Thomas More Catholic Academy
FAITH | EXCELLENCE | RESPECT

Maths Theta Curriculum Sequence – Key Stage 4

	KS3 National Curriculum prior learning	By the end of the term, students can:	Year 10 Term 1	Year 10 Term 2	Year 10 Term 3	Year 11 Term 1	Year 11 Term 2	Year 11 Term 3
What we want our students to know and remember	*Key concepts from KS3 are embedded into the KS4 curriculum such as graph work and extended algebraic reasoning.*	Define the key tier 3 **vocabulary**:	Recur, Decimal, Fraction, Place Value, Algebraic, Fraction, Solve, Rearrange, Standard Form, Surds, Rational, Irrational, Index Law, Fractional Indices, Denominator, Power, Root, Expand, Factorise, Split the Middle, Product, Sum, Factors, Formula, Identity, Equation, Expression, Substitute, Solve, Linear, Quadratic, Inverse, Proportion, Proof, Compound, Growth, Decay, Interest, Arc, Sector, Area, Circumference, Circle, Volume, Cones, Spheres, Pyramids	Equations, Solve, Simultaneous, Loci, Constructions, Bisectors, Perpendicular, Distance, Transformations, Reflection, Rotation, Enlargements, Translation, Scale Factors, Two-way Table, Tree Diagrams, Branch, Dependent, Conditional, Independent, Sequence, Arithmetic, Geometric, Fibonacci, Quadratic, Simplify, Factorise.	Inequalities, Graphical, Regions, Plot, Co-ordinate, Gradient, Intercept, Parallel, Perpendicular, Linear, Quadratic, Cubic, Curve, Reciprocal, Scatter, Correlation, Anomaly, Cumulative, Frequency, Median, Box Plot, Scatter, Quartiles, Interquartile, Histograms, Frequency Density.	Pythagoras, Trigonometry, Cuboid, Prism, Cone, Pyramid, Dimension, Surface Area, Volume, Hypotenuse, Adjacent, Opposite, Formula, Sine, Cosine, Tangent, Trigonometry, Graphs, Ratio, Graph, Polynomials, Quadratic, Sequences, Iteration, Cubic, Set, Estimate, Solution, Vector, Scalar, Circle, Theorem, Tangent, Radius, Diameter, Inverse, Composite, Functions, Transformations, Translations, Graphs, Stretch, Squash, Reflect,	Congruency, Similar, Scale Factors, Solutions, Graphical, Root, Turning Point, Minimum, Maximum, Intercept, Perpendicular, Parallel, Gradient, Acceleration, Velocity, Distance, Average.	
	A strong emphasis on algebra will develop the skills that students need to use in KS5	Recall the **knowledge**:	In term 1 of Y10 they build on the Theta SOL from Y9 and study the topics in more depth such as complete the square, indices, factorising and areas/lengths of sectors. Surds will be introduced. In KS4 they will be comprehensively covering all topics to prepare them for their GCSE exams.	They will combine their learning from Term 1 with previous years to solidify their understanding of key topics such as constructions, transformations, probability and sequences. Algebra skills involving simultaneous equations and fractions will be developed further.	They will move towards more geometry and statistics work by covering topics such as histograms, cumulative frequency, equations of lines and inequality regions - this is not taught in previous years so will combine skills such equations of line and inequalities.	They will delve into Trigonometry more deeply covering topics such as 3D Trig, Sine and Cosine rules. different geometric concepts will be covered such as circle Theorems and vectors.	They will build on their knowledge of unit conversions, standard form to study topics such as congruency and similarity. They will further delve into equations and graphs of quadratic equations and explore concepts such as turning points. They will also study velocity time graphs which links in with Physics and distance/time graphs.	
What we want our students to do	*This scheme is a direct follow on from the KS3 SoL. Consistent methods are used, to ensure students transition into KS4.*	Demonstrate excellence in these **skills**:	Understanding the difference between negative, fractional and decimal powers, knowledge of rounding being applied to bounds to solve real-life problems, solving problems involving surds in a number of forms, change the subject of an equation that can involve the subject multiple times, solve a quadratic equation by factorising, solve a quadratic equation with the quadratic formula,	Solving linear simultaneous equations, Solving quadratic simultaneous equations, to bisect lines and angles, to perform transformations on a variety of shapes, use scale factors for converting between area and volume, finding the probability of an event using tree and venn diagrams, finding the probability of a conditional event, finding the nth term of linear and quadratic sequences, to have	To turn linear equations into linear inequalities on a graph, understand parallel and perpendicular equations of lines, sketch quadratics including turning point and roots, understand cubic and reciprocal graphs, to know what the equation of a circle is, apply correlation and outliers to a graph, be able to interpret different types of graphs, perform stratified sampling, create and interpret cumulative	Find missing angles and sides in a right-angled triangle with/without a calculator, apply concepts of trigonometry to bearings, calculate angles and sides in a 3d shape, understand and read off information from a trigonometric graph, find solutions based on a trigonometric graph, find missing sides and angles in non-right-angled triangles, expand double and triple brackets, understand the	To transform a shape using 1 or more transformation, solve a problem using area and volume scale factors, find solutions to 2 or more equations graphically, find solutions to a quadratic and a linear set of equations graphically, understand perpendicular and parallel lines, understand equations of circles, apply knowledge of linear equations to equations of circles, calculate the area under a	

			complete the square on a quadratic, to prove something algebraically, to solve ratio questions that need LCM, understand the constant of proportionality, applying knowledge of compound interest to growth and decay style questions, area and circumference of circles, applying area and circumference of circles to cylinders and arcs and sectors, find the volume and surface area of prisms and basic 3d shapes, find the volume and surface area of more complex shapes like spheres and pyramids	knowledge on fibonacci and geometric sequences, solve an equation involving algebraic fractions, to perform the basic operations onto algebraic fractions	frequency graphs, calculate averages and spread from data with/without a table, relate the information in a cumulative frequency graph to box plots, construct and interpret histograms	iterative process, perform basic vector calculations, provide reasoning for straight line or parallel/perpendicular using vectors, understand each of the circle theorems, apply multiple circle theorems to 1 scenario, understand function machine notation, transform a graph by knowing and using the function notation	straight line, calculate the area under a curve.	
Key assessment questions:			Calculations with index laws Simplifying simple surds after using index laws to simplify Combinations of indices within fractions Work backwards to find missing fractional indices Calculating with fractional indices Reason why fractional indices are sometimes, always or never true Compound units and bounds Combining surds and algebraic fractions for simplification Estimating values after simplifying Expand double brackets with surds. Using surds in measures (e.g. lengths of a shape being surds, hence find the area) Work with general surds represented by algebra Incorporating simple algebraic fractions Creating links with graphs Rearranging steps Reason why some expressions can factorise and other do not Begin to factorise to	Link to graphical solutions of simultaneous equations, up to cubics Where rearrangement is required Describe transformations given no axes Split a negative enlargement into a series of congruent transformations and enlargement Working with similar shapes where actual lengths are not provided (e.g. percentages and ratio) Calculating with three or more probability branches Incorporating algebraic probabilities Forming equations from Venn diagrams Working in reverse Incorporating algebraic manipulation Use each probability diagram for one question to investigate their use Explain the limitations of each probability diagram Incorporating algebraic terms Exploring real life applications of sequences Explain why algebraic fractions have to be factorised to simplify	Exploring quadratic inequalities Working with quadratics where the coefficient of x squared is greater than 1 Understand the impact of the negative x2 coefficient on the direction of the graph Work backwards from roots to find the equation Finding the equation of the radius Describing completed journeys Correlation vs causation Error identifying and explaining Explain what assumptions are made when working with samples Error identifying and explaining Working with more complex data sets Exploring grouped frequency tables Error identifying and explaining Reason why some averages may or may not be more accurate than others Error identifying and explaining Explain what assumptions are made when calculating	Identifying when trigonometry is necessary for a problem Compound measure calculations linked to volume and use of 3D trig. Proving results Bearings in advanced trigonometry Construct diagrams from worded problems Explaining with the basic trigonometry ratios do not work Creating links with graphs Rearranging steps Sketch and investigate when there is one or no solutions to the inequality Use reasoning to discuss whether solutions are correct Links to real life contexts Work backwards from an inequality solution to work out what the original quadratic inequality could be Real life application Combining ratio and lengths of lines Incorporating other angle facts within a problem Link to standard transformations Look at if graphs are transformed what will	Describe transformations given no axes Proving results Find the length of a line segment of the tangent segment Justify whether points lie on two circle equations Error spotting and explaining Using graphs to compare and contrast contextual problems Plotting nonlinear velocity time graphs Apply knowledge to contexts and use diagrams to support argument Split a negative enlargement into a series of congruent transformations and enlargement Working with similar shapes where actual lengths are not provided (e.g. percentages and ratio) Incorporating rearranging equations	

			simplify algebraic expressions Explain how to use completing the square to find the quadratic formula Using diagrams to complete the square Incorporating graphs to form proofs Considering popular proofs and theorems Interpret an equation of proportion from its graph Clear mathematical reasoning when finding missing variables in proportional equations inc rearranging Work backwards to identify rates from multipliers Applying financial and applied problems with area and perimeter of sectors Using trigonometry/Pythagoras to identify lengths needed for calculation Removing parts of solids Reasoning why some equations may be the odd one out regarding number of steps, coefficients and solutions plus those that can and cannot be solved Constructing equations with quadratics or simultaneous equations Incorporating graphical solutions	Expand, simplify and factorise to simplify algebraic fractions Proving results	averages from histograms Mean from histograms	happen to the turning points (without diagrams) Reason with reflection transformations why some graphs look the same and some do not once transformed		
Disciplinary Rigour		What makes your subject different to other subjects? What are the expectations for students in your subject area in the KS4 National Curriculum if applicable / KS4 qualification specification?	Applying the algebra to real life contexts Find the best/worst case scenario using bounds	Use a compass to find bisections and areas real life probabilities where it is hinged on a condition that something else has already occurred	Finding the solution to an algebraic problem by drawing it out on graph paper Assumptions in modelling Why something is an estimate or not	understanding of the standard form context calculators often default to Knowing a sketch can be as useful as an accurate diagram	How 2 or more transformations can lead to a single transformation another way Finding the solution to an algebraic problem by drawing it out on graph paper	