Algebra - Notation, vocabulary and manipulation	
KS3 Alg (a)	Use and interpret algebraic notation, including: - ab in place of a × b - 3y in place of y + y + y and 3 × y - a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b - a/b in place of a ÷ b - coefficients written as fractions rather than as decimals - brackets
KS4 Alg (1)	Use and interpret algebraic notation, including: - ab in place of a × b - 3y in place of y + y + y and 3 × y - a^2 in place of a × a, a^3 in place of a × a × a, a^2b in place of a × a × b - a/b in place of a ÷ b - coefficients written as fractions rather than as decimals - brackets
KS3 Alg (b)	Substitute numerical values into formulae and expressions, including scientific formulae
KS4 Alg (2)	Substitute numerical values into formulae and expressions, including scientific formulae
KS3 Alg (c)	Understand and use the concepts and vocabulary of expressions, equations, inequalities, terms and factors
KS4 Alg (3)	Understand and use the concepts and vocabulary of expressions, equations, formulae, identities inequalities, terms and factors
KS3 Alg (d)	Simplify and manipulate algebraic expressions to maintain equivalence by: - Collecting like terms - Multiplying a single term over a bracket - taking out common factors - expanding products of two or more binomials
KS4 Alg (4)	Simplify and manipulate algebraic expressions (including those involving surds **and algebraic fractions)** by: - collecting like terms - multiplying a single term over a bracket - taking out common factors - expanding products of two **or more** binomials - factorising quadratic expressions of the form $x^2 + bx + c$, including the difference of two squares; **factorising quadratic expressions of the form $ax^2 + bx + c$** - simplifying expressions involving sums, products and powers, including the laws of indices
KS3 Alg (e)	Understand and use standard mathematical formulae; rearrange formulae to change the subject
KS4 Alg (5)	Understand and use standard mathematical formulae; rearrange formulae to change the subject
KS4 Alg (6)	Know the difference between an equation and an identity; argue mathematically to show algebraic expressions are equivalent, and use algebra to support and construct arguments **and proofs**
KS4 Alg (7)	Where appropriate, interpret simple expressions as functions with inputs and outputs; **interpret the reverse process as the 'inverse function'; interpret the succession of two functions as a 'composite function'.**
Algebra - Graphs	
KS3 Alg (h)	Work with coordinates in all four quadrants
KS4 Alg (8)	Work with coordinates in all four quadrants
KS3 Alg (i)	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
KS3 Alg (k)	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
KS4 Alg (9)	Plot graphs of equations that correspond to straight-line graphs in the coordinate plane; use the form y = mx + c to identify parallel **and perpendicular lines**; find the equation of the line through two given points, or through one point with a given gradient
KS4 Alg (10)	Identify and interpret gradients and intercepts of linear functions graphically and algebraically
KS4 Alg (11)	Identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically **and turning points by completing the square**
KS4 Alg (12)	Recognise, sketch and interpret graphs of linear functions, quadratic functions, simple cubic functions, the reciprocal function y = 1/x with x ≠ 0, **exponential functions =xyk for positive values of k, and the trigonometric functions (with arguments in degrees) y = sin x , y = cos x and y = tan x for angles of any size**
KS4 Alg (13)	**Sketch translations and reflections of a given function**
KS4 Alg (14)	Plot and interpret graphs (including reciprocal graphs **and exponential 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
KS4 Alg (15)	**Calculate or estimate gradients of graphs and areas under graphs (including quadratic and other non-linear graphs), and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts**
KS4 Alg (16)	**Recognise and use the equation of a circle with centre at the origin; find the equation of a tangent to a circle at a given point.**

Algebra - Solving equations and inequalities	
KS3 Alg (f)	Model situations or procedures by translating them into algebraic expressions or formulae and by using graphs
KS3 Alg (j)	Interpret mathematical relationships both algebraically and graphically
KS3 Alg (l)	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
KS3 Alg (m)	Find approximate solutions to contextual problems from given graphs of a variety of functions, including piece-wise linear, exponential and reciprocal graphs
KS3 Alg (g)	Use algebraic methods to solve linear equations in one variable (including all forms that require rearrangement)
KS4 Alg (17)	Solve linear equations in one unknown algebraically (including those with the unknown on both sides of the equation); find approximate solutions using a graph
KS4 Alg (18)	Solve quadratic equations (**including those that require rearrangement**) algebraically by factorising, **by completing the square and by using the quadratic formula;** find approximate solutions using a graph
KS4 Alg (19)	Solve two simultaneous equations in two variables (linear/linear **or linear/quadratic**) algebraically; find approximate solutions using a graph
KS4 Alg (20)	**Find approximate solutions to equations numerically using iteration**
KS4 Alg (21)	Translate simple situations or procedures into algebraic expressions or formulae; derive an equation (or two simultaneous equations), solve the equation(s) and interpret the solution.
KS4 Alg (22)	Solve linear inequalities in one **or two** variable(**s**), **and quadratic inequalities in one variable**; represent the solution set on a number line, **using set notation and on a graph**
Algebra - Sequences	
KS3 Alg (n)	Generate terms of a sequence from either a term-to-term or a position-to-term rule
KS4 Alg (23)	Generate terms of a sequence from either a term-to-term or a position-to-term rule
KS3 Alg (o)	Recognise arithmetic sequences and find the nth term
KS3 Alg (p)	Recognise geometric sequences and appreciate other sequences that arise.
KS4 Alg (24)	Recognise and use sequences of triangular, square and cube numbers, simple arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric progressions (r^n where n is an integer, and r is a rational number > 0 **or a surd) and other sequences**
KS4 Alg (25)	Deduce expressions to calculate the n^{th} term of linear **and quadratic** sequences.