The Nottingham Emmanuel School – Maths Curriculum Map (2019-2020)

	AUT 1	AUT 2	SPR 1	SPR 2	SUM 1	SUM 2
Year 7	**Addition and Subtraction** Add and subtract negative numbers Use positive and negative numbers in context Simplify expressions by collecting like terms Find the perimeter of shapes Find equivalent fractions Convert between mixed numbers and improper fractions Addition and Subtraction of fractions	**Multiplication and Division** Compare multiplication and division methods Multiply and Divide Negative Numbers Multiplication and Division of Fractions Find the area of a rectangle, triangle, parallelogram and trapezium BIDMAS (New 2020) Use divisibility rules Identify prime numbers Identify factors and HCF	**Angles** Draw and measure angles Find angles on a straight line, around a point, vertically opposite, in triangles and quadrilaterals Angles in parallel lines Bearings	**Coordinate Geometry** Plot and read Cartesian coordinates Understand the equations of vertical and horizontal lines Find simple rules connecting x and y coordinates. Reflect, rotate, enlarge and translate shapes on a Cartesian grid	**Rounding and Estimation** Investigate place value Solve problems involving large numbers. Solve problems that require assumptions to be made Rounding to decimal places Rounding to significant figures Estimation Limits of Accuracy Applying Limits of Accuracy to problems	**Interpreting data** Solve problems using averages Read & interpret pie charts Compare frequency graphs and pie charts
Year 8	**Proportional reasoning** 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	**Expressions, Equations and Inequalities** 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 (New 2020)	**2D Geometry** 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	**Sequences** Find patterns in spatial sequences Find different ways of describing spatial sequences Find the nth term of linear sequences All about Fibonacci	**3D Geometry** 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 (New 2020) Find the volumes of spheres and compound shapes (New 2020)	**Statistics and probability** Plot Scatter diagrams Interpret scatter diagrams Understand correlation and causation Sample Space Diagrams (New 2020) Relative Frequency (New 2020) Tree Diagrams (New 2020) Using Tree Diagrams without replacement (New 2020)

Year 9	**Algebraic Manipulation** Multiply out two or more brackets Factorise quadratic expressions Cancel algebraic fractions Multiply and divide algebraic fractions Add and subtract algebraic fractions	**Further Coordinate Geometry** Use multiple representations of straight lines Understanding and using y = mx + c Understand the link between parallel and perpendicular lines	**Angles, Construction and Congruence** Know and use angle rules for parallel lines Know and use angles in polygons Understand when shapes tessellate Construct triangles Identify when triangles are congruent Construct bisectors and angles using compasses and rulers	**Quadratic Expressions, Equations and Graphs** Drawing Quadratic Graphs Finding roots of quadratic equations by factorising Form and Solve Quadratic Equation by factorising by (a =1) Form and Solve Quadratic Equation by factorising (a>1) Complete the Square Using the Quadratic Formula	**Pythagoras, Surds and Surface Area** Finding the hypotenuse Finding a shortened side Pythagoras Problems Introducing Surds Simplifying Surds Manipulating Surds Expanding brackets with surds (NEW 2020) Rationalising Surds (NEW 2020) 3D Pythagoras Surface Area of Pyramids	**Probability and Venn Diagrams** Frequency Trees Venn Diagrams Finding probabilities from a Venn Diagrams
Year 10	**Trigonometry** Use trigonometric ratios to find missing lengths and angles in triangles Find exact values for sin theta, cos theta and tan theta for key angles Use the Sine and Cosine rules to find missing lengths and angles. Bearings (New 2020) Find the area of triangles using trigonometry Recognise and sketch trigonometric functions.	**Circles and Equations** Solving and forming simultaneous equations by elimination Solving and forming simultaneous equations by substitution Calculate arc lengths, angles and areas of sectors Proof and application of Circle Theorems Equation of a Circle Finding the equation of a tangent Finding the intersection of lines and curves	**Science Skills** Rearranging Formula Work with numbers in Standard Form SUVAT Equations Solve problems involving measure such as speed, density and pressure. Changing Units Draw and interpret graphs of non-standard functions and use them in real-life problems. 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	**Statistical Representations** Construct and Interpret Cumulative Frequency Tables and Graphs Construct and Interpret BoxPlots Construct and Interpret Histograms Use tables and line graphs to represent time series	**Sequences and Graphs** Using iterative methods to generate different types of sequences Finding the nth term of a Quadratic Sequence Solving Equations using Iterative methods Solving Quadratic Inequalities Solve Direct and Inverse Proportion Problems Recognise graphs showing direct and inverse proportion Function Notation and Composite Functions (NEW 2020) Inverse Functions (NEW 2020) Recognise and draw cubic and reciprocal functions Recognise and draw graphs of exponential functions Recognise and sketch translations and reflections of graphs	**Further Probability and Combinatorics** Combinations Calculating conditional probabilities Understanding independent events

Year 11	**HIGHER** Vector Geometry Similar Shapes (BWA) Further Transformations Proof Loci Problems Further Ratio **FOUNDATION** Simultaneous Equations Compound Interest Reverse Percentages Further Ratio Factorising Quadratics Arcs and Sectors	See bespoke Mid-term plan for each class	See bespoke Mid-term plan for each class	See bespoke Mid-term plan for each class	See bespoke Mid-term plan for each class	See bespoke Mid-term plan for each class
Year 11 Further Maths	**AUT 1**	**AUT 2**	**SPR 1**	**SPR 2**	**SUM 1**	**SUM 2**
	Expanding brackets using Pascal's Triangle Differentiating polynomials Equation of Tangent and Normal at any point on the curve Increasing and Decreasing Functions Stationary Points The second derivative	Using Trigonometric identities to simplify expressions and proof further identities Using Trigonometric identities to solve trigonometric equations in given intervals	Solving linear equations in three unknowns Equation of a Circle with centre (a, b)	Limiting Value of a sequence Multiplying Matrices	Transformation Matrices Combinations of Transformations	The Factor Theorem Factorising cubic expressions

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Year 12 Core Maths	**FERMI ESTIMATION** Estimate answers to calculations in unfamiliar contexts **PERCENTAGES** Percentages of an amount Interpret percentages as a fraction or decimal Compare two quantities Understand and use percentages greater than 100% Reverse percentages Solve problems involving percentage increase and decrease Simple interest Compound interest and depreciation **INCOME TAX AND NATIONAL INSURANCE** Calculate tax, NI, Student Loan and pension payments **DATA ANALYSIS** Primary, secondary, qualitative and quantitative data **REPRESENTING DATA** Cumulative Frequency and box plots Stem and leaf diagrams (including back to back) **SPREADSHEETS** Use of simple formulae	**VOLUME AND SURFACE AREA** Surface area and volume of cones, spheres, pyramids and compound shapes Solve problems involving similar shapes **AER** Perform AER calculations Solve problems involving savings and investments and AER calculations **EQUATION OF A STRAIGHT LINE** Gradient of a line connecting 2 points Understand and use $y = mx + c$ **REPRESENTING DATA** Calculate and interpret the mean, median and mode of a data set Calculate and interpret quartiles, percentiles, range, interquartile range and standard deviation of a data set **APR** Perform APR calculations Solve problems involving debt and APR calculations Payday Loans	**OPTIONAL CONTENT** **FINANCIAL PROBLEMS** Understand the effect of inflation Use iterative formulae Exchange rates Understand how to budget **OPTIONAL CONTENT**	**CRITICAL ANALYSIS** Critically analyse data used in the media **LIMITS OF ACCURACY** Apply and interpret limits of accuracy Appreciate errors due to rounding **OPTIONAL CONTENT**	**BESPOKE REVISION / MOCK EXAMS**	

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Year 12 AS Mechanics Route	**STRAIGHT LINES AND CIRCLES** 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 **PROOF** Mathematical arguments and notation Proof by deduction, exhaustion and counter-example	**BINOMIAL EXPANSION** Understanding the Binomial Theorem Solving problems involving binomial coefficients Applications of the Binomial Theorem **DIFFERENTIATION** Sketching derivatives Differentiation from first principals Rules of differentiation Interpreting derivatives and second derivatives Solving problems involving tangents, normal and stationary points Optimisation	**INTEGRATION** Rules for integration Finding the equation of a curve Definite integrals Calculate the area between a curve and a line **VECTORS** 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	**KINEMATICS IN ONE DIMENSION** Displacement, velocity and acceleration Calculus and kinematics Displacement-time graphs Velocity-time graphs Problems involving kinematics **FORCES AND NEWTON'S LAWS** 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	**FORCES AND NEWTON'S LAWS** Newton's third law Normal reaction force Solving complex problems in involving equilibrium Connected particles Problems involving pulleys **BESPOKE REVISION / MOCK EXAMS**	**SEQUENCES AND SERIES** 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
Year 12 AS Statistics Route	**ALGEBRAIC MANIPULATION** Laws of indices Surds **QUADRATIC EQUATIONS** Solving quadratic equations Graphs of quadratic equations Completing the square Quadratic inequalities The discriminant Disguised quadratics **POLYNOMIALS** Polynomial division The factor theorem Sketching polynomial functions **GRAPHS, LINEAR AND QUADRATIC INEQUALITIES** Intersections of graphs Transforming graphs Reciprocal Graphs Sketching inequalities	**TRIGONOMETRY** Graphs of sine, cosine and tangent functions Trigonometric identities Solving trigonometric equations in degrees Transformations of trigonometric graphs **PROBABILITY AND STATISTICAL DISTRIBUTIONS** Mutually exclusive and independent probabilities Probability distributions The binomial distribution	**STATISTICAL SAMPLING AND HYPOTHESIS TESTING** Methods of sampling Hypothesis testing for the binomial distribution Understand critical regions for hypothesis testing.	**LOGARITHMS** Understand the relationship between logarithms and indices Understand the laws of logarithms Solve exponential equations including disguised quadratics **EXPONENTIALS** Graphs of exponential and logarithmic functions Solve problems involving exponential functions Approximate an exponential model as a straight line	**DATA PRESENTATION AND REPRESENTATION** 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 **BESPOKE REVISION / MOCK EXAMS**	**FUNCTIONS** Mappings and functions Domain and range Composite functions Inverse functions **FURTHER TRANSFORMATIONS OF GRAPHS** Combined graph transformations The modulus function Solving modulus equations and inequalities

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Year 13 Mechanics Route	**RADIAN MEASURE** 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 **PROOF** Proof by contradiction Criticising proof **BINOMIAL THEROEM** Binomial theorem for fractional and negative powers Expansion of compound expressions	**FURTHER DIFFERENTIATION** The chain rule The product rule The quotient rule Implicit differentiation Differentiation of inverse functions **FURTHER APPLICATIONS OF CALCULUS** 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.	**DIFFERNETIAL EQUATIONS** Solving differential equations with 1 or 2 variables Modelling with differential equations **APPLICATIONS OF VECTORS** Describing motion in two dimensions Constant acceleration equations Calculus with vectors Vectors in three dimensions Solving geometrical problems	**PROJECTILES** Modelling projectile motion The trajectory of a projectile **FORCES IN CONTEXT** Resolving forces Coefficient of friction Motion on a slope	**MOMENTS** The turning effect of a force Equilibrium **BESPOKE REVISION / MOCK EXAMS**	
Year 13 Statistics Route	**PARTIAL FRACTIONS** Solving problems involving the factor theorem Simplifying rational functions Partial fractions with distinct and repeated factors **TRIGNOMETRY** Compound angle identities Double angle identities Functions in the form $a\ sin\ x\ +\ b\ cos\ x$ Reciprocal trigonometric functions **CALCULUS OF EXPONENTIAL AND TRIGONOMETRIC FUNCTIONS** Differentiation Integration	**FURTHER INTEGRATION** Integration of $\sec x, cosec\ x\ and\ \cot x$ Integration by substitution Integration by parts Using trigonometric identities in integration Integration rational functions	**NUMERICAL METHODS** Locating roots of a function The Newton-Raphson method and its limitations Fixed-point iteration and its limitations The trapezium rule	**FURTHER PROBABILITY** Set notation Venn diagrams Two-way tables Tree diagrams **THE NORMAL DISTRIBUTION** The normal distribution The inverse normal distribution Finding unknown $\mu\ or\ \sigma$ Modelling with the normal distribution	**<u>FURTHER HYPOTHESIS TESTING</u>** Calculating and interpreting probabilities using the normal distribution for a sample Hypothesis testing for the normal distribution Hypothesis testing for correlation coefficients **BESPOKE REVISION / MOCK EXAMS**	