Mathematics

The Intentions of the Mathematics Curriculum

Mathematics – has it been invented or discovered? Wherever you stand on this question, there is no doubt that mathematics is a fascinating, creative discipline of thought. Mathematics is often viewed as mysterious, intellectual and a code to be cracked, rather than as a system for simplifying the complexities around us. For example, Fibonacci discovered a sequence of numbers from which emerges the Golden Ratio to make sense of patterns in nature.

To enable students at Nova Hreod to be the mathematicians of the next generation, to solve problems and make advancements in a world yet to be discovered, they need to master mathematical concepts to GCSE. Three elements of this are developing fluency (recall of facts and procedures), reasoning (explaining mathematically) and problem solving (applying knowledge to unfamiliar scenarios). This is basis for the sequence of the curriculum, for example, developing fluency and depth of understanding of place value and four operations before advancing to algebra. This is supported through a 'Concrete – Pictorial – Abstract' approach. Beginning with use of manipulatives to represent physical models to explore the mathematical ideas before moving on to represent with pictures and symbols, students learn general mathematical truths: the abstract principles of mathematics. Students complete their five years at Nova Hreod with a GCSE in mathematics and the skills and knowledge to enable them to progress to further education and apply their knowledge to future careers and everyday life.

The Learning Sequence in Mathematics

Academic Year	Autumn Term	SPR1 Assessments	Spring Term and Summer Term 1	SPR2 Assessments	Summer Term 2
Year 7	**Making generalisations about the number system:** Number operations including order of operations, factors and multiples and positive and negative numbers. **Expressions, equations and sequences:** Algebraic representations, simplifying and manipulating expressions and summarising sequences algebraically.	Mathematics Mastery pre and post tests for term 1 and 2. United Learning test of their curriculum which mirrors Mathematics Mastery.	**2D Geometry:** angle properties, classifying 2D shapes, constructing angles and quadrilaterals. **The Cartesian plane:** Co-ordinates, area of 2D shapes, transforming 2D figures.	Mathematics Mastery pre and post tests for terms 3, 4 and 5. Synoptic – tests all Y7 so far. Two United Learning Test and one Mathematics Mastery test.	**Fractions:** prime factor decomposition, equivalent fractions, four operations of fractions. **Ratio and proportion:** Working with ratio and calculating with percentages.
Year 8	**Equations and inequalities:** Forming and solving equations and inequalities.	Mathematics Mastery pre and post tests for terms 1 and 2 United learning test: synoptic – test on Y7 and Autumn term of Y8	**Proportional reasoning:** ratio, real life graphs and rates of change, direct and inverse proportion. **Representations and reasoning with data:** univariate and bivariate data.	Mathematics Mastery pre and post tests for terms 3, 4 and 5. Synoptic – tests all Y7 and Y8 so far. Two United Learning Test and one Mathematics Mastery test.	**Angles:** angles in polygons and bearings **Area, volume and surface area:** circles and composite shapes, volume of prisms, surface area of prisms.

Year 9	**Indices, powers and roots:** Basic laws of indices and calculating values of powers and roots. **Bounds:** Rounding and finding error intervals of a number **Standard Form:** Writing numbers in standard form and converting back to ordinary numbers. Four operations in standard form. **Percentages:** Converting between fractions, decimals and percentages. Calculating percentages of an amount, increase and decrease amounts by a percentage. **Ratio**: Simplifying, sharing amounts and solving ratio problems. **Proportion:** Calculating amounts with direct and inverse proportion and relating this to graphs	United Learning test of term 1 and 2 of Year 9 curriculum.	**Algebraic skills:** manipulation, forming and substitution. Solving equations and inequalities. Rearranging equations **Forming and solving equations:** Solving linear equations and constructing equations to represent problems to solve. **Co-ordinates and graphs:** Plotting co-ordinates, linear, quadratic, cubic and reciprocal graphs. **Area and perimeter:** of 2D shapes including circles and compound shapes. **Pythagoras:** Use the theorem to calculate missing sides.	Two United Learning tests of the Year 9 curriculum.	**Volume and surface area:** Calculate prisms, cones, spheres and pyramids. **Properties of shapes:** Classifying 2D shapes and features of 3D shapes. **Angles:** Apply angle properties including those in parallel lines. Angles in polygons.**Transformations:** reflecting, rotating, translating and enlarging 2D shapes. Working with vectors.
Year 10	**Probability:** Calculate probability of mutually exclusive events, sample space and more than one event by using tree diagrams. **Sequences:** Representing linear and quadratic graphs algebraically. **Linear graphs:** Plotting linear graphs, identifying equations and gradients of lines. **Simultaneous equations:** Solving algebraically linear simultaneous equations. **Quadratic graphs:** Plotting graphs and identifying roots and turning points.	United Learning test of term 1 and 2 of Year 10 and revisit some topics from Year 9.	<u>Higher</u> **Surds:** Simplifying, manipulating and rationalising denominators **Bounds:** Calculating with error intervals **Rearranging formulae** **Interest, growth and decay:** Calculate simple and compound interest and exponential growth. **Charts and data:** Sample, capture and recapture method, cumulative frequency and histograms. **Further proportion:** Algebraic formulae for direct and inverse proportion. **Plans and elevations:** Drawing views of 3D shapes and identifying shapes from the given views. **Congruence and similarity:** Using rules of congruence and similarity to calculate missing values, and proof.	Two United Learning tests: Synoptic of all taught in Y9 and 10.	**Constructions and loci:** bisectors and locus of points and lines. Constructing triangles. **Trigonometry:** Calculating missing sides and angles of right-angle triangles. <u>Higher</u> **Functions:** Function notation, inverse and solving. **Iteration:** Deriving formulae and applying iterative methods to seek a solution **Solving Quadratic equations and Simultaneous equations**

			<u>Foundation</u> **Interest:** Simple and compound interest. **Charts and data:** Pie charts, stem and leaf, scatter graphs **Error intervals** **Compound measures:** Use and manipulate formulae to calculate speed, density and pressure. <u>All</u> **Averages**: 3 averages and range, averages from grouped data.		<u>Foundation</u> **Plans and elevations:** Drawing views of 3D shapes and identifying shapes from the given views. **Congruence and similarity:** Using rules of congruence and similarity to calculate missing and proof. **Vectors:** Drawing and calculating resultant vectors.
Year 11	<u>Higher</u> **Algebraic proof** **Solving quadratics and simultaneous equations** **Further trigonometry:** Apply sine rule and cosine rule to calculate area of triangles when given an angle and missing sides and angles of non-right angled triangles. **Functions:** notation, inverse and solving. **Kinematics:** Acceleration, interpreting gradients and areas under graphs. <u>Foundation</u> **Review:** Revisit and strengthen key GCSE skills in number, algebra, ratio and proportion and probability.	First Mock Exam: GCSE June 2019 series	<u>Higher</u> **Linear inequalities:** Solving and identifying regions on a graph **Equations of circles:** Using equations of circles and finding equations for the tangent **Graphical transformation:** Applying transformations of reflection and translation to functions and trigonometric graphs. <u>Foundation</u> **Review:** Revisit and strengthen key GCSE skills in area and perimeter, angles and translation and statistics **Higher Revision:** Using bespoke revision packs informed from student's assessments **Foundation Revision:** Using bespoke revision packs informed from student's assessments	Second Mock Exam: GCSE November 2019 series.	Bespoke revision packs informed from student's assessments

Formal Assessment of our Mathematics Curriculum

Year 7 and 8 will be assessed each term through the Mathematics Mastery pre- and post-tests. From these, the progress of all students is tracked to compare scores in each test before and after the content learned in lessons. In December and June, students will also sit the required United Learning assessments.

Year 9 and 10 will be assessed in December and June using the United Learning exam papers. These assessments will assess all learning from the beginning of year 9 until the point at which they are sitting the assessment.

Year 11 will be assessed using previous Edexcel exam papers. Progress is very closely monitored, and areas of development and tier of entry are frequently reviewed.