

MATHEMATICS KS3
SUBJECT OVERVIEW MAP

Year 7	Substantive Knowledge	Disciplinary Knowledge	Assessment
Half-term 1	<p>Negative Numbers</p> <ul style="list-style-type: none"> • Addition/subtraction of positive and negative numbers • Multiplication/division of positive and negative numbers • BIDMAS involving negative numbers <p>Algebra (Transition)</p> <ul style="list-style-type: none"> • Writing basic algebraic expressions • Collecting like terms • Substitution into expressions • Expanding single brackets • Solving one step equations • Solving two steps equations • Form and Solve one/two steps equations <p>Decimals and Rounding</p> <ul style="list-style-type: none"> • Round a number to a given number of significant figures. • Round a number to a given number of decimal places • Approximate the value to a multiplication/division by rounding each number to 1 significant figure. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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<p>Half-term 2</p>	<p>Fractions, Decimals and Percentages</p> <ul style="list-style-type: none"> • Be able to simplify, add, subtract, multiply and divide fractions, including mixtures of improper fractions, integers and mixed numbers • Compare and order fractions; use the symbols =, ≠, <, >, ≤, ≥. • Find what percentage one amount is of another and find a percentage change. • Calculator and non-calculator methods for finding the percentage of an amount or a value after a percentage change, with appreciation of decimal multipliers. • Non-calculator method for finding a value before a percentage change. • Convert between fractions, decimals and percentages, where the values are greater than 1. <p>Sequences</p> <ul style="list-style-type: none"> • Term-to term rules and position-to-term rules (both linear and non-linear) • Finding the nth term of linear sequences. • Generate Sequences 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes
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<p>Half-term 3</p>	<p>Area and Perimeter</p> <ul style="list-style-type: none"> • Find the area of a triangle, trapezium, parallelogram. • Find the area and circumference/perimeter of circles • Appreciate strategies to find areas of composite shapes formed by rectangles • Appreciate that triangles have the same area if their base and height are the same, and compare sizes of triangles by considering the proportion of base/height. • Find what fraction of a shape is shaded by splitting into congruent shapes. <p>Angles</p> <ul style="list-style-type: none"> • Know the sum of angles on a straight line and angles around a point. • Understand alternate, corresponding, co-interior and vertically opposite angles. Know that (interior) angles in a quadrilateral sum to 360. know angle properties of parallelograms. • Recognise that base angles of an isosceles triangle are equal. • Introduce and use algebraic angles. • Be able to construct diagrams from written information about vertices/sides/angles. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> MID-TERM EXAM <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes
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	<ul style="list-style-type: none"> Construct angle proofs 		
Half-term 4	<p>Equations</p> <ul style="list-style-type: none"> Solve one step linear equations Solve two step linear equations (including with fractions) Solve linear equations involving brackets including with unknowns on both sides and with brackets. Form and solve equations Solve linear equations with unknowns on both sides <p>Graphs, Charts and Averages</p> <ul style="list-style-type: none"> Recognise a variety of ways to display data Be able to construct and interpret bar charts. Construct stem and leaf diagrams. Understand frequency diagrams and how grouped data can be put in tabular form. Be able to construct frequency polygons. Be able to analyse data and calculate statistics Find the mean, mode, median, range from a stem and leaf diagram. 	<ul style="list-style-type: none"> Application of substantive knowledge within different scenarios Justification or making corrections tasks Problem solving tasks Making connections between questions and concepts Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none"> • Calculate the mean from a frequency table and estimate a mean from a grouped frequency table. • Solve (non-algebraic) problems involving mean, including combined means. • Appreciate the difference between continuous and discrete data. 		
Half-term 5	<p>HCF/LCM</p> <ul style="list-style-type: none"> • Understand key terms such as perfect square, integer, positive integer, non-negative integers. • Prime factorise a number • find the LCM of two numbers. • find the HCF of two numbers. • Know the divisibility laws from 3 to 11 and be able to break down into multiple divisibility rules for larger numbers. Use these rules to mentally prime factorise numbers rapidly and have a sense if a number is prime. • Find factors of a number using its prime factorisation (e.g. is 20 a factor of $2^4 \times 3 \times 5^3$?) and determine the number of factors of a number <p>Probability</p> <ul style="list-style-type: none"> • Determine probabilities using matching outcomes/total outcomes. • Understand the concept of a 'sample space'. Identify the sample space for 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<p>both a single event and two combined events (e.g. adding two dice) and use to calculate probabilities.</p> <ul style="list-style-type: none"> • Understand the difference between experimental and theoretical probabilities. Calculate experimental probabilities. 		
Half-term 6	<p>Ratio and Proportion 1</p> <ul style="list-style-type: none"> • Use ratio notation • Simplify ratios • Express in the form 1:n and n:1 • Share a ratio into 2 or more parts • When given information about one part, find the whole or other parts <p>Transformations</p> <ul style="list-style-type: none"> • To rotate a shape about a given direction and degree. • To reflect a shape in a given line (including diagonals) • To translate a shape using words (1 right and 3 down) • To enlarge a shape by a whole number or fractional scale factor 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> END OF YEAR EXAM <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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Year 8	Substantive Knowledge	Disciplinary Knowledge	Assessment
Half-term 1	<p>Algebra (Rearranging and Inequalities)</p> <ul style="list-style-type: none"> • Change the subject of any formula where the new subject appears only once. Includes powers and roots. • Solve problems by rearranging and then substituting. • Understand the inequality symbols. • Draw inequalities on a number line. • Solve basic one and two sided inequations. <p>Constructions and Bearings</p> <ul style="list-style-type: none"> • Use a compass accurately. • Use a protractor accurately. • Construct triangles given SAS (Side-Angle-Side), ASA, SSS. • Construct perpendicular and angle bisectors, angles of 30, 45, 60 and 90, and the perpendicular from a point on a line. • Understand bearings and scale drawings. <p>Angles in Polygons</p> <ul style="list-style-type: none"> • Understand the definition of different quadrilaterals (kite, trapezium, rhombus, and parallelogram). 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none"> • Know properties that quadrilaterals have, i.e. symmetry, diagonals, rotational symmetry, etc. • Know the angle sum of interior angles given the number of sides, and of exterior angles. • Determine each interior/exterior angle of a regular polygon. • Determine the number of sides a regular polygon has given each exterior or interior angle. 		
Half-term 2	<p>Sampling Data</p> <ul style="list-style-type: none"> • Discuss the different types of sampling methods • To find a random sample of a set of data • To find a stratified sample of a set of data, including a subgroup <p>Pythagoras' Theorem</p> <ul style="list-style-type: none"> • Apply Pythagoras' Theorem to single right-angled triangles. • Appreciate that an answer in surd form is exact. • Know common Pythagorean triples: (3,4,5), (5,12,13) and multiples of these. • Solve more advanced problems involving use of Pythagoras' Theorem • Finding the perpendicular height and area of an isosceles and equilateral triangle (and a mental method for the latter). 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none"> • Multiple right-angled triangles with shared sides. • Appreciate that we sometimes need to add lines to yield right-angled triangles. * Use of algebraic sides. • Appreciate that a triangle with angles 30-60-90 is half an equilateral triangle, using this to reason about sides. <p>Charts and Quartiles</p> <ul style="list-style-type: none"> • Know how to construct and interpret stem and leaf diagrams and frequency polygons. • Draw and interpret cumulative frequency diagrams and box plots. • Find quartiles, interquartile range from lists of data and cumulative frequency graphs. 		
Half-term 3	<p>Straight Line Graphs</p> <ul style="list-style-type: none"> • Appreciate the conceptual line between lines and their equation (i.e. a line is a set of points that satisfies the equation). • Know equations of vertical and horizontal lines (e.g. $x = 3$) and also $y = x$ and $y = -x$. • Plot graphs using a table of values (linear equations). • Recognise and use $y = mx + c$. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts 	<ul style="list-style-type: none"> <input type="checkbox"/> MID-TERM EXAM <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none"> • Appreciate that parallel lines have the same gradient. • Find the midpoint of a line/coordinates <p>Assessment Window 1</p> <p>Laws of Indices</p> <ul style="list-style-type: none"> • Know laws of indices for multiplying, • Know the laws of indices for dividing • Know the laws of indices for raising a power to a power. • Understand negative and zero indices. • Be able to raise a whole term to a power, e.g. $(3m^2)^4 = 81m^8$. 	<ul style="list-style-type: none"> ✓ Chains of reasoning 	
Half-term 4	<p>Standard Index Form</p> <ul style="list-style-type: none"> • Understand why putting numbers in standard form is useful (particularly in Science). • Be able to use the $\times 10^{\wedge}$ button on your calculator. • Convert numbers into standard form. • Convert standard form into ordinary numbers • Order numbers in standard index from 	<ul style="list-style-type: none"> • Application of substantive knowledge within different scenarios • Justification or making corrections tasks • Problem solving tasks • Making connections between questions and concepts • Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<p>Compound Measures</p> <ul style="list-style-type: none"> • Calculate average speed • Calculate distance • Calculate time • Solve problems involving density, mass and volume • Solve problems involving pressure, force and area 		
<p>Half-term 5</p>	<p>Correlation</p> <ul style="list-style-type: none"> • Draw and interpret scatter diagrams. • Identify correlation • Identify the relationship • Draw a line of best fit and use to predict values. • Predict correlation from real-life examples when data not given (e.g. house price with distance from London). <p>Bounds</p> <ul style="list-style-type: none"> • Identify upper and lower bounds for a measurement to a given degree of accuracy, both with decimal places and significant figures (subsequent calculations involving bounds are not required). • Write an error interval <p>Assessment Window 2</p>	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Formative Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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Half-term 6	<p>Trigonometry</p> <ul style="list-style-type: none">• Name the sides of a right-angled triangle• Identify the appropriate trig ratio to use• Find missing lengths• Find missing angles• Rearrange trig ratios to solve for x <p>Algebra (Expressions and Equations)</p> <ul style="list-style-type: none">• Multiply out (and simplify) a pair of linear expressions, by multiplying each term from one by each in the other.• Be able to square a linear expression, e.g. $(2x + 3)^2$.• Factorise into a single bracket.• Solve simple equations involving fractions, e.g. $x/3 - 4 = x$	<ul style="list-style-type: none">✓ Application of substantive knowledge within different scenarios✓ Justification or making corrections tasks✓ Problem solving tasks✓ Making connections between questions and concepts✓ Chains of reasoning	<ul style="list-style-type: none"><input type="checkbox"/> END OF YEAR EXAM<input type="checkbox"/> Formative Assessments<input type="checkbox"/> Homework<input type="checkbox"/> In class Assessment for Learning activities<input type="checkbox"/> Low Stake Quizzes
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Year 9	Substantive Knowledge	Disciplinary Knowledge	Assessment
Half-term 1	<p>Number (Estimating, Standard Form, Surds, Laws of Indices)</p> <ul style="list-style-type: none"> • Calculations using the order of operations and decimals. • Estimate an answer. • Use and manipulate place value to answer questions. • Work with square and cubic numbers and find roots. • Use powers and roots with multiple variables. • Work with negative indices. • Work with fractional indices. • Manipulate ordinary numbers and numbers in standard form. • Calculate with numbers in standard form (Addition and Subtraction) • Understand the difference between rational and irrational numbers. • Simplify a surd. • Manipulate a surd. • Rationalise a denominator. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes
Half-term 2	<p>Expressions and Sequences</p> <ul style="list-style-type: none"> • Distinguish between expressions, equations, formulae and identities. • Algebraic manipulation (including with indices) working with quadratic expressions. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks 	<ul style="list-style-type: none"> <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities

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	<ul style="list-style-type: none"> • Understand non-linear sequences (Geometric, Fibonacci and Quadratic). • Find the nth term of a geometric or quadratic sequence. <p>Averages, Tables, Graphs and Correlation</p> <ul style="list-style-type: none"> • Decide which average is best for a set of data. • Create a frequency table and read data from it. • Understand the difference between non-grouped and grouped data/tables. • Find the mode and median from frequency tables. • Find the mean and range from frequency tables. • Construct and interpret stem and leaf and back-to-back stem and leaf diagrams. • Draw a Pie-Chart diagram and read them. • Draw a Scatter Graph diagram and read them by using a line of best fit to estimate from and predict trends. • Choose appropriate diagrams to display data. • Recognise misleading graphs. 	<ul style="list-style-type: none"> ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Low Stake Quizzes
Half-term 3	<p>Operate with Fractions, Decimals, Percentages and Ratio (Problem Solving)</p> <ul style="list-style-type: none"> • Do calculations with fractions and mixed fractions. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks 	<ul style="list-style-type: none"> <input type="checkbox"/> MID-TERM EXAM <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework

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	<ul style="list-style-type: none"> • Recognise decimal values that make a percentage multiplier. • Calculate percentages of amounts and work in reverse. • Use percentages in real-life situations. • Calculate VAT (value added tax). • Calculate simple interest. • Calculate percentage increases and decreases using a percentage multiplier. • Calculate with compound interest. • Solve real-life problems involving percentages. • Use ratios to convert between currencies and measures. <p>Assessment Window 1</p> <p>Pythagoras and Trigonometry</p> <p>Solve problems using Pythagoras' theorem</p> <ul style="list-style-type: none"> • Find the hypotenuse and shorter sides. • Multi-step problems • Use Pythagoras with algebra • Recognise different situations where Pythagoras can be used. • 3D problems with Pythagoras. <p>Use trigonometric ratios to solve problems.</p> <ul style="list-style-type: none"> • Recall how to use basic trigonometry to find angles and sides. • Combine trigonometry and Pythagoras in the same problem. • Draw the trigonometric graphs. 	<ul style="list-style-type: none"> ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes
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	<ul style="list-style-type: none"> • Know the exact values of the sine, cosine and tangent. • Link the exact values to the trigonometric graphs. 		
Half-term 4	<p>Graphs (Linear, Quadratic, Cubic and Reciprocal)</p> <ul style="list-style-type: none"> • Draw linear graphs and identify the gradient and intercept from $y = mx + c$ • Plot graphs with equations $ax + by = c$. • Sketch graphs using the gradient and intercepts. • Find the equations of lines parallel or perpendicular to a given line. • Draw quadratic graphs. • Solve quadratic equations using graphs. • Draw graphs of cubic functions. • Draw graphs of reciprocal functions. • Link linear and non-linear real-life graphs. • Draw the graph of a circle using a table of values. 	<ul style="list-style-type: none"> • Application of substantive knowledge within different scenarios • Justification or making corrections tasks • Problem solving tasks • Making connections between questions and concepts • Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes
Half-term 5	<p>Area and Perimeter (Prisms and Sectors of circles)</p> <ul style="list-style-type: none"> • Find the area and perimeter of basic shapes. • Find the area and perimeter of compound shapes. • Convert between metric units of area. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks 	<ul style="list-style-type: none"> <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none"> • Calculate volumes and surface areas of 3D prisms. • Calculate the perimeter and area of semicircles and quarter circles. • Calculate arc lengths, angles and areas of sectors of circles. • Calculate volume and surface area of a cylinder and a sphere. • Calculate volume and surface area of 3D pyramids and cones. • Solve problems involving volumes and surface areas. <p>Assessment Window 2</p>	<ul style="list-style-type: none"> ✓ Making connections between questions and concepts ✓ Chains of reasoning 	
Half-term 6	<p>Transformations</p> <ul style="list-style-type: none"> • Draw shapes using the rules of all transformations. • Describe transformations that have taken place. • Enlarge shapes by fractional and negative scale factors about a centre of enlargement. • Carry out multiple transformations and spot single steps that would be more efficient. <p>Bearings, Loci, Plans and Elevations</p> <ul style="list-style-type: none"> • Recall how to use bearings and scaled drawings. • Calculate with bearings. • Find positions using triangulation. • Solve problems involving bearings and right-angled trigonometry. 	<ul style="list-style-type: none"> ✓ Application of substantive knowledge within different scenarios ✓ Justification or making corrections tasks ✓ Problem solving tasks ✓ Making connections between questions and concepts ✓ Chains of reasoning 	<ul style="list-style-type: none"> <input type="checkbox"/> END OF YEAR EXAM <input type="checkbox"/> Interim Assessments <input type="checkbox"/> Homework <input type="checkbox"/> In class Assessment for Learning activities <input type="checkbox"/> Low Stake Quizzes

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	<ul style="list-style-type: none">• Draw bisectors (perpendicular and angle).• Draw a locus.• Use bisectors to solve problems loci problems.• Draw plans and elevations of 3D solids. <p>Review, Recap and Enrich based on gaps within the class.</p>		
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