Thomas More Catholic Academy
FAITH | EXCELLENCE | RESPECT

Maths KS3 Delta Curriculum Sequence – Key Stage 3

	KS2 National Curriculum prior learning	By the end of the term, students can:	Year 7 Term 1	Year 7 Term 2	Year 7 Term 3	Year 8 Term 1	Year 8 Term 2	Year 8 Term 3	Year 9 Term 1	Year 9 Term 2	Year 9 Term 3
What we want our students to know and remember	*Skills that have taught at KS2 such as addition, subtraction, multiplication and division are further developed at KS3 and additional skills such as simplification and expanding are added to ensure students are making effective progress. A scheme of learning has been devised that is personalising learning for each individual student.*	Define the key tier 3 **vocabulary**:	Index, Indices, Square, Cube, Root, Multiple, Factor, Prime, Highest Common Factor, Lowest Common Multiple, Decomposition, product, positive, negative, Simplify, Collect, Express, Factorise, Expand, Multiply, Divide, Indices, Powers, BIDMAS, Expression, Equation, Formula, Substitute, Integer, Place Value, Share, Divide	Equation, Algebra, Inverse, Balance, Operation, Two-Step, Brackets, Unknown, Solve , Probability, Fraction, Likely, Unlikely, Impossible, Evens, Certain, Mutually Exclusive, Denominator, Outcome, Probability, List, Sample, Efficiency, Fraction, Numerator, Relative, Experiment, Frequency, Fraction, Decimal, Estimate, Predict, Bias, Ratio, Proportion, Unitary, Recipe, Units, Conversions, Metric, Imperial, Cube, Cuboid, Pythagoras. Polygons, Interior, Exterior, Equilateral, Parallel, Scalene, Isosceles, Inequality, Factor, Fraction, Improper, Mixed Number, Percentage, Decimal, Compare, Equivalent,	Pattern, Picture, Rule, Count, Pattern, Sequence, Rule, nth Term, Substitute, Difference, Relationship, Term, Position, Coordinate, Axis, Straight Line, Middle, Half, Divide, Sketch, Plot, Mean, Median, Mode, Range, Compare, Parallel, Transform, Pie Chart, Angle, Proportion, Compare, Size, Table, Congruent, Coordinate, Line, Parallel, Angle, Centre, Vector	Prime Factor Decomposition, LCM, HCF, Index Laws, Negatives, Standard Form, Base, Rounding, Decimal, Significant, Estimate, Complex, Approximate, Co-efficient, Variable, Number Line, Solution Set, Inequality, Subject, Inverse, Direction, Measure, scale, Ratio, Proportion, Enlargement, Surface Area, Similarity, Congruence, Scale, Plan, Elevation, Sketch, Volume, 3D Shapes, Cylinders, Cube, Cuboid, Pythagoras, Hypotenuse, Trigonometry.	Recur, Decimal, Terminate, Fraction, Equivalent, Notation, Convert, Divide, Percentage, Calculate, Amount, Multiplier, Reverse, Original, Inverse, Change, Increase, Decrease, Repeat, Probability, Two-way Tables, Outcomes, Tree, Branch, Conditional, Dependent, AND/OR Rule, Combine, Angles, Polygons, Interior, Exterior, Scale, Bearings, Rotate, Transformations, Translations, Reflections, Rotations, Enlargement, Clockwise, Ray, Scale Factor, Perimeter, Area, Similarity, Congruence.	Plot, Co-ordinate, Gradient, Intercept, Parallel, Perpendicular, Linear, Quadratic, Cubic, Curve, Reciprocal, Sequence, Arithmetic, Geometric, Fibonacci, Speed, Distance, Time, Interpret, Population, Sample, Mean, Mode, Median, Range, Estimated, Averages, Grouped, Ungrouped, Class, Scatter, Correlation, Anomaly.	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, Cumulative, Frequency, Median, Box Plot, Scatter, Quartiles, Interquartile, Histograms, Frequency Density, Ratio, Share, Proportion, Direct, Inverse, Relationship, Compound, Growth, Decay, Interest.	Minimum, Maximum, Parabola, Curve, Quadratic, Solution, Turning Point, Cubic, Reciprocal, Intercept, Exponential, Probability, Outcome, Certain, Impossible, Even, Two-way Table, Tree Diagrams, Branch, Dependent, Conditional, Independent, Compound, Measure, Speed, Density, Pressure, Accuracy, Bounds, Estimation, Error, Interval, Rate of Change, Gradient, Intercept, Equation, Intersection, Simultaneous, Solve, Substitution.	Pythagoras, Hypotenuse, Adjacent, Opposite, Trigonometry, Ratios, Sine, Cosine, Tangent, Label, Exact, Surds, Rationalise, Function, Arc, Sector, Area, Circumference, Circle, Volume, Cones, Spheres, Pyramids, Congruency, Similar, Vectors, Scalar, Transformations, Reflection, Rotation, Enlargements, Translation, Loci, Constructions, Bisectors, Perpendicular, Distance.

		Recall the **knowledge**:	In Yr 7 they will begin their learning journey by consolidating and extending concepts from KS2 which have been demonstrated to have misconceptions, such as negative numbers. This will then lead into key algebraic concepts - which build on their arithmetic skills from KS2 which are addition leading to collecting like terms, multiplication leading to expanding brackets and multiplying expressions. They will then apply these skills to shape, angles and fractions.	They will now begin to insert their algebraic/arithmetic skills into more practical questions such as shapes, ratio and probability.	They will now begin to apply sequences, transformations and handling data	In Yr. 8 they will start to work on other mathematical topics such as LCM, HCF, Primes which will build on KS2 knowledge of venns and number work. They will also be introduced to topics such as standard form and volumes of shapes which they have completed to a basic level at KS2.	They will build on their KS2/Y7 of FDP and study more difficult topics such as recurring decimals, percentage multiplier and reverse percentages. This will include real life examples. Understanding of fractions and percentages will then be applied to probability. They will also be introduced to transformations and build on their knowledge of shapes.	Building on their Y7 learning on equations of lines they will delve further into equations of lines, their graphs and link in with other graphs such as cubic, quadratic and reciprocal graphs. Averages developed in Y8, to ensure students can find averages from different representations.	They will learn in depth about FDP and be introduced to further standard form and surds including rationalising. Indices will be delved into further with negative and fractional indices covered. Factorising of quadratics will be delved into further including co-efficient of x squared. Statistics will be covered in depth which will build on what they have learnt in Term 3 Y8.	Quadratic graphs and their terminology will be explored and complete the square can be touched on. Probability will be taught further with more complex conditional probability concept taught to students. Bounds and Estimation will be taught building upon their knowledge of rounding which has been covered in previous years. Knowledge of equations will be developed to include simultaneous equations.	They will have covered basic Pythagoras in Y8 which will be extended and then lead to the study of Trigonometry. This will build on their skills of substitution and basic algebraic manipulation learnt in Y7/8. Students will learn how topics can be combined. They will study Exact Trig values and link into Surds. They will study transformations in further detail including combinations and loci/construction will be studied to a basic level.
What we want our students to do	*Students will be able to practically apply their arithmetic skills to a variety of mathematical topics such as LCM, HCF, Surds, FDP, Algebra, Shape, Data, Statistics, Probability, Graphs and Angles.*	Demonstrate excellence in these **skills**:	Algebraic simplification, expand brackets, factorise expressions, form and solve equations, calculate with fractions, fdp conversions and percentage calculations.	Solve equations, substitute into and rearrange formula, calculating probabilities, using ratios and proportion.	Find equations of lines, work with angles, understand congruency and similarity, find averages.	Prime Factors, LCM and HCF, work with indices, estimate and use basic bounds, be able to solve inequalities, interpret inequalities and draw them. Be able to use scales and ratios especially for enlargement and similar shape questions. Sketch and understand plans and shapes.	Convert between all FDP, use percentages in calculations including reverse percentages and multipliers. Be able to draw and interpret probability diagrams including tables, tree diagrams and sample spaces.	Be able to calculate equation of lines, understand different types of graphs and their properties, find rule for sequences and data analysis with scatters and averages.	Be able to work with surds and standard form, convert recurring decimals to fractions, evaluate fractional and negative indices, application of all index laws, interpret different complex data graphs such as cumulative frequency and histograms.	Understand properties of quadratic graphs such ass turning point, understand probability terminology such as conditional and be able to apply to questions, be able to calculate bounds and equations of lines.	Be able to find lengths and angles of any right angle triangle whether using Pythagoras or trigonometry. Find area and length of sectors of a circle in rounded values or exact values. Construct and interpret bisectors of shapes.

Key assessment questions:			*Simplifying involving BIDMAS *Reason when expressions cannot be simplified *Find missing signs or coefficients to make mathematical statements equivalent *Link collecting like terms to perimeter of shapes *Substitution with decimals/fractions *Substitution with brackets *Order of operations reasoning *Expanding where there are more than two terms inside the bracket *Reasoning whether expressions are fully factorised *Work backwards to find what was expanded *Use visual representations to expand brackets" *Explain the links between expanding and factorising *Reason with factorising *Combining expressions to form equations *Exploring possible solutions and methods" *Construct an accurate triangle given geometric notation *Reason clearly using geometric notation *Artful maths for circle work	*error spotting and explaining *Exploring various representations and methods for equations *Applying equations to real-world scenarios *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 *Exploring real world probabilities *Explaining the effects of bias *Use equivalent fractions to work out which events are more likely to occur *Reason clearly when unequal chance of outcomes *Exploring real world probabilities *Working with more than two events *Anticipating outcomes *Linking relative frequency with sampling *Combining multiple events *Reason which method (bar or fraction of amount) is more efficient or effective" "*Use bar modelling, fractions and written methods to share into ratio *Use bar modelling, fractions and written methods	"*error spotting and explaining *Practical representations of picture sequences *Combined sequences within one picture (e.g. different coloured sticks)" *Explaining why 2n looks like the two times tables *Demonstrate what values lie in two sequences using nth terms *Generating simple quadratic terms" *Area/perimeter calculations on a coordinate axis *Exploring diagonal lines *Label equations given one coordinate *Reason clearly about other student solutions" *Describing transformations "*Considering likelihoods for conditional probability *Create a description based on a two-way table *Evaluate the importance and limitations of averages in statistics *Reverse average problems *Calculate averages from graphs such as bar charts" "*Creating a table of values from a dual/compound bar chart *Misleading bar charts "*Error spotting	"*HCF/LCM of three numbers *Work from a Venn diagram to identify the numbers that created it *"error spotting and explaining *Explore rewriting division problems using negative indices *Explain the rules of indices clearly *Complete missing indices to create equivalent expressions" *Explain the limitations of standard form on calculators *Reason odd one out for numbers in standard form" *Using estimation to check complex working, and argue whether a result is correct/incorrect *Reason with over and under estimates *Check calculator errors using estimations" *Reason when expressions cannot be simplified *Find missing signs or coefficients to make mathematical statements equivalent *Link collecting like terms to perimeter of shapes *Explain the links between expanding and factorising *Reason with factorising	"*error spotting and explaining *Using calculations with fractions/decimals within context problems *Explore 0.9… as a fraction" "*Using percentages in context, including with money *Solving general rules where percentage changes have occurred, but no values have been provided" *Exploring sample spaces/Venn diagrams for more than two events *Interpreting more challenging probabilities from diagrams *Working backwards" *Exploring more than two events *Probability experiments *Interpreting probability within contexts" *Exploring more than two events *Reason with parallel line angles *Given descriptions of angles on parallel lines (no diagrams) *Reason with parallel line angles to prove angles in a triangle add to 180." *Calculating speeds from a scale drawing" *Identifying mirror lines that are not parallel to the axis *Combining	"*Find missing values for tables of values *Explain why coordinates line on a line equation *Error spot in table of values *Function machines and real life graphs *Given a gradient construct a line segment *Given a gradient work out the horizontal and vertical lengths" "*error spotting and explaining *Why does the graph cut through the x-axis in certain places?" *Using algebra with a Fibonacci sequence *Demonstrate what values lie in two sequences using nth terms" *Combining price, value and scales to interpret speed, distance and time *Converting units of speed" *Discuss the limitations of a distance time graph "*Discuss how to minimise bias *How to represent population proportionally" *Making judgements on populations during comparisons" *Interpreting misjudgements and misleading statistics"	"*Prove a result (e.g. Only two possible numbers with single digits can give the result 0.3333) *error spotting and explaining *Explain why errors can be made *Argue about 0.9999…. 1 *Calculate with recurring decimals" *Exploring reasons why standard form is used *Interpreting standard form within scientific situations *Substitution with standard form *Calculating with standard form in geometric problems" "*Estimating values of surds *Exploring brackets and surds *Using simple surds in context and geometric problems *Basic Rationalising *Work with general surds represented by algebra" *Combining multiple index laws *Explain the rules of indices clearly *Complete missing indices to create equivalent expressions *Form a connection between the brackets and the expanded results	"*error spotting and explaining *Intersections of graphs and solutions *Use trial and improvement to check approximations to roots *Reason why the negative coefficient of x2 turns the graph upside down *Use trial and improvement to check approximations to roots" *Using a three part Venn diagram *Working backwards from a completed Venn diagram" *Identifying three event probabilities *Explaining methods for checking" *Making judgements on context problems using speed, density and pressure" *Use combinations of bounds within a variety of real world calculations" *Working in reverse" *Simultaneous equations within contexts, e.g. pictures including rectangle lengths *Reason whether to add or subtract simultaneous equations *Explain why some simultaneous equations have no solution" *Exploring	"*error spotting and explaining *Constructing scale drawings after identifying lengths/angles *Working in reverse with a known diagonal *Understanding how much information is required to use the trigonometric ratios" *Re-arranging fractions with exact trig values *Combining other 2D shapes with sectors and circles *Working in reverse *Use of parallel line properties for congruency proofs *Calculating magnitude using Pythagoras *Recognising congruency *Describe transformations given no axes "*Error spotting and explain errors *Best value problems and similar volumes/areas *Using volume and area scale factors as a percentage increase/decrease *Using volume and area scale factor in context *Incorporating scale drawings and bearings

			*Comparing solids Reason whether angle facts are sometimes, always or never true Explaining how to tell when a fraction is fully simplified where prime numbers are involved. Work with decimals within a fraction (e.g. the numerator) *Work with writing one number as a fraction of another within a larger problem error spotting and explaining "*Using BIDMAS within fraction calculations *Using fractions in combination with integers in larger problems. *Fluent with the language difference, product and sum" "*Error spotting and reasoning *Reason mathematically when comparing percentages of amounts *Reasoning overall percentage change when two percentage calculations have been made - misconception 10% increase followed by 10% decrease ends up with the original value *Explain the benefits of multipliers	to share into ratio *Converting units within area *Area/perimeter of fractions of circles *Reason why leaving solutions in terms of Pi or not is best for different scenarios *Error spotting *Understanding the order of operations when calculating the area" *Converting units within area and perimeter *Compound shapes with more challenging combinations" *Volume/Surface area of compound cubes/cuboids *Use clear reasoning to comment on other student's solutions" *Identifying simple Pythagoras' in context"	and explain *Misleading pie charts"	*Exploring simplification of algebraic fractions *Evaluate the need decimal coefficients in algebra to be converted to fractions" *Forming an inequality" *Solving an equation as part of a larger problem" *Substitute to prove re-arrangement is correct" *Substituting and re-arrangement in complex formulae. * Derive formulae and substitute values as required. *Order of operations reasoning" *Forming simultaneous equations *Using picture representations to explore simultaneous equations *Differing positive coefficients" "*Interpreting distance and speed from a scale diagram "*Working with combined ratio *Working out lengths in shapes using ratio *Use bar modelling, fractions and written methods to share into ratio **Identify values that are in direct proportions *Find fractional multipliers between values in	transformations *Describe transformations given no axes" *Exploring changes in area" "*Explore area changes in similar shapes *Similar shapes where two shapes part of a bigger diagram *Reason using similar shape lengths and angles to find missing information in triangles *Identifying and using similar properties to find similar measures without use of a diagram"		*Expanding two binomials with no constant values e.g (a + b)(a - c) *Use identities and expanding brackets to find missing constants *Apply to geometric areas" *Comment on other factorised solutions using mathematical reasoning *Use factorising in basic identities to find missing constants" *Forming equations within contexts, including geometric and missing numbers" *Form links with graphs and potential regions" *Forming simple simultaneous equations" *Multiple factorising steps *Use of Pi as a variable" *Exploring where double brackets are used" *Misleading graphs *Exploring proportions from a cumulative frequency curve" *Interpreting misjudgements and misleading statistics *Calculating frequencies partially through bars *Error identifying and explaining *Explain what assumptions are made when calculating averages from histograms	quadratic inequalities" *Exploring real life applications of sequences"	

						direct proportion" "*Explore area changes in similar shapes *Using plans and elevations within contexts, such as building plans *Using plans and elevations to calculate areas and perimeters within context (e.g. painting a wall)" *Working in reverse to identify lengths of prisms" *Contextual problems *Working backwards *Context problems (Pythagoras) *Exact calculations (writing as simple roots) *Understanding how much information is required to use the trigonometric ratios"			*Mean from histograms "*Working with combined ratio *Working out lengths in shapes using ratio *Create a shopping list using items for best value *Plan a charity event with best value and recipes" *Exploring inverse graphs *Combine fractions, decimals, percentages and ratio		
Disciplinary Rigour		What makes your subject different to other subjects? What are the expectations for students in your subject area in the KS3 National Curriculum?	Simplify expressions Factorise expressions Rearrange formulae Substitute into formula Form and solve equations	Apply to real world settings Calculate probabilities and convert between them	Analyse data Collect data Interpret results Analyse graphs	Rearrange, factorise and solve equations Devise questions Justify reasoning Construct ideas/arguments	Collect and analyse data Interpret percentage problems Real world numeracy	Identify patterns in sequences Draw and analyse graphs Devise questions	Draw conclusions based on sound logical reasoning Devise questions Apply and structure mathematical reasoning	Devise questions Approximate answers and compare values Substitute and solve equations	Collect and analyse data Interpret results Analyse and construct graphs Compare data