KS3 Curriculum Map – Mathematics: Year 7 & 8

Topic	Knowledge *Substantive knowledge*: This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Skills *Disciplinary knowledge*: This is the action taken within a particular topic in order to gain substantive knowledge.	Assessment Opportunities What assessments will be used to measure student progress?
Factors, multiples, squares and cubes	• Factors • Multiples • Prime • Triangular • Common factors • Common multiples	• Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorization, including product notation and the unique factorization property. • Use integer power and associated real roots (square, cube and higher), recognize powers of 2, 3, 4, 5/ • Make and test conjectures about patterns and relationships, look for proof or counterexamples. • Begin to reason deductively in number and algebra.	• Teacher diagnostic questioning • Teacher assessment during lesson • Autumn Assessment • End of year assessments
Place value, ordering decimals and integers	• Number line • Rounding • One billion • Decimals • Significant figures • Powers of 10	• Consolidate their understanding of the number system and place value to include decimals. • Understand and use place value for decimals, measures and integers of any size. • Order positive and negative integers and decimals. Use the number line as a model for ordering of the real numbers; use the symbols =, ≠, ≤, ≥. • Round numbers to an appropriate degree of accuracy • Describe, interpret and compare observed distributions of a single variable through: the median and the range. • Interpret and compare numbers in standard form.	• Homework Task 1 • Teacher assessment during lesson • Autumn Assessment • End of year assessments

Arithmetic procedures with integers and decimals	• Order of operations (BIDMAS) • Directed number • 4 operations with decimals,	• Apply the correct order of operations (BIDMAS) and understand that the division and multiplication are the same level and are completed left to right, and analogously for addition and subtraction • Addition, subtraction, multiplication and division of decimals and integers	• Teacher assessment during lesson • Autumn Assessment • End of year assessments
Expressions and equations	• Algebra vocabulary • Collect like terms • Substitution • Solve linear equations • Multiply a single term over a bracket • Factorise a single term from an expression	• Use letter symbols to represent unknown numbers or variables • Know the meanings of term, expression, equation and formula • Know and use the order of operations and understand that algebra follow the same conventions and order as arithmetic • Simplify linear algebraic expressions by collect like terms • Substitute numbers into algebraic expressions and formulae to solve problems • Construct and solve simple linear equations with integer coefficients • Multiply a single term over a bracket • Factorise algebraic expressions by finding a single common term	• Homework Task 2 • Teacher assessment during lesson • Autumn Assessment • End of year assessments

Plotting coordinates	• Four quadrants • Parallel to axes • Y=x • Y=x+a	• Plot coordinates and working with different scales on axes • Plot graphs of linear functions where *y* is given explicitly in terms of *x* • Plot graphs parallel to axes and lines such as *x=c, y=c, y=x, y=-x*	• Teacher assessment during lesson • Spring Assessment • End of year assessments
Perimeter and Area	• Properties of quadrilaterals • 3D shape vocabulary • Plans and elevations • Nets • Units of measurement • Area of 2D shapes • Volume and surface area of cuboids • Circle vocabulary • Area and circumference of circles and part-circles	• Derive and apply properties of special types of quadrilaterals • Know the meanings of faces, surfaces, edges and vertices and identify them in 3D shapes • Recognise and draw 3D shapes from their plans and elevations • Create plans and elevations for given 3D shapes • Construct nets of 3D shapes • Choose and use units of measurement to measure, estimate, calculate and solve problems in a range of contexts • Know rough metric equivalents of imperial measures in everyday use and use given conversions to answer problems • Know and use the formulae for the area of a triangle, • parallelogram and trapezium • Find the volume and surface area of cuboids or 3D shapes formed of cuboids • Construct equations to solve cuboid volume and surface area problems • Understand circle vocabulary such as radius, diameter, circumference, arc, sector, chord, and segment • Know and use the formulae for the circumference and area • of a circle, and use these to answer problems relating to shapes that contain semicircles and quarter-circles.	• Homework Task 3 • Teacher assessment during lesson • Spring Assessment • End of year assessments

Arithmetic procedures including fractions Ratio and scale	• Fractional and decimal number lines • Fractions • Equivalent • Division • Multiplication • Addition • Subtraction • Mixed number • Improper • Reciprocal Representation • Notation • Solve problems • Simplify • Share • Compare • Pi • Gradient	• Apply the correct order of operations (BIDMAS) and understand that the division and multiplication are the same level and are completed left to right, and analogously for addition and subtraction • Addition, subtraction, multiplication and division of decimals, fractions and mixed numbers • Find the reciprocal of a number and recognise the product of a number and its reciprocal makes 1 • Convert between fractions, mixed numbers, decimals and percentages, and use this skill to compare proportions and answer complex numerical problems (including fractions that lead to recurring decimals)	• Teacher assessment during lesson • Spring Assessment • End of year assessments • Teacher assessment during lesson • Half Term test • End of year assessments
Multiplicative change	• Direct proportion • Conversion graphs • Currencies • Direct proportion graphs • Scale factors • Scale Diagrams • Maps	• Understand and use proportion as equality of ratios • Relate ratios to fractions and to linear functions • Use the unitary method to solve simple word problems involving ratio and direct proportion • Use conversion graphs such as for exchange rates • Represent direct proportion graphically • Read and construct scale drawings • Use and interpret maps and scale drawings, using a variety of scales and units and using proper map scales (1 : 25 000) • Use and interpret scale drawings, where scales use mixed units, and drawings aren't done on squared paper, but have • measurements marked on them.	• Teacher assessment during lesson • Half term test • End of year assessments

Transformations	• Symmetry • Reflection • Translation • Rotation • Enlargement • Invariance	• Identify congruent and similar shapes • Identify rotational and reflective symmetry in 2-D shapes • Reflect shapes in axes and lines such as *x=c, y=c, y=x, y=-x* • Translate shapes using vectors • Rotate shapes around points with angles that are multiples of 90° • Describe translations using the information above	• Teacher assessment during lesson • End of year assessments
Rounding and estimating	• Powers of 10 • Significant figures • Decimal places • Estimation • Error interval notation	• Round to whole numbers and decimal places. • Use estimates to check appropriateness of answers • Use inequality notation to specify simple error intervals due to rounding • Understand and use equivalences between 0.1, $^1/_{10}$ and 10^{-1}, and multiply and divide by any integer power of 10	• Homework Task 1 • Teacher assessment during lesson • Autumn Assessment • End of year assessments
Sequences	• Next term • Linear • Non linear • Term-to-term • Generate • Nth term	• Use functions machines and use brackets to represent the output of a function machine as an algebraic expression • Generate linear sequences using term-to-term & position-to- term rules • Find the nth term of an arithmetic sequence including from diagrams • Recognise and generate special sequences including those for • odd, even, triangular, square, cube numbers and Fibonacci-type sequences, and powers of 2	• Homework Task 2 • Teacher assessment during lesson • Autumn Assessment • End of year assessments

Graphical representations of linear relationships	• Y=kx • Direct proportion • Gradient • Negative gradient • Linear sequences • Y=mx+c • Non-linear graphs • Midpoint	• Use the unitary method to solve simple word problems involving ratio and direct proportion • Represent direct proportion graphically • Generate points and plot graphs of linear functions • Recognise that linear functions can be rearranged to give y explicitly in terms of x • Know that the gradient of a line is the change in y over change in x. • Use gradients to interpret how one variable changes in relation to another • Find the gradient of lines given by equations of the form *y =* • *mx + c and ax + by = c* • *Find the equation of a straight line from its graph* • Find the coordinates of a mid-point of a line • Solve geometrical problems on coordinate axes	• Teacher assessment during lesson • Autumn Assessment • End of year assessments
Solving linear equations	• Equality • Solving one step • Two step • Brackets • Form and solve • Unknowns on both sides	• Use letter symbols to represent unknown numbers or variables • Know the meanings of term, expression, equation and formula • Know and use the order of operations and understand that algebra follow the same conventions and order as arithmetic • Simplify linear algebraic expressions by collect like terms • Substitute numbers into algebraic expressions and formulae to solve problems • Construct and solve simple linear equations with integer coefficients • Multiply a single term over a bracket • Factorise algebraic expressions by finding a single common term	• Homework Task 3 • Teacher assessment during lesson • Autumn Assessment • End of year assessments

Number	• Powers of 10 • Standard Form • Negative powers of 10 • Compare and order • Calculate • Negative indices • Fractional indices	• Understand and use equivalences between 0.1, $^1/_{10}$ and 10^{-1}, and multiply and divide by any integer power of 10 • Use integer powers and associated real roots (square, cube and higher), recognize powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations. • Interpret and compare numbers in standard for A x 10^n, $1 \leq A < 10$, where n is a positive or negative integer or zero	• Teacher assessment during lesson • Autumn Assessment • End of year assessments
Multiplicative relationships	• Direct proportion • Conversion graphs • Currencies • Similar shapes • Scale factors • Scale diagrams • Maps	• Understand and use proportion as equality of ratios • Relate ratios to fractions and to linear functions • Use the unitary method to solve simple word problems involving ratio and direct proportion • Represent direct proportion graphically • Read and construct scale drawings • Use and interpret maps and scale drawings, using a variety of scales and units and using proper map scales (1 : 25 000) • Use and interpret scale drawings, where scales use mixed units, and drawings aren't done on squared paper, but have • measurements marked on them.	• Teacher assessment during lesson • Half Term Assessment • Spring Assessment • End of year assessments
Statistical representations and measures	• Scatter graphs • Correlation • Line of best fit • Non linear relationships • Frequency tables • Grouped • Discrete • Continuous • Two way tables	• Identify issues with “bad graphs” • Read from scatter diagrams and lines of best fit • Plan, construct and interpret two-way tables for recording data • Compare two simple distributions using summary statistics or graphs • Understand the differences between qualitative	• Teacher assessment during lesson • Half Term Assessment • Spring Assessment • End of year assessments

		and quantitative data, and discrete and continuous data	
Statistical analysis	• Bar chart • Pie chart • Range • Distribution • Misleading graphs • Averages • Mean • Outliers • Compare distribution	• Identify issues with “bad graphs” • Read from bar charts, pictograms, and pie charts • Construct and interpret pie charts • Construct and interpret stem and leaf diagrams • Construct and interpret frequency diagrams • Calculate the mean, median, mode and range for discrete data • Calculate possible values of the set of data given summary statistics	• Teacher assessment during lesson • Half Term Assessment • Spring Assessment • End of year assessments
Perimeter, area and volume	• Perimeter • Area • Circles • Compound • Prisms • Volume	• Derive and apply properties of special types of quadrilaterals • Know the meanings of faces, surfaces, edges and vertices and identify them in 3D shapes • Recognise and draw 3D shapes from their plans and elevations • Create plans and elevations for given 3D shapes • Construct nets of 3D shapes • Choose and use units of measurement to measure, estimate, calculate and solve problems in a range of contexts • Know rough metric equivalents of imperial measures in everyday use and use given conversions to answer problems • Know and use the formulae for the area of a triangle, • parallelogram and trapezium • Find the volume and surface area of cuboids or 3D shapes formed of cuboids • Construct equations to solve cuboid volume and surface area problems	• Teacher assessment during lesson • Homework Task 4 • End of year assessments

		• Understand circle vocabulary such as radius, diameter, circumference, arc, sector, chord, and segment • Know and use the formulae for the circumference and area • of a circle, and use these to answer problems relating to shapes that contain semicircles and quarter-circles	
Geometrical properties	• Notation • Parallel lines • Alternate • Corresponding • Co interior • Quadrilaterals • Interior • Exterior • Proof	• Understand perpendicular means at a right angle/90° • Use angles around a point, angles on a straight line, angles in a triangle, and angles in a quadrilateral • Use rules for alternate, corresponding, vertically opposite, and co-interior angles in parallel lines • Use special properties of triangles and quadrilaterals to answer problems such as the base angles in an isosceles triangle being equal • Find and use interior and exterior angles in both regular and irregular polygons • Know and use properties of angles, parallel and intersecting lines, polygons • Solve geometrical problems using correct terminology • Understand what tessellation is and why some shapes tessellate	• Teacher assessment during lesson • Homework Task 5 • End of year assessments
Constructions	• Measure • Draw • Perpendicular • Triangles • Quadrilaterals • SSS • SAS • ASA • Angle bisector • Perpendicular bisector	• (Including to and from a point & including knowing the perpendicular is the shortest distance from a point to a line), angular bisectors & triangles • Construct angles of 60^o, 90^o, 30^o, 45^o	• Teacher assessment during lesson • End of year assessments

KS3 Curriculum Map – Mathematics: Year 9

Topic	Knowledge *Substantive knowledge*: This is the specific, factual content for the topic, which should be connected into a careful sequence of learning.	Skills *Disciplinary knowledge*: This is the action taken within a particular topic in order to gain substantive knowledge.	Assessment Opportunities What assessments will be used to measure student progress?
Straight line graphs	• Parallel to axes • Table of values • Gradients • Intercepts • Y=mx+c • Real life graphs • Inverse proportion • Perpendicular lines	• Develop algebraic and graphical fluency, including understanding linear and simple quadratic functions • Recognise, sketch and produce graphs of linear and quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane • Interpret mathematical relationships both algebraically and graphically • Reduce a given linear equation in two variables to the standard form y=mx+c; calculate and interpret gradients and intercepts of graphs of such linear equations numerically, graphically and algebraically. • Use linear and quadratic graphs to estimate values of y for given values of x and vice versa to find approximate solutions of simultaneous linear equations • Solve problems involving direct and inverse proportion, including graphical and algebraic represenations	• Teacher assessment during lesson • Homework Task 1 • Half Term • Autumn Assessment • End of year assessments

Forming and solving equations	• Equations • Inequalities • Brackets • Unknowns both sides • Substitution • Rearranging formulae	• Move freely between different numerical, algebraic, graphical and diagrammatic representations • Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement) • Understand and use standard mathematical formulae; rearrange formulae to change the subject • Model situations or procedures by translating them into algebraic expressions or formulae, and by using graphs.	• Teacher assessment during lesson • Half Term • Autumn Assessment • End of year assessments
Testing conjectures	• Factors, multiples and primes • Always, sometimes, never true • Conjectures about number • Binomials • Conjectures with algebra • 100 grid	• Make and test conjectures about patterns and relationships; look for proofs or counterexamples • Begin to reason deductively in geometry, number and algebra. • Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorization. • Simplify and manipulate algebraic expressions to maintain equivalence by expanding products of two or more binomials.	• Teacher assessment during lesson • Half Term • Autumn Assessment • End of year assessments

Three dimensional shapes	• 2D and 3D Shapes • Prisms • Nets • Plans and elevations • Surface area • Cubes and cuboids • Triangular prisms • Cylinder • Volume	• Use language and properties precisely to analyse numbers, algebraic expressions, 2-D and 3-D shapes. • Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D • Derive and apply formulae to calculate and solve problems involving: perimeter and area of triangles, parallelograms, trapezia, volume of cuboids (including cubes) and other prisms (including cylinders)	• Teacher assessment during lesson • Homework Task 2 • Autumn Assessment • End of year assessments
Constructions and congruency	• Draw and measure angles • Scale drawings • Locus • Perpendicular bisector • From a point • To a point • Angle bisector • Construct triangles • Congruent Triangles	• Draw and measure line segments and angles in geometric figures, including interpreting scale drawings • Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicual to a given line from/at a given point, bisecting a given angle); recognize and use the perpendicular distance from a point to a line as the shortest distance to the line. • Describe, sketvch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. • Use the standard conventions for labelling the sides and angles of triangle ABC, and know and use the criteria for congruence of triangles.	• Teacher assessment during lesson • Autumn Assessment • End of year assessments

Numbers	• Integers, real and rational numbers • Surds • Integers • Decimals • HCF • LCM • Fractions	• Use the four operations, including formal written methods, applied to integers, decimals, proper and improper fractions, and mixed numbers, all both positive and negative. • Use the concepts and vocabulary of prime numbers, factors, multiples, common factors, common multiples, highest common factor, lowest common multiple, prime factorization, including using product notation and the unique factorization property. • Interpret and compare numbers in standard form A x 10^n , $1 \leq n < 10$ where n is a positive or negative integer or zero • Appreciate the infinite nature of the sets of integers, real and rational numbers.	• Teacher assessment during lesson • Spring Assessment • End of year assessments
Using percentages	• Equivalence – fractions, decimals and percentages • Increase and decrease • Percentage change • Reverse percentages • Non-calculator problems • Repeated percentage change	• Define percentage as 'number of parts per hundred', interpret percentage changes as a factor or a decimal, interpret the multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%. • Interpret fractions and percentages as operations. • Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics.	• Teacher assessment during lesson • Homework Task 3 • Spring Assessment • End of year assessments

Maths and money	• Bills and bank statements • Simple interest • Compound interest • Value added tax • Wages and taxes • Exchange rates • Unit pricing	• Solve problems involving percentage change, including: percentage increase, decrease and original value problems and simple interest in financial mathematics. • Select and use appropriate calculation strategies to solve increasingly complex problems. • Interpret when the structure of a numerical problem requires additive, multiplicative or proportional reasoning. • Develop their use of formal mathematical knowledge to interpret and solve problems, including in financial mathematics.	• Teacher assessment during lesson • Spring Assessment • End of year assessments
Deduction	• Angles in parallel lines • Chains of reasoning • Angle problems with algebra • Conjectures with angles • Conjectures with shapes • Geometrical reasoning	• Derive and use the standard ruler and compass constructions (perpendicular bisector of a line segment, constructing a perpendicular to a given line from/at a given point, bisecting a given angle); recognize and use the perpendicular distance from a point to a line as the shortest distance to the line. • Describe, sketch and draw using conventional terms and notation: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. • Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. • Understand and use the relationship between parallel lines and alternate and corresponding angles.	• Teacher assessment during lesson • Spring Assessment • End of year assessments

Rotation and translation	• Rotational symmetry • Rotate a shape about a point • Translate • Vector • Series of transformations	• Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures. • Describe, sketch and draw using conventional terms and notations: points, lines, parallel lines, perpendicular lines, right angles, regular polygons, and other polygons that are reflectively and rotationally symmetric. • Develop the mathematical knowledge, in part through solving problems and evaluating the outcomes, including multi-step problems.	• Teacher assessment during lesson • Homework Task 4 • Spring Assessment • End of year assessments
Pythagoras' Theorem	• Squares and square roots • Hypotensue • Missing sides • Axes • Proofs • 3-D Shapes	• Use Pythagoras' Theorem to solve problems involving right-angled triangles. • Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results to obtain simple proofs. • Interpret mathematical relationships both algebraically and geometrically. • Begin to reason deductively in geometry, number and algebra, including using geometrical constructions • Begin to model situations mathematically and express the result using a range of formal mathematical representations.	• Teacher assessment during lesson • Spring Assessment • End of year assessments

Enlargement and similarity	• Enlargement • Similarity • Positive scale factor • Fractional scale factor • Negative scale factor • Similar triangles	• Construct similar shapes by enlargement, with and without coordinate grids • Use scale factors, scale diagrams and maps • Apply angle facts, triangle congruence, similarity and properties of quadrilaterals to derive results about angles and sides • Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. • Use Pythagoras' Theorem and trigonometric ratios in similar triangles to solve problems involving right-angled triangles.	• Teacher assessment during lesson • End of year assessments
Solving ratio and proportion problems	• Direct proportion • Conversion graphs • Inverse proportion • Ratio problems • Best buy • Ratio and algebra problems	• Divide a given quantity into two parts in a given part:part or part:whole ratio; express the division of a quantity into two parts as a ratio • Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. • Solve problems involving direct and inverse proportion, including graphical and algebraic representations. • Use compound units such as speed, unit pricing and density to solve problems.	• Teacher assessment during lesson • Homework Task 5 • End of year assessments

Rates	• Speed, distance times • Distance-time graphs • Density, mass and volume • Flow problems • Rates of change • Compound units	• Use compound units such as speed, unit pricing and density to solve problems. • Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. • Change freely between related standard units (for example time, length, area, volume/capacity, mass).	• Teacher assessment during lesson • End of year assessments
Probability	• Single event • Relative frequency • Expected outcomes • Independent events • Tree Diagrams • Replacement	• Record describe and analyse the frequency of outcome of simple probability experiments involving randomness, fairness, equally and unequally likely outcomes, using appropriate language and the 0-1 probability scale. • Understand that the probabilities of all possible outcomes sum to 1. • Enumerate sets and unions/ intersections of sets systematically, using tables, grids and venn diagrams. • Generate theoretical sample spaces for single and combined events with equally likely, mutually exclusive outcomes and use these to calculate theoretical probabilities.	• Teacher assessment during lesson • Homework Task 6 • End of year assessments

Algebraic representation	• Graphs • Quadratic functions • Approximation • Linear graphs • Equations • Inequalities	• Recognise, sketch and produce graphs of quadratic functions of one variable with appropriate scaling, using equations in x and y and the Cartesian plane. • Use quadratic graphs to estimate values of y for given values of x and vice versa. • Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs. • Use linear graphs to estimate values of y for given values of x and vice versa and to find approximate solutions of simultaneous linear equations. • Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors.	• Teacher assessment during lesson • End of year assessments

Assessments are either homework tasks that are peer assessed or in class assessments marked by the teacher.		
Autumn	**Spring**	**Summer**
Year 7 ● Baseline ● Homework Task 1 ● Autumn Test	**Year 7** ● Homework Task 2 ● Homework Task 3 ● Spring Test	**Year 7** ● Homework Task 4 ● Half Term Test ● End of Year
Year 8 ● Homework Task 1 ● Homework Task 2 ● Autumn Test	**Year 8** ● Homework Task 3 ● Half Term Test ● Spring Test	**Year 8** ● Homework Task 4 ● Homework Task 5 ● End of Year
Year 9 ● Homework Task 1 ● Half Term Test ● Homework Task 2 ● Autumn Test	**Year 9** ● Homework Task 3 ● Homework Task 4 ● Spring Test	**Year 9** ● Homework Task 5 ● Homework Task 6 ● End of Year / Core / Set Test