognise factors of algebraic terms involving single brackets and simplify expressions by factorising, including subsequently collecting like terms.</li> <li>Factorise quadratic expressions including those that use the difference of two squares.</li> <li>Write and solve simple equations in real-life context.</li> <li>Solving one and two inequalities in which their solution sets are compared.</li> </ul>							
<ul> <li>Notes/Links/Interleaving</li> <li>Revisit the conversion between mixed numbers and improper fractions.</li> <li>Students should be able to write powers of 10 in index form and recognise and recall powers of 10, i.e. 10<sup>2</sup> = 100.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Finding the roots of a quadratic function algebraically.</li> <li>Use inequality notation to specify simple error intervals due to truncation and rounding.</li> </ul>							
Autumn H	lalf Term 2							
Block 3 – Weeks 7 to 9	Block 4 = Weeks 10 to 12							
<ul> <li>Plan a statistical investigation to include data collection and statistical analysis needed.</li> </ul>	<ul> <li>Produce and interpret frequency polygons for both discrete and continuous data.</li> <li>Draw and use the line of best fit to make predictions and identify correlations between variables.</li> <li>Construct tables for time series data and identify trends in the data.</li> </ul>							
<ul> <li>Notes/Links/Interleaving</li> <li>Encourage students to revisit statistical diagrams and inequality notation.</li> <li>Students will have experience with tally charts and be able to calculate the midpoint of two numbers.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>State how reliable scatter graph predictions are i.e. not reliable if extrapolated.</li> </ul>							

ORMISTON RIVERS ACADEMY– KEY STAGE 4 MATHS OVERVIEW – HIGHER (SET 2)							
Spring Ha	alf Term 1						
Block 1 – Weeks 1 to 2	Block 2 – Weeks 3 to 6						
<ul> <li>Use their understanding of ratio to solve ratio problems in context.</li> <li>Scale up recipes and decide if there is enough of each ingredient.</li> <li>Engage in proportion problem solving using the unitary method.</li> </ul>	<ul> <li>Recognise, sketch and interpret linear, quadratic, cubic and reciprocal graphs using key mathematical formulae.</li> <li>Understand and use compound measures including density, pressure and speed including conversions.</li> <li>Interpret gradient as the rate of change in distance-time and speed-time graphs, graphs of containers filling and emptying, and unit price graphs.</li> <li>Construct distance-time and velocity-time graphs.</li> </ul>						
<ul> <li>Notes/Links/Interleaving</li> <li>Students should be able to plot coordinates and read scales.</li> <li>Revisit student's understanding of substituting into a formula.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Plot and draw graphs of straight lines in the form ax + by = c</li> <li>Identify and interpret roots, intercepts and turning points of quadratic graphs.</li> <li>Find approximate solutions to a linear equation from a graph.</li> </ul>						
Spring Ha	alf Term 2						
Block 3 – Weeks 7 to 9	Block 4 - Weeks 10 to 12						
<ul> <li>Understand, recall and apply Pythagoras' Theorem in 2D, including a triangle drawn on a coordinate grid.</li> <li>Understand, use and recall SOHCAHTOA, and apply them to find angles and lengths in general triangles in 2D figures.</li> <li>Solve multi-step problems that require the use of both Pythagoras and trigonometry.</li> </ul>	<ul> <li>Recall and use key mathematical reasoning such as angles around a point, angles on a straight line and vertically opposite angles.</li> <li>Understand and use both the angle properties of parallel lines and interior/exterior angles of polygons including problems in context.</li> </ul>						
<ul> <li>Notes/Links/Interleaving</li> <li>Students should be able to rearrange simple formulae and equations, as preparation for rearranging trigonometric formulae.</li> <li>Revisit the plotting of coordinates in all four quadrants and draw axes.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Use both Pythagoras Theorem and trigonometry to engage with abstract problems.</li> <li>Understand a proof for the exterior angles of a triangle.</li> <li>Explain why some polygons fit together and others do not.</li> </ul>						

ORMISTON RIVERS ACADEMY– KEY STAGE 4 MATHS OVERVIEW – HIGHER (SET 2)								
Summer Half Term 1								
Block 1 – Weeks 1 to 3	Block 2 – Weeks 4 to 7							
<ul> <li>Identify shapes which are congruent to each other (by eye).</li> <li>Use accurate drawing to solve bearings including those involving locus.</li> <li>Engage with locus problems including bearings.</li> <li>Understand and draw elevations for simple solids including 3D solids.</li> </ul>	<ul> <li>Recall and use key formulae of circles to calculate its perimeter and area.</li> <li>Find the surface area of prisms using the formulae for triangles and rectangles, and other (simple) shapes with and without a diagram.</li> <li>Calculate the surface area and volume of prisms made from composite 3D solids using a variety of metric measures.</li> <li>Engage with problem solving involving more complex shapes and solids, including segments of circles and frustums of cones.</li> <li>Using similarity and congruence to successfully solve complex problems</li> </ul>							
<ul> <li>Notes/Links/Interleaving</li> <li>Students should be able to measure and draw lines.</li> <li>Construct diagrams of everyday 2D situations involving rectangles, triangles, perpendicular and parallel lines.</li> <li>Students should know how to use the four operations on a calculator.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Use constructions to solve loci problems involving 3D shapes.</li> <li>Find the surface area and volumes of compound solids constructed from cubes, cuboids, cones, pyramids, spheres, hemispheres, cylinders.</li> <li>Know that scale diagrams, including bearings and maps are 'similar' to the real-life examples.</li> </ul>							
Summer	Half Term 2							
Block 3 – Weeks 8 to 9	Block 4 - Weeks 10 to 12							
<ul> <li>Describe and transform 2D shapes using single transformations including reflections, rotations, enlargements and translations.</li> </ul>	<ul> <li>Calculate probabilities involving mutually exclusive outcomes and both independent and dependent combined events.</li> <li>Using 1 – p as the probability of an event not occurring where p is the probability of it occurring.</li> </ul>							
<ul> <li>Notes/Links/Interleaving</li> <li>Students should have an understanding of the concept of rotation.</li> <li>Students should be able to draw and recognise lines parallel to axes and y = x, y = -x.</li> <li>Revisit adding and multiplying fractions and decimals.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Interpret a calculator display using standard form and know how to enter numbers in standard form.</li> <li>Understand conditional probabilities and decide if two events are independent.</li> <li>Enlarge a given shape by a centre of enlargement and a negative scale factor.</li> </ul>							

### ORMISTON RIVERS ACADEMY- KEY STAGE 4 MATHS OVERVIEW - HIGHER (SET 2)

	′ear 11	Week 1	Week 2	Week 3	Week 4	Week 5	Week 6	Week 7	Week 8	Week 9	Week 10	Week 11	Week 12	Week 13	Week 14
	Autumn	Geometry Algebra						Probability Ratio Diversity Geo and Proportion			Geome Dive	e <b>try</b> ersity	Statistics Diversity	Asse	ssment
		<ul> <li>Cc</li> <li>Cilling</li> <li>Suvo</li> <li>Tr</li> </ul>	oordinate C rcles, arcs ctors Irface area Iume ansformat	Geometry and and ion	<ul> <li>Se</li> <li>Fc</li> <li>so</li> <li>ec</li> </ul>	Sequences Forming and solving equations Simultaneous equations			<ul> <li>Direct and inverse proportion</li> <li>Congruence</li> <li>Similarity</li> <li>Ratio and proportion (recipes)</li> <li>Bearings</li> <li>Plans and elevations</li> <li>Constructic</li> </ul>			ngs and tions ructions	<ul> <li>Sampling</li> <li>Averages</li> <li>Frequency diagrams</li> <li>Scatter graphs</li> <li>Time series</li> <li>Cumulative frequency diagrams</li> <li>Boxplots</li> </ul>		
	Spring	Algebra Geo					ometry	/	Revision				Assessment		
		<ul> <li>Pythagoras Theorem</li> <li>Trigonometry</li> <li>Expanding and factorising</li> <li>Rearranging equations</li> <li>Surds (simplify)</li> </ul>						als tive Indices counting r bounds ckets)	Revision based on topics     identified in PPEs.						
		Revision								Exams					
	Summer	Revision based on topics identified in PPEs.							<ul> <li>25<sup>th</sup> May 2021 – Paper 1 : Non – Calculator Morning exam – 1 hour 30 minutes</li> <li>8<sup>th</sup> June 2021 – Paper 2 : Calculator Morning exam – 1 hour 30 minutes</li> <li>15<sup>th</sup> June 2021 – Paper 3 : Calculator Morning exam – 1 hour 30 minutes</li> </ul>						

## ORMISTON RIVERS ACADEMY- KEY STAGE 4 MATHS OVERVIEW - HIGHER (SET 2)

Autumn H	alf Term 1
Block 1 – Weeks 1 to 3	Block 2 – Weeks 4 to 7
<ul> <li>Recall and use key formulae for circles involving perimeter and area.</li> <li>Find the surface area of prisms, cylinders, pyramids, spheres and cones.</li> <li>Recall and use the formula for the volume of a cuboid or prism made from composite 3D solids using a variety of metric measures.</li> <li>Describe and transform 2D shapes using single transformations including reflections, rotations, enlargements and translations.</li> </ul>	<ul> <li>Continue arithmetic, quadratic and geometric progression and use the nth term to generate terms.</li> <li>Form and solve equations in various contexts such as; Perimeter, area, probability etc.</li> <li>Write and solve linear simultaneous equations algebraically and graphically in the context of the problem.</li> <li>Calculate probabilities involving mutually exclusive outcomes and both independent and dependent combined events.</li> <li>Using 1 – p as the probability of an event not occurring where p is the probability of it occurring.</li> </ul>
<ul> <li>Notes/Links/Interleaving</li> <li>Revisit approximating solutions of a quadratic equations from the graph.</li> <li>Revisit volume and surface area of 3D shapes including cubes, cuboids and prisms.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Engage with problem solving involving more complex shapes and solids, including segments of circles and frustums of cones.</li> <li>Use the method of substitution to solve simultaneous equations involving a quadratic equation.</li> </ul>
Autumn H	lalf Term 2
Block 3 – Weeks 8 to 10	Block 4 - Weeks 11 to 14
<ul> <li>Solve word problems involving direct and inverse proportion.</li> <li>Recognise shapes, which are both similar and congruent.</li> <li>Solve ratio problems in context.</li> <li>Use accurate drawing to solve bearings problems including those involving loci.</li> <li>Use a ruler and a compass to construct triangles, perpendicular bisector, angle bisector and use these constructions to solve loci problems.</li> </ul>	<ul> <li>Plan a statistical investigation to include data collection and statistical analysis needed.</li> <li>Produce and interpret frequency polygons for both discrete and continuous data.</li> <li>Recognise simple patterns, characteristics and relationships in frequency polygons and vertical line graphs.</li> <li>Draw and interpret statistical diagrams including scatter diagrams, boxplots etc.</li> </ul>
<ul> <li>Notes/Links/Interleaving</li> <li>Students should understand the data handling cycle.</li> </ul>	<ul> <li>Additional Higher Content</li> <li>Compare two or more data sets from box plots relating to the key measures in the context of data.</li> </ul>

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Spring Half Term 1								
Block 2 – Weeks 5 to 6								
<ul> <li>Convert a fraction to a recurring decimal and vice versa.</li> <li>Use index laws to simplify and calculate the value of numerical expressions involving fractional and negative powers.</li> <li>Use the product rule for counting in a real-life context.</li> <li>Calculate the upper and lower bounds of numbers given to a varying degree of accuracy.</li> <li>Find the upper and lower bounds in real-life context, particularly when working with measurements.</li> </ul>								
<ul> <li>Additional Higher Content</li> <li>Use both Pythagoras Theorem and trigonometry to engage with abstract problems.</li> <li>Prove that the square root of a number lies between certain values.</li> <li>Find the upper and lower bounds of calculations involving 3D shapes.</li> <li>Links with other areas of Mathematics can be made by using surds in Pythagoras and when using trigonometric ratios.</li> </ul>								
lf Term 2								
Block 4 - Weeks 10 to 12								
<ul> <li>Revision to be determined by question level analysis (QLA) completed on the PPEs.</li> </ul>								
Additional Higher Content •								

ORMISTON RIVERS ACADEMY– KEY STAGE 4 MATHS OVERVIEW – HIGHER (SET 2)									
Summer Half Term 1									
Block 1 – Weeks 1 to 4	Block 2 – Weeks 5 to 6								
<ul> <li>Revision to be determined by question level analysis (QLA) completed on the PPEs.</li> <li>Exams to be completed on dates outlined above.</li> </ul>	<ul> <li>Revision to be determined by question level analysis (QLA) completed or the PPEs.</li> <li>Exams to be completed on dates outlined above.</li> </ul>								
Notes/Links/Interleaving •	Additional Higher Content •								
Summer I	Half Term 2								
Block 3 – Weeks 7 to 9	Block 4 – Weeks 10 to 12								
<ul> <li>Revision to be determined by question level analysis (QLA) completed on the PPEs.</li> <li>Exams to be completed on dates outlined above.</li> </ul>	<ul> <li>Revision to be determined by question level analysis (QLA) completed on the PPEs.</li> <li>Exams to be completed on dates outlined above.</li> </ul>								
Notes/Links/Interleaving •	Additional Higher Content •								