Key Performance Indicators	Year 8 Milestones - Maths (Knowledge)
Number: Structure	I can apply the four operations, including formal written methods, to integers, decimals and simple fractions (proper and improper), and mixed numbers – all both positive and negative. I can apply the 4 operations with negative numbers. I can understand how to enter negative numbers into a calculator.
	I can use conventional notation for priority of operations, including brackets, powers, roots and reciprocals. I can understand the order of operations including powers. I can understand that $a^0 = 1$. I can apply the multiplication, division and power laws of indices.
	I can use the concepts and vocabulary of prime numbers, highest common factor, lowest common multiple, prime factorisation, including using product notation and the unique factorisation theorem. I can understand how to write a number as a product of its prime factors.
	I can calculate exactly with fractions.
	I can calculate with and interpret standard form $A \times 10^n$, where $1 \leq A < 10$ and n is an integer. I can convert numbers into standard form and vice versa.
	I can apply systematic listing strategies.
Number: Fraction, decimals and percentages	I can convert between terminating decimals and fractions. I can understand percentage and decimal equivalents for fractions with a denominator of 3, 5, 8 and 10.
	I can identify and work with fractions in ratio problems.
	I can interpret fractions and percentages as operators.
Number: Measures and Accuracy	I can round to significant figures.
Algebra: Notation, Vocabulary	I can use and interpret algebraic notation, including: a^2b in place of $a \times a \times b$, coefficients written as fractions rather than as decimals.
	I can substitute numerical values into scientific formulae.
	I can understand and use the concepts and vocabulary of inequalities and factors.

Vocabulary and Manipulation	I can simplify and manipulate algebraic expressions by taking out common factors and simplifying expressions involving sums, products and powers, including the laws of indices. I can factorise an expression by taking out common factors.
	I can change the subject of a formulae when 2 steps are required.
Algebra: Graphs	I can plot graphs of equations that correspond to straight-line graphs in the coordinate plane.
	I can identify and interpret gradients and intercepts of linear functions graphically and algebraically. I can plot and interpret graphs of linear functions.
	I can characteriste the shape of a graph of a quadratic function.
	I can plot and interpret graphs and graphs of non-standard functions in real contexts, to find approximate solutions to problems such as simple kinematic problems involving distance, speed and acceleration.
Algebra: Solving Equations	I can solve linear equations with the unknowns on both sides of the equation.
	I can find approximate solutions to linear equations using a graph.
Algebra: Sequences	I can generate terms of a sequence from either a term-to-term or a position-to-term rule.
	I can deduce expressions to calculate the nth term of linear sequences. Find the nth term for a linear sequence.
Ratio, Proportion and Rates of Change	I can change freely between compound units (e.g. speed, rates of pay, prices) in numerical contexts.
	I can use compound units such as speed, rates of pay, unit pricing.
	I can use scale factors, scale diagrams and maps.
	I can express the division of a quantity into two parts as a ratio; apply ratio to real contexts and problems (such as those involving conversion, comparison, scaling, mixing, concentrations).
	I can express a multiplicative relationship between two quantities as a ratio or a fraction. I can find a relevant multiplier when solving problems involving proportion.
	I can understand and use proportion as equality of ratios.
	I can relate ratios to fractions and to linear functions.
	I can compare lengths, areas and volumes using ratio notation.

	I can work with percentages greater than 100%.
	I can solve problems involving percentage change, including original value problems, and simple interest including in financial mathematics.
	I can solve problems involving direct and inverse proportion, including graphical and algebraic representations.
Geometry and Measures: Properties and Structures	I can identify alternate and corresponding angles on parallel lines.
	I can derive and use the sum of angles in a triangle (e.g. to deduce and use the angle sum in any polygon, and to derive properties of regular polygons.) I can understand how to find the angle sum of any polygon.
	I can identify, describe and construct similar shapes, including on coordinate axes, by considering enlargement.
	I can interpret plans and elevations of 3D shapes.
Geometry and Measures: Mensuration and Calculation	I can measure line segments and angles in geometric figures, including interpreting maps and scale drawings and use of bearings. I can understand how to measure and write bearings.
	I can calculate perimeters of 2D shapes, including circles. I can apply the formula for circumference of a circle and I can understand that the circumference of a circle = $2\pi r = \pi d$.
	I can calculate areas of circles and composite shapes. I can apply the formula for area of a circle and know that the area = πr^2.
	I can apply formulae to calculate volume of right prisms (including cylinders.) I can understand that the volume of a prism = area of cross section x length.
Statistics	I can apply statistics to describe a population.
	I can use and interpret scatter graphs of bivariate data.
	I can recognise correlation.
	I can interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate graphical representation involving discrete, continuous and grouped data.

	I can interpret, analyse and compare the distributions of data sets from univariate empirical distributions through appropriate measures of central tendency (median, mean, mode and modal class) and spread (range, including consideration of outliers.) Know to use the midpoints of groups to estimate the mean of a set of grouped data.
Probability	I can apply the property that the probabilities of an exhaustive set of outcomes sum to one; apply the property that the probabilities of an exhaustive set of mutually exclusive events sum to one. I can understand that probability is measured on a 0-1 scale. I can understand that the sum of all probabilities for a single event is 1.
	I can enumerate sets and combinations of sets systematically, using tables, grids and venn diagrams.
	I can construct theoretical possibility spaces for combined experiments with equally likely outcomes and use these to calculate theoretical probabilities.
	I can calculate theoretical probabilities for single events.