Maths Department Programme of Study KS3 (Years 7-9)

Year 7 – Mastery Curriculum		
Autumn Term	***Spring Term***	***Summer Term***
Core Skills Test **<u>Algebraic thinking:</u>** **Sequences** ● Describing and continuing sequences (diagrammatically and numerically) ● Representing sequences graphically ● Continuing sequences and explaining term to term rules ● Finding missing numbers in sequences ● *(End of Unit Assessment)* **Understand and use algebraic notation** ● Using a single function machine (input to output, output to input) ● Using function machines with more than one function ● Using function machines with algebraic expressions (input to output, and output to input) ● *(End of Unit Assessment)* **Equality & equivalence** ● Understanding inverse operations ● Solving linear equations	**<u>Applications of Number:</u>** **Solving problems with addition and subtraction** ● Addition and subtraction (with integers and decimals) ● Use addition and subtraction to solve real life issues (including bar charts, frequency tables, and pie charts) ● *(End of Unit Assessment)* **Solving problems with multiplication and division** ● Understanding factors, and multiples ● Multiplying and dividing (with powers of 10, integers, and decimals) ● Converting between metric units ● Understanding and using BIDMAS ● Using multiplication and division to solve real life problems (including areas of shapes, and finding the mean from a set of data) ● *(End of Unit Assessment)* **Fractions and percentages of amounts** ● Finding fractions of an amount ● Using fractions to find fractions ● Finding percentages of amounts (with and without calculators)	**<u>Lines and Angles:</u>** **Construction, measuring & using geometric notation** ● Understanding labelling for geometry ● Drawing and measuring lines and angles ● Identifying types of angles, and parallel and perpendicular lines ● Identifying types of triangles, and other polygons ● Constructing triangles using Congruent triangles rules (SSS, SAS, ASA), and using this to also construct polygons ● Interpreting and drawing pie charts ● *(End of Unit Assessment)* **Developing geometric reasoning** ● Understanding that angles round a point equal 360, angles on a straight line and in a triangle equal 180, and vertically opposite angles are the same ● Understanding how to find the sum of interior angles within a polygon ● Understanding how to find angles on parallel lines

● Simplifying algebra by collecting like terms ● *(End of Unit Assessment)* **<u>Place Value and Proportion:</u>** **Place value & ordering integers & decimals** ● Recognising place value of numbers (including decimals) ● Being able to convert between digits and words ● Rounding numbers (to powers of ten, whole numbers, decimal places, and significant figures) ● Ordering and comparing numbers ● Finding range and median of a set of numbers ● Writing numbers as powers of 10, or in standard form (including negative powers of 10 and decimals in standard form) ● *(End of Unit Assessment)* **Fraction, decimal & percentage equivalence** ● Converting between fractions and decimals on number lines (involving decimal place values) ● Understand percentages ● Working with equivalent fractions (including mixed numbers) ● *(End of Unit Assessment)* **QMA 1**	● Solving problems using fractions and percentages ● *(End of Unit Assessment)* **<u>Directed Number</u>** **Operations and equations with directed number** ● Ordering directed numbers and understanding number lines ● Using the four operations with directed numbers ● Working with directed numbers in algebra ● Understanding powers and roots ● *(End of Unit Assessment)* **<u>Fractional thinking</u>** **Addition and subtraction of fractions** ● Converting between improper fractions and mixed numbers ● Adding and subtracting fractions (with common denominators, and different denominators) ● Using equivalent fractions ● Adding and subtracting mixed numbers ● Adding and subtracting with decimals and fractions together ● Using fractions in algebra ● *(End of Unit Assessments)* **QMA 2**	● Investigating known facts to show simple proofs ● *(End of Unit Assessment)* **<u>Reasoning with number</u>** **<u>Measures:</u>** **Developing number sense** ● Using mental strategies to complete the four operations with integers, decimals, and fractions ● Using factors to simplify difficult calculations ● Using estimation to check the accuracy of answers ● Using number and algebra facts to derive other information ● Being able to identify when to use a mental, formal written, or calculator strategy to work out calculations ● *(End of Unit Assessment)* **QMA 3** **Sets & probability** ● Identify and represent sets ● Draw and interpret Venn diagrams ● Understanding intersection, union, and complement of a set ● Using probability vocabulary ● Using sample space diagrams for single even probability ● Calculating probability ● Using the probability scale (including probability and chance) ● Understanding that mutually exclusive events add up to 1 ● *(End of Unit Assessment)* **Prime numbers and proof** ● Finding multiples and factors ● Recognising prime numbers

		● Recognising triangle numbers ● Writing a number as a product of its prime factors ● Using prime factors to find HCF and LCM ● *(End of Unit Assessment)*

Year 8 – Mastery Curriculum		
Autumn Term	***Spring Term***	***Summer Term***
<u>Proportional reasoning:</u> **Ratio and Scale** ● Understanding ratio (meaning, representation, and notation) ● Simplifying ratios (and express in the form 1:n) ● Solving problems involving ratio (in the forms 1:n or m:n) ● Sharing into a ratio ● Compare ratios (and their related fractions) ● Understanding where else ratio appears (e.g. Pi, and gradient of a straight line) ● *(End of Unit Assessment)* **Multiplicative change** ● Solving problems using direct proportion ● Interpreting conversion graphs (and use to convert between currencies) ● Recognise and interpret direct proportion graphs ● Recognising and working with similar shapes (scale factors = ratios) ● Drawing and interpreting scale drawings(including maps) ● *(End of Unit Assessment)* **Multiplying and dividing fractions** ● Multiplying and dividing fractions (including fractions, integers, and mixed numbers) ● Understand and use reciprocals ● Multiplying and dividing algebraic fractions	**<u>Algebraic techniques:</u>** **Brackets, equations & inequalities** ● Forming algebraic expressions ● Using directed number with algebra ● Expanding and factorising with single brackets ● Expanding multiple single brackets and simplifying ● Expanding double brackets ● Forming and Solving equations (including brackets) ● Understanding, forming and solving simple inequalities ● Forming, and solving equations and inequalities with unknowns on both sides ● Recognise the difference between expressions, equations, formulae, and identities ● *(End of Unit Assessment)* **Sequences** ● Generating sequences from rules (worded, simple algebraic, and complex algebraic) ● Finding the nth term rule for a linear sequence ● *(End of Unit Assessment)* **Indices** ● Adding and subtracting with indices ● Using index laws (multiplication, division, and brackets) ● Exploring powers of powers ● *(End of Unit Assessment)* **<u>Developing Number:</u>** **Fractions and percentages** ● Converting between decimals, fractions, and percentages (including when above 100%)	**<u>Developing Geometry:</u>** **Angles in parallel lines & polygons** ● Understanding and using angles rules (angles in a triangle, on a straight line, around a point, vertically opposite angles) ● Identifying and calculating with angles on parallel lines ● Solving complex problems involving angles on parallel lines ● Constructing triangles and special quadrilaterals ● Investigating the properties of special quadrilaterals (including identifying and calculating sides, angles and diagonals) ● Understanding and calculating the sum of interior and exterior angles of polygons (including individual interior and exterior angles in a regular polygon) ● Construct bisectors (angle bisectors, and perpendicular bisectors of lines) ● *(End of Unit Assessment)* **Area of trapezia & circles** ● Calculating the area of triangles, rectangles, parallelograms, and trapezia ● Recognising parts of a circles ● Investigating the area and circumference of a circle ● Calculating the perimeter and area of compound shapes (including shapes with parts of circles) ● *(End of Unit Assessment)*

- *(End of Unit Assessment)*

<u>Representations:</u>

Working in the cartesian plane

- Recognising coordinates in all quadrants
- Identifying and drawing vertical and horizontal lines
- Identifying and drawing the lines y=x, and y=kx
- Recognising and plotting lines in the form y=mx+c
- Exploring graphs with negative gradients
- Representing linear sequences graphically
- Exploring non-linear graphs
- Finding the midpoint of a line segment
- *(End of Unit Assessment)*

Representing data

- Drawing and interpreting scatter graphs
- Understanding and describing correlation
- Drawing lines of best fit
- Identifying non-linear relationships and different types of data
- Interpreting ungrouped and grouped frequency tables, and representing the data
- Representing data in two-way tables
- *(End of Unit Assessment)*

Tables and Probability

- Constructing sample space diagrams for 1 or more events, and use these to find probabilities
- Finding probabilities from two-way tables, and Venn diagrams
- *(End of Unit Assessment)*

- Calculating FDP of amounts (with and without a calculator)
- Calculate percentage increase and decrease using a multiplier
- Expressing numbers as percentages or fractions of another (with and without a calculator)
- Calculating percentage change
- Calculating reverse percentages
- Solving percentage problems
- *(End of Unit Assessment)*

Standard Index Form

- Investigating powers of 10 (positive and negative)
- Converting between ordinary numbers and standard form (including positive and negative powers of 10)
- Comparing and ordering numbers in standard form
- Complete the four operations using numbers in standard form
- Understanding and using negative and fractional indices
- *(End of Unit Assessment)*

Number Sense

- Rounding numbers (to powers of 10, integers, decimal places, and significant figures)
- Estimating calculations
- Understanding and using error interval notation
- Calculating using BIDMAS
- Calculating with money
- Converting metric measures (with length, weight, and capacity)
- Converting metric units of area and volume
- Solving problems involving time and calendars
- *(End of Unit Assessment)*

QMA 2

Line symmetry & reflection

- Recognising line symmetry
- Reflecting shapes in lines (horizontal, vertical, and diagonal lines)
- *(End of Unit Assessment)*

<u>Reasoning with data:</u>

The data handling cycle

- Setting up statistical enquiries (including designing and criticising questionnaires)
- Drawing and interpreting charts (pictograms, bar charts, vertical line charts, multiple bar charts, pie charts, and line graphs)
- Choosing the most appropriate diagram for given data
- Representing and interpreting grouped data
- Finding and interpreting the range of set of data
- Comparing distributions
- Recognising and criticising misleading graphs
- *(End of Unit Assessment)*

QMA 3

Measures of location

- Understanding and calculating averages (mean, median, mode, and range)
- Choosing the most appropriate average
- Calculating the mean of ungrouped data
- Estimating the mean of grouped data
- Identifying outliers
- Comparing distributions using averages
- *(End of Unit Assessment)*

QMA 1		

Year 9 – Mastery Curriculum		
Autumn Term	***Spring Term***	***Summer Term***
<u>Reasoning with algebra:</u> **Straight line graphs** ● Lines parallel to the axes, $y = x$ and $y = -x$ ● Using tables of values ● Compare gradients ● Compare intercepts ● Understand and use $y = mx + c$ ● Write an equation in the form $\boldsymbol{y = mx + c}$ ● Find the equation of a line from a graph ● Interpret gradient and intercepts of real-life graphs ● Model real-life graphs involving inverse proportion ● Explore perpendicular lines ● *(End of Unit assessment)* **Forming and solving equations** ● Solve one- and two-step equations and inequalities ● Solve one- and two-step equations and inequalities with brackets ● Inequalities with negative numbers ● Solve equations with unknowns on both sides ● Solve inequalities with unknowns on both sides ● Solving equations and inequalities in context ● Substituting into formulae and equations ● Rearrange formulae (one-step) ● Rearrange formulae (two-step)	**<u>Reasoning with Number:</u>** **Numbers** ● Integers, real and rational numbers ● Understand and use surds ● Work with directed number ● Solve problems with integers ● Solve problems with decimals ● HCF and LCM ● Adding and subtracting fractions ● Multiplying and dividing fractions ● Solving problems with fractions ● Numbers in standard form ● *(End of Unit assessment)* **Using Percentages** ● Use the equivalence of fractions, decimals and percentages ● Calculate percentage increase and decrease ● Express a change as a percentage ● Solve 'reverse' percentage problems ● Recognise and solve percentage problems (non-calculator) ● Recognise and solve percentage problems (calculator) ● Solve problems with repeated percentage change ● *(End of Unit assessment)* **Maths and Money** ● Solve problems with bills and bank statements ● Calculate simple interest ● Calculate compound interest ● Solve problems with Value Added Tax	**<u>Reasoning with Proportion:</u>** **Enlargement and Similarity** ● Recognise enlargement and similarity ● Enlarge a shape by a positive integer scale factor ● Enlarge a shape by a positive integer scale factor from a point ● Enlarge a shape by a positive fractional scale factor ● Enlarge a shape by a negative scale factor ● Work out missing sides and angles in a pair of given similar shapes ● Solve problems with similar triangles ● Explore ratios in right-angled triangles ● *(End of Unit assessment)* **Ratio and Proportion** ● Solve problems with direct proportion ● Direct proportion and conversion graphs ● Solve problems with inverse proportion ● Graphs of inverse relationships ● Solve ratio problems given the whole or a part ● Solve 'best buy' problems ● Solve problems ratio and algebra ● *(End of Unit assessment)* **Rates** ● Solve speed, distance and time problems without a calculator

- Rearrange complex formulae including brackets and squares
- *(End of Unit assessment)*

Testing conjectures

- Factors, Multiples and Primes
- True or False?
- Always, Sometimes, Never true
- Show that
- Conjectures about number
- Expand a pair of binomials
- Conjectures with algebra
- Explore the 100 grid
- Expand three binomials
- *(End of Unit assessment)*

<u>Constructing in 2 & 3D:</u>

Three-dimensional shapes

- Know names of 2-D and 3-D shapes
- Recognise prisms
- Accurate nets of cuboids and other 3-D shapes
- Sketch and recognise nets of cuboids and other 3-D shapes
- Plans and elevations
- Find area of 2-D shapes
- Surface area of cubes and cuboids
- Surface area of triangular prisms
- Surface area of a cylinder
- Volume of cubes and cuboids
- Volume of other 3-D shapes – prisms and cylinders
- Explore volumes of cones, pyramids and spheres
- *(End of Unit assessment)*

Constructions & congruency

- Draw and measure angles
- Calculate wages and taxes
- Solve problems with exchange rates
- Solve unit pricing problems
- *(End of Unit assessment)*

<u>Reasoning with Geometry:</u>

Deduction

- Angles in parallel lines
- Solving angles problems (using chains of reasoning)
- Angles problems with algebra
- Conjectures with angles
- Conjectures with shapes
- Link constructions and geometrical reasoning
- *(End of Unit assessment)*

Rotation and Translation

- Identify the order of rotational symmetry of a shape
- Compare and contrast rotational symmetry with line symmetry
- Rotate a shape about a point on a shape
- Rotate a shape about a point not on a shape
- Translate points and shapes by a given vector
- Compare rotation and reflection of shapes
- Find the result of a series of transformations
- *(End of Unit assessment)*

Pythagoras' Theorem

- Squares and square roots
- Identify the hypotenuse of a right-angled triangle
- Determine whether a triangle is right-angled
- Calculate the hypotenuse of a right-angled triangle
- Calculate missing sides in right-angled triangles
- Solve speed, distance and time problems with a calculator
- Use distance/time graphs
- Solve problems with density, mass and volume
- Solve flow problems and their graphs
- Rates of change and their units
- Convert compound units
- *(End of Unit assessment)*

<u>Represtations</u>

Probability

- Single event probability
- Relative frequency – include convergence
- Expected outcomes
- Independent events
- Use tree diagrams
- Use tree diagrams to solve 'without replacement' problems
- Use diagrams to work out probabilities
- *(End of Unit assessment)*

<u>Algebraic representation</u>

- Draw and interpret quadratic graphs
- Interpret graphs, including reciprocal and piece-wise
- Investigate graphs of simultaneous equations
- Represent inequalities
- *(End of Unit assessment)*

SUMMER QMA 3

● Construct and interpret scale drawings ● Locus of distance from a point ● Locus of distance from a straight line/shape ● Locus equidistant from two points ● Construct a perpendicular bisector ● Construct a perpendicular from a point ● Construct a perpendicular to a point ● Locus of distance from two lines ● Construct an angle bisector ● Construct triangles from given information ● Identify congruent figures ● Explore congruent triangles ● Identify congruent triangles ● *(End of Unit assessment)* **AUTUMN QMA 1**	● Use Pythagoras theorem on coordinate axes ● Explore proofs of Pythagoras' theorem ● Use Pythagoras' theorem in 3-D shapes ● *(End of Unit assessment)* **SPRING QMA 2**	