

# The Nottingham Emmanuel School – Maths Curriculum Map (2020-2021)



## COVID RECOVERY

Additional time has been built into each year group to give time for teachers to focus on assessing pre-requisites for each topic at the start of the lesson/half term. Any gaps in knowledge needed for the focus is then reviewed and retaught before moving onto the new concept. This covers most of the curriculum due to the cyclic/inter-connected nature of the Maths curriculum. Individual topics that have been identified as a weakness due to covid has been replanned into the curriculum at a later stage.

	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2
Year 7	<p><b>Algebraic Thinking</b></p> <p>Work with linear and non-linear sequences Term to term rules of numerical sequences in words Working with function machines Use algebraic conventions Substitution into one and two step expressions Generating sequences given an algebraic rule Solve one step linear equations Collect like terms</p>	<p><b>Place Value and Proportion</b></p> <p>Working with large numbers Rounding to nearest 10 and 1 significant figure Ordering numbers Range and Median Standard Form Fractional diagrams and on number lines Equivalent fractions Fractions as division Convert between FDP</p>	<p><b>Applications of Number</b></p> <p>Mental strategies for addition and subtraction Formal methods Perimeter Financial Problems Timetables Frequency Trees Bar Charts and Line Charts Factors and Multiples Multiply and divide by powers of 10 Formal methods Order of operations Area Mean Problems Fractions and percentages of amounts with and without a calculator</p>	<p><b>Directed Number and Fractional Thinking</b></p> <p>Understand and use representations of directed number Add, subtract, multiply and divide with directed number Use of a calculator Substitution with directed number Solve two step equations Convert between mixed numbers and fractions Add and subtract fractions including improper and mixed numbers Add and subtract fractions and decimals Algebraic fractions</p>	<p><b>Lines and Angles</b></p> <p>Use of a protractor Identify types of triangle, quadrilaterals and polygons Construct SSS&lt; SAS and ASA triangles Draw and interpret pie charts Find angles on a straight line, around a point, vertically opposite, in triangles and quadrilaterals Angles in parallel lines</p>	<p><b>Reasoning with Number</b></p> <p>Use mental strategies for integers, fractions and decimals Use factors to simplify calculations Work with simple Venn diagrams Expressing probability in numbers Probability of single events Factors and multiples Prime, square and triangular numbers Product of prime factors HCF and LCM</p>
	<p><b>COVID RECOVERY</b></p> <p>This year has been completely sequenced to line up with white rose maths hub sequencing which a number of our feeder schools follow. This will allow greater consistency with transition from year 6 to year 7 and will allow the teacher to assess prior learning to identify any gaps in knowledge linked to KS2 curriculum.</p>					

<b>Year 8</b>	<b>Proportional reasoning</b>	<b>Expressions, Equations and Inequalities</b>	<b>2D Geometry</b>	<b>Sequences</b>	<b>3D Geometry</b>	<b>Statistics and probability</b>
	<p>Solve problems involving ratio Find percentages of amounts Find percentage increase and decrease Develop understanding of ratio tables Use ratio tables to solve proportional word problems</p> <p><b>COVID RECOVERY</b> There is a greater emphasis on calculating without a calculator this year to allow teachers to assess any arithmetic/number gaps in knowledge from last year.</p>	<p>Identify prime numbers Identify factors and HCF Prime factorisation Using prime factorisation to calculate HCF and LCM Use basic index rules Use algebraic conventions Multiply single brackets Factorise single brackets Form equations and inequalities Use different representations for equations Solve linear equations Solve linear inequalities Solve word problems that lead to linear equations Ratio and Algebra Solve linear inequalities</p> <p><b>COVID RECOVERY</b> Additional time spent at the start of topic ensure students have a firm understanding on HCF and LCM from year 7</p>	<p>Rounding to decimal places and significant figures Find the area of compound shapes Solve word problems involving areas Understand the relationship between the circumference and radius of the circle Find the circumference of a circle given a radius or diameter Find the radius of diameter of a circle given the circumference Find the length of arcs Find the area of a circle given a radius or diameter Find the radius or diameter of a circle given the area Find the area and perimeter of compound shapes involving circles</p>	<p>Find patterns in spatial sequences Find different ways of describing spatial sequences Find the nth term of linear sequences All about Fibonacci</p> <p><b>COVID RECOVERY</b> Reduced content in this half term to allow teachers to catch up from any additional lesson time given to teaching missed pre-requisites</p>	<p>Use isometric paper to draw 3D shapes Draw plans and elevations of 3D shapes Find the volume of cuboids Find the volume of shapes made from cuboids Use nets to find the surface Area of cuboids Pyramids and prisms Find the volume of prisms Find the volume of pyramids and cones Find the volumes of spheres and compound shapes</p>	<p>Plot Scatter diagrams Interpret scatter diagrams Understand correlation and causation Expressing probability in numbers Probability of single events Understanding mutually exclusive events Relative Frequency Sample Space Diagrams Independent events Tree Diagrams Using Tree Diagrams without replacement</p>

<b>Year 9</b>	<b>Algebraic Manipulation</b>	<b>Further Coordinate Geometry</b>	<b>Angles, Construction and Congruence</b>	<b>Quadratic Expressions, Equations and Graphs</b>	<b>Pythagoras, Surds and Surface Area</b>	<b>Probability and Venn Diagrams</b>
	<p>Multiply out two or more brackets</p> <p>Factorise quadratic expressions</p> <p>Cancel algebraic fractions</p> <p>Multiply and divide algebraic fractions</p> <p>Add and subtract algebraic fractions</p>	<p>Use multiple representations of straight lines</p> <p>Understanding and using <math>y = mx + c</math></p> <p>Understand the link between parallel and perpendicular lines</p>	<p>Know and use angle rules for parallel lines</p> <p>Know and use angles in polygons</p> <p>Understand when shapes tessellate</p> <p>Construct triangles</p> <p>Identify when triangles are congruent</p> <p>Construct bisectors and angles using compasses and rulers</p>	<p>Drawing Quadratic Graphs</p> <p>Finding roots of quadratic equations by factorising</p> <p>Form and Solve Quadratic Equation by factorising by <math>(a = 1)</math></p> <p>Form and Solve Quadratic Equation by factorising <math>(a &gt; 1)</math></p> <p>Complete the Square</p> <p>Using the Quadratic Formula</p>	<p>Finding the hypotenuse</p> <p>Finding a shorter side</p> <p>Pythagoras Problems</p> <p>Introducing Surds</p> <p>Simplifying Surds</p> <p>Manipulating Surds</p> <p>Expanding brackets with surds</p> <p>Rationalising Surds</p> <p>3D Pythagoras</p> <p>Surface Area of Pyramids</p> <p>Area and circumference of circles</p> <p>Surface area of cuboids</p> <p>Area and circumference of circles</p> <p>Surface area of cylinders</p> <p>Surface area of cones</p>	<p>Sample space diagrams</p> <p>Drawing tree diagrams</p> <p>Using tree diagrams without replacement</p> <p>Frequency trees</p> <p>Frequency Trees</p> <p>Venn Diagrams</p> <p>Finding probabilities from a Venn Diagrams</p> <p><b>COVID RECOVERY</b> Additional time to review tree and frequency diagrams from year 8 that was missed due to reduced lesson time</p>

<b>Year 10</b>	<b>Trigonometry</b>	<b>Circles and Equations</b>	<b>Science Skills</b>	<b>Sequences and Graphs</b>	<b>Delving into Data</b>	<b>Further Probability and Combinatorics</b>
	<p>Use trigonometric ratios to find missing lengths and angle sin triangles            Finding the hypotenuse            Finding a shorter side            Pythagoras Problems            Introducing Surds            Simplifying Surds            Manipulating Surds            Expanding brackets with surds            Find exact values for sin theta, cos theta and tan theta for key angle            Solving area problems using Pythagoras and Trigonometry</p> <p><b>HIGHER ONLY</b>            Rationalising Surds            Use the Sine and Cosine rules to find missing lengths and angles.            Find the area of triangles using trigonometry</p> <p><b>COVID RECOVERY</b>            Additional time given to reviewing surds from year 9</p>	<p>Solving and forming simultaneous equations by elimination            Calculate arc lengths, angles and areas of sectors            Drawing Quadratic Graphs            Finding roots of quadratic equations by factorising Form and Solve Quadratic Equation by factorising.</p> <p><b>HIGHER ONLY</b>            Quadratic Equation by factorising (<math>a &gt; 1</math>)*            Solving and forming simultaneous equations by substitution            Equation of a Circle            Finding the intersection of lines and curves</p> <p><b>COVID RECOVERY</b>            Additional time given to reviewing factorising quadratics from year 9</p>	<p>Related Calculations            Negative Indices            Standard Form            Solve problems involving measure such as speed, density and pressure.            Changing Units            Surface Area of Prisms, cylinders, cones and spheres.            Volume of prisms, cylinders, cones, pyramids &amp; spheres.</p> <p><b>HIGHER ONLY</b>            Fractional Indices            Index Laws in Context            Approximate the gradient of a curve at a given point and the area under a graph.            Interpret these values in real-life problems including kinematic graphs.            Further volume and surface area problems.</p>	<p>Using iterative methods to generate sequences            nth term of linear sequence            Sequences and Ratio            Combining Ratios            1:n            Unit Pricing            Solve Direct and Inverse Proportion Problems            Recognise different types of graphs</p> <p><b>HIGHER ONLY</b></p> <p>Quadratic Sequences            Iterative methods            Quadratic Inequalities            Compound Functions            Inverse Functions            Recognise and draw cubic and reciprocal functions            Recognise and draw graphs of exponential functions            Recognise and sketch translations and reflections of graphs.</p>	<p>Working with averages and range            Estimating the Mean from a grouped Frequency Table            Constructing and Interpreting Pie Charts            Use tables and line graphs to represent time series</p> <p><b>HIGHER ONLY</b></p> <p>Construct and Interpret Cumulative Frequency Tables and Graphs            Construct and Interpret BoxPlots            Construct and Interpret Histograms</p>	<p>Combinations            Understanding independent events (From Year 9 Summer 2)            Using Two way tables            Using Tree Diagrams (From Year 9 Summer 2)</p> <p><b>HIGHER ONLY</b></p> <p>Conditional Probability from Tree Diagrams            Conditional Probability from Venn Diagrams            Algebraic Probability problems</p> <p><b>COVID RECOVERY</b>            Additional time to review complex tree diagrams from year 9 that was missed due to reduced lesson time</p>

<b>Year 11</b>	<p><b>FOUNDATION</b> Types of Number Rounding and Estimation Using Number Simplify and Solve</p> <p><b>COVID RECOVERY</b> End of year 10 QLA's used to identify gaps in knowledge in the above topics to create bespoke MTPs for each foundation class. This continues throughout this year.</p> <p><b>HIGHER</b>  Surface Area and Volume (From Year 10 Spring 1) Transformations Similar Shapes Vector Geometry</p> <p><b>COVID RECOVERY</b> Additional curriculum teaching time given to these topics to ensure full understating</p>	<p><b>FOUNDATION</b> Percentages Representing Data Averages and Spread Right-angled Triangles</p> <p><b>HIGHER</b>  Function Notation Compound Functions Inverse Functions Quadratic Sequences Using Iteration to solve equations</p> <p><b>COVID RECOVERY</b></p>	<p><b>FOUNDATION</b> Measures Perimeter, Area and Volume Ratio &amp; Proportion Constructions</p> <p><b>HIGHER</b>  Construct and Interpret Cumulative Frequency Tables and Graphs Construct and Interpret BoxPlots Construct and Interpret Histograms</p> <p><b>COVID RECOVERY</b> Constructions added into the curriculum here as it has not been taught at all during covid due to equipment challenges.</p>	<p><b>FOUNDATION</b> Probability Angle Properties Working with Graphs Transformations</p> <p><b>HIGHER</b>  To be determined from Mock QLA - bespoke mid-term plan for each class</p>	See bespoke Mid-term plan for each class	See bespoke Mid-term plan for each class
	<b>AUT 1</b>	<b>AUT 2</b>	<b>SPR 1</b>	<b>SPR 2</b>	<b>SUM 1</b>	<b>SUM 2</b>
<b>Level 2 Further Maths</b>	Expanding brackets using Pascal's Triangle Working with straight lines	Using Trigonometric identities to simplify expressions and proof further identities Using Trigonometric identities to solve trigonometric equations in given intervals Using factor Theorem to factorise cubic expressions	Solving linear equations in three unknowns Equation of a Circle with centre (a, b) Geometric Proof	Differentiation Equations of Tangents and Normals	Increasing and Decreasing Functions Stationary Points and Classification Sketching and Interpreting Curves using calculus	Limiting value of a sequence Drawing piece-wise functions Domain and Range of a Function

	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2
<b>Year 12 AS Mechanics Route</b>	<p><b>STRAIGHT LINES AND CIRCLES</b> Distance between two points and midpoints The equation of a straight line Parallel and perpendicular lines The equation of a circle Solving problems with lines and circles</p> <p><b>PROOF</b> Mathematical arguments and notation Proof by deduction, exhaustion and counter-example</p> <p><b>POLYNOMIALS</b> Polynomial division The factor theorem Sketching polynomial functions</p> <p><b>COVID RECOVERY</b> Additional assessment put into place within the first three weeks to assess GCSE knowledge and understanding needed for A Level maths. Low scores lead to student-teacher meeting and attendance to interventions</p>	<p><b>BINOMIAL EXPANSION</b> Understanding the Binomial Theorem Solving problems involving binomial coefficients Applications of the Binomial Theorem</p> <p><b>KINEMATICS IN ONE DIMENSION</b>  Displacement, velocity and acceleration Calculus and kinematics Displacement-time graphs Velocity-time graphs Problems involving kinematics</p>	<p><b>FORCES AND NEWTON'S LAWS</b>  Deriving the constant acceleration formula Solving problems involving the constant acceleration formula and vertical motion Newton's Laws of motion Problems involving gravity and resultant forces Types of forces, gravity and weight Forces in equilibrium</p> <p><b>VECTORS</b>  Describe vectors using magnitude and direction Addition and subtraction of vectors Problems involving equal and parallel vectors Understand position and displacement vectors Use vectors to solve geometrical problems</p>	<p><b>FORCES AND NEWTON'S LAWS</b>  Newton's third law Normal reaction force Solving complex problems in involving equilibrium Connected particles Problems involving pulleys</p> <p style="text-align: center;"><b>INTEGRATION</b></p> <p>Rules for integration Finding the equation of a curve Definite integrals Calculate the area between a curve and a line</p>	<p><b>VARIABLE ACCELERATION</b>  <b>BESPOKE REVISION / MOCK EXAMS</b></p>	<p><b>SEQUENCES AND SERIES</b> Term-to-term and position-to-term rules Sigma notation Arithmetic sequences and series Geometric sequences and series Infinite geometric series Mixed arithmetic and geometric problems</p>

<b>Year 12 AS Statistics Route</b>	<p><b>ALGEBRAIC MANIPULATION</b> Laws of indices Surds</p> <p><b>QUADRATIC EQUATIONS</b> Solving quadratic equations Graphs of quadratic equations Completing the square Quadratic inequalities The discriminant Disguised quadratics</p> <p><b>GRAPHS, LINEAR AND QUADRATIC INEQUALITIES</b> Intersections of graphs Transforming graphs Reciprocal Graphs Sketching inequalities</p>	<p><b>DATA PRESENTATION AND REPRESENTATION</b> Draw and interpret statistical diagrams including histograms, cumulative frequency diagrams and box and whisker plots Standard deviation Calculate and interpret the mean, standard deviation and variance from frequency tables. Interpret correlation coefficients and regression lines Calculate and determine outliers</p> <p><b>PROBABILITY AND STATISTICAL DISTRIBUTIONS</b> Mutually exclusive and independent probabilities Probability distributions The binomial distribution</p>	<p><b>STATISTICAL SAMPLING AND HYPOTHESIS TESTING</b> Methods of sampling Hypothesis testing for the binomial distribution Understand critical regions for hypothesis testing.</p> <p><b>TRIGONOMETRY</b> Graphs of sine, cosine and tangent functions Trigonometric identities Solving trigonometric equations in degrees Transformations of trigonometric graphs</p>	<p><b>DIFFERENTIATION</b> Sketching derivatives Differentiation from first principals Rules of differentiation Interpreting derivatives and second derivatives Solving problems involving tangents, normal and stationary points Optimisation</p> <p><b>LOGARITHMS</b> Understand the relationship between logarithms and indices Understand the laws of logarithms Solve exponential equations including disguised quadratics</p>	<p><b>EXPONENTIALS</b> Graphs of exponential and logarithmic functions Solve problems involving exponential functions Approximate an exponential model as a straight line</p> <p><b>BESPOKE REVISION / MOCK EXAMS</b></p>	<p><b>FUNCTIONS</b> Mappings and functions Domain and range Composite functions Inverse functions</p> <p><b>FURTHER TRANSFORMATIONS OF GRAPHS</b> Combined graph transformations The modulus function Solving modulus equations and inequalities</p>
	<b>AUT 1</b>	<b>AUT 2</b>	<b>SPR 1</b>	<b>SPR 2</b>	<b>SUM 1</b>	<b>SUM 2</b>
<b>Year 13 Mechanics Route</b>	<p><b>RADIAN MEASURE</b> Understanding radians as an angle measure Inverse trigonometric functions Solving trigonometric equations in radians Modelling with trigonometric functions Arc length and sector area Small angle approximations</p> <p><b>PROOF</b> Proof by contradiction Criticising proof</p> <p><b>APPLICATIONS OF VECTORS</b> Vectors in three dimensions Solving geometrical problems</p>	<p><b>FURTHER DIFFERENTIATION</b> The chain rule The product rule The quotient rule Implicit differentiation Differentiation of inverse functions</p> <p><b>FURTHER APPLICATIONS OF CALCULUS</b> Concave and convex curves Points of inflection Parametric equations Differentiating parametric equations Integrating parametric equations Connected rates of change Finding complex areas e.g. between 2 curves, between a curve and the y-axis.</p>	<p><b>DIFFERENTIAL EQUATIONS</b> Solving differential equations with 1 or 2 variables Modelling with differential equations</p> <p><b>MOMENTS</b> The turning effect of a force Equilibrium</p>	<p><b>FORCES IN CONTEXT</b> Resolving forces Coefficient of friction Motion on a slope</p> <p><b>PROJECTILES</b> Modelling projectile motion The trajectory of a projectile</p>	<p><b>APPLICATIONS OF VECTORS</b> Describing motion in two dimensions Constant acceleration equations Calculus with vectors</p> <p><b>BESPOKE REVISION / MOCK EXAMS</b></p>	

<p style="writing-mode: vertical-rl; transform: rotate(180deg);">Year 13 Statistics Route</p>	<p><b>PARTIAL FRACTIONS</b> Solving problems involving the factor theorem Simplifying rational functions Partial fractions with distinct and repeated factors</p> <p><b>TRIGONOMETRY</b> Compound angle identities Double angle identities Functions in the form <math>a \sin x + b \cos x</math> Reciprocal trigonometric functions</p> <p><b>BINOMIAL THEROEM</b> Binomial theorem for fractional and negative powers Expansion of compound expressions</p>	<p><b>CALCULUS OF EXPONENTIAL AND TRIGONOMETRIC FUNCTIONS</b> Differentiation Integration</p> <p><b>FURTHER INTEGRATION</b> Integration of <math>\sec x, \operatorname{cosec} x</math> and <math>\cot x</math> Integration by substitution Integration by parts Using trigonometric identities in integration Integration rational functions</p>	<p><b>NUMERICAL METHODS</b> Locating roots of a function The Newton-Raphson method and its limitations Fixed-point iteration and its limitations The trapezium rule</p> <p>Regression, correlation and the large data set</p>	<p><b>FURTHER PROBABILITY</b> Set notation Venn diagrams Two-way tables Tree diagrams</p> <p><b>THE NORMAL DISTRIBUTION</b> The normal distribution The inverse normal distribution Finding unknown <math>\mu</math> or <math>\sigma</math> Modelling with the normal distribution</p>	<p><b>FURTHER HYPOTHESIS TESTING</b> Calculating and interpreting probabilities using the normal distribution for a sample Hypothesis testing for the normal distribution Hypothesis testing for correlation coefficients</p> <p><b>BESPOKE REVISION / MOCK EXAMS</b></p>	
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