KEY STAGE THREE CURRICULUM KNOWLEDGE AND SKILLS MAPPING TOOL SUBJECT: Mathematics

	KNOWLEDGE	SKILLS
YEAR 7	Number – Place Value Number – Addition and Subtraction Number – Multiplication and Division Number - Fractions Number – Negative Numbers Statistics – Data Cycle Algebra – Substitution and Equations Geometry – Lines and Angles	**Number –** understand place value for numbers of any size. Round numbers to appropriate degrees of accuracy. Use symbols for equals and inequalities. Use formal addition and subtraction methods for integers and decimals. Calculate and solve problems involving perimeter. Multiply and divide by powers of 10. Use formal written methods for multiplication and division of integers and decimals. Understand the order of operations. Prime factors, factors, multiples, HCF and LCM. Use powers and roots for square and cube numbers. Recognise powers of 2, 3, 4 and 5. Solve problems for areas of rectangles, triangles and parallelograms. Calculate a mean. Use four number operations with negative numbers. Identify and use equivalent fractions. Simplify, compare fractions. +/- any fractions, including mixed numbers and improper fractions. Convert between fractions and decimals. Find a fraction of an amount. **Statistics –** Understand the data handling cycle. Collect data, draw and interpret charts including bar, line and pictograms. Use tally charts and two way tables. Mean, median, mode and range calculations. **Algebra** – Understand the terms expression, equations, term, formula, function and identity. Use and interpret algebraic notation. Substitute values into formulae. Collect like terms. Solve simple linear equations. **Geometry –** Describe and sketch conventional shapes and angles such as right angles, triangles, parallel lines etc. Derive and illustrate properties of triangles, quadrilaterals, circles and other plane figures. Use a protractor to measure and draw angles. Apply angle rules such as straight line, angles at a point, vertically opposite. Derive and use the sum of angles in triangles and quadrilaterals. Draw and interpret pie charts.

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
YEAR 7	Content	Number – Place Value, Addition and Subtraction	Number – Multiplication and Division and Negative Numbers	Number – Fractions	Statistics – Data Handling Cycle	Algebra – Introduction	Geometry – Lines and Angles
	Skills	Understand and use place value for decimals, measures and integers of any size. Order positive and negative integers, use the number line as a model for ordering of the real numbers; use the symbols =, ≠, <, >, ≤, ≥. Round numbers and measures to an appropriate degree of accuracy. Use formal written methods for addition and subtraction of integers and decimals. Recognise and use relationships between addition and subtraction including inverse operations. Calculate and solve problems involving perimeter.	Multiply and divide by 10, 100 and 1000. Use formal written methods for multiplication and division of integers and decimals. Recognise and use relationships between operations including inverse operations. Understand the order of operations. Use the concepts and vocabulary of prime numbers, factors (or divisors), common factors and highest common factor (HCF). Use integer powers and associated real roots (square, cube and higher), recognise powers of 2, 3, 4, 5 and distinguish between exact representations of roots and their decimal approximations.	Represent fractions using diagrams and on a number line. Express one quantity as a fraction of another. Identify and use equivalent fractions. Compare and order fractions; use the symbols =, ≠, <, >, ≤, ≥. Convert between mixed numbers and improper fractions. Simplify fractions. Convert between fractions and decimals. Tenths, hundredths, thousandths Associating a fraction with division to convert any fraction to a decimal. Use the concepts and vocabulary of multiples and lowest common multiple (LCM). Add and subtract any fraction. Fractions with the same denominator.	Understand the data handling cycle. Understand the different types of data. Collect, organise and interpret data. Tally charts. Two way tables. Median, mode and range. Consider outliers. Draw and interpret bar charts, pictograms and line graphs.	Introduction to algebra. Understand that a letter represents a variable. Understand the difference between an expression, equation, formula, term, function and identity. Form expressions from situations describes in words. Use and interpret algebraic notation. Substitute numerical values into formulae and expressions, including scientific formulae. Collecting like terms. Use algebraic methods to solve simple linear equations. Generate terms of a sequence. Recognise arithmetic sequences and find the nth term.	Describe, sketch and draw using conventional terms and notations. Derive and illustrate properties of triangles, quadrilaterals, circles, and other plane using appropriate language and technologies. Use a protractor to measure and draw angles. Apply the properties of angles at a point, angles at a point on a straight line, vertically opposite angles. Understand and use alternate and corresponding angles on parallel lines. Derive and use the sum of angles in a triangle and a quadrilateral. Derive and use the sum of angles in a triangle and use it to deduce the angle

			Find the prime factor decomposition of a number. Calculate and solve problems involving area of rectangles, triangles and parallelograms. Calculate the mean average. Use approximation through rounding to estimate answers and calculate possible resulting errors expressed using inequality notation $a<x\leq b$. Use the four operations with negative numbers.	Fractions with a denominator that is a multiple of the other. Fractions with different denominators. Find a fraction of an amount.			sum in any polygon, and to derive properties of regular polygons. Pie charts.
	Assessment	Written end of term assessment on all content covered during Autumn term.		Written end of term assessment on all content covered during Spring term.		Written end of year assessment on all content covered over the entire year.	

KEY STAGE THREE CURRICULUM KNOWLEDGE AND SKILLS MAPPING TOOL SUBJECT: Mathematics

	KNOWLEDGE	SKILLS
YEAR 8	Number – Fractions Number – Percentages Algebra – Substitution, equations and linear graphs Geometry – Circles and Area Geometry – 3D Shapes Ratio, Proportion and Rates of Change Probability Geometry – Transformation and Construction	**Number –** Multiply and divide proper and improper fractions and mixed numbers both positive and negative. Find a fraction of an amount. Find a whole amount from a fraction. Fractional increase and decrease. Define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%. Solve problems involving percentage change. **Algebra –** Use substitution into formulae including all four operations and order of operations. Brackets and factorisation of expressions. Solve equations including brackets and fractions, including negatives. Plot coordinates in all four quadrants. Understand linear graphs of the form y=mx+c. Calculate gradients and intercept values. Recognise quadratic and cubic graphs. **Geometry –** Convert between measures and units. Calculate and solve problems for area and perimeter of circles, trapeziums and composite shapes. Know the names and properties of 3D shapes. Apply formulae to calculate and solve problems involving volume and surface area of cuboids and other prisms (including cylinders). Construct and interpret plans and elevations of 3-D shapes. Know, use and interpret rotations, reflections, translations and enlargements. Construct compass constructions such as angle bisectors and perpendicular bisectors. Use scale factors on diagrams and maps. **Ratio –** convert between units. Use ratio notation for simplest forms. Divide into a given ration with multiple parts. Use proportion to aid with recipe problems, best buy etc. **Probability –** use the language of probability. Know the probability scale runs from 0 to 1. Understand concepts of randomness and fairness. Use tables, grids and basic Venn diagrams. Generate sample space diagrams.

		Autumn 1	Autumn 2	Spring 1	Spring 2	Summer 1	Summer 2
YEAR 8	Content	Number – Fractions and percentages	Number – Percentages cont. Algebra – substitution and equations	Algebra – linear graphs cont.	Geometry - Circles and area and 3D shapes	Ratio	Probability Geometry – transformation & construction
	Skills	Multiply and divide proper and improper fractions and mixed numbers both positive and negative. Find a fraction of an amount. Find the whole amount, given a fraction of the amount. Find a fractional increase and decrease. Define percentage as 'number of parts per hundred', interpret percentages and percentage changes as a fraction or a decimal, interpret these multiplicatively, express one quantity as a percentage of another, compare two quantities using percentages, and work with percentages greater than 100%; eg,	Substitute numerical values into formulae and expressions, including scientific formulae. Include all prior learning specifically fractions, decimals and negatives. Simplify and manipulate algebraic expressions to maintain equivalence by: -multiplying a single term over a bracket taking out common factors -expanding products of two or more binomials -simplifying expressions involving sums, products and powers, including the laws of indices. Use algebraic methods to solve linear equations in one variable (including all forms that require	Work with coordinates in all four quadrants. Recognise, sketch and produce graphs of: -Linear functions of one variable -Quadratic functions of one variable. Understand and use standard mathematical formulae; rearrange formulae to change the subject, including where the subject appears more than once. Interpret mathematical relationships both algebraically and graphically; eg, direct and inverse proportion and real life graphs. Reduce a given linear equation in two variables to the standard form $y = mx + c$. Calculate and interpret gradients	Convert between cm^2 and m^2. Derive and apply formulae to calculate and solve problems involving area of circles, composite shapes and trapeziums. Calculate and solve problems involving perimeters of 2-D shapes (including circles). Include examples using algebra, fractions, decimals, etc. Use the properties of faces, surfaces, edges and vertices of cubes, cuboids, prisms, cylinders, pyramids, cones and spheres to solve problems in 3-D. Convert between cm^3 and m^3 Know and use the fact that 1 litre = $1000cm^3$. Derive and apply formulae to calculate and solve	Change freely between related standard units [for example time, length, area, volume/capacity, mass]. Use ratio notation, including reduction to simplest form. Divide a given quantity into two or more parts. Given information about one part, find the whole or other part(s). Understand that a multiplicative relationship between two quantities can be expressed as a ratio or a fraction. Use compound units such as speed, unit pricing and density to solve problems. Solve problems involving direct and inverse proportion, including graphical and algebraic representations.	Record, describe and analyse the frequency of outcomes 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.

		Claire got 16 out of 20 on a test, Simon got 21 out of 25 on a test. Who got the better score? Interpret fractions and percentages as operators, with and without a calculator. Solve problems involving percentage change, including percentage increase, decrease and original value problems, and simple interest in financial mathematics.	rearrangement). Include equations with brackets. Include fractional equations. Understand and use the concepts and vocabulary of inequalities. Represent the solution set to an inequality on a number line and vice versa. Find the integer solutions of an inequality. Solve linear inequalities in one variable. Rearrange formulae to change the subject, where the subject appears once.	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 and to find approximate solutions of simultaneous linear equations. Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs. Recognise and generate geometric sequences.	problems involving volume and surface area of cuboids (including cubes) and other prisms (including cylinders). Construct and interpret plans and elevations of 3D shapes.	Examples may include: -Recipe problems -Best buy problems -Exchange rates	Identify properties of, and describe the results of, translations, rotations and reflections applied to given figures. Draw and measure line segments and angles in geometric figures, including interpreting scale drawings and use of bearings. Use scale factors, scale diagrams and maps. Identify and construct congruent triangles, and construct similar shapes by enlargement, with and without coordinate grids. 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); distance to the line.

	Assessment	Written end of term assessment on all content covered during Autumn term.	Written end of term assessment on all content covered during Spring term.	Written end of year assessment on all content covered over the entire year.