Higher GCSE 9-1 Algebra content checklist			
Algebra – manipulation equations & inequalities		Graphs	
• Expanding products of two or more binomials: • Expand 2 brackets $(2x + 1)(2x - 3)$ • 3 brackets $(2x + 1)(2x - 3)(3x + 2)$		• Plot straight line graphs using table of values or step method • Use $y = mx + c$ to identify parallel and perpendicular lines(gradient = -1/m) • Find the equation of the line through two given points or through one point with a given gradient $y - y_1 = m(x - x_1)$ • Find the midpoint of a line $(x_1+x_2, y_1 + y_2)/2$	
• Factorising quadratic expressions : $x^2 + 8x + 15$ *and* $5x^2 - 14x - 3$ • Including the difference of two squares: $x^2 - 9$		• Identify and interpret gradients and intercepts of linear functions graphically and algebraically	
• Rearrange formulae to change the subject: Make x the subject • y= mx + c or $y = \frac{3x+4}{x-3}$ (will involve factorising)		• Identify and interpret roots, intercepts, turning points of quadratic functions graphically; deduce roots algebraically and turning points by completing the square	
• Algebraic proofs: • Represent even as 2n, odd as 2n + 1 • Consecutive numbers represent as n, n + 1 • Multiples look for factor eg 4(2n+3) factor of 4		• Recognise, sketch and interpret linear, quadratic, cubic and reciprocal graphs /exponential functions $y = kx$ for positive values of k, • Trigonometric graphs $y = \sin x$, $y = \cos x$ and $y = \tan x$	
• Functions: Composite $f(x) = 2x - 3$ $g(x) = x^2 + 2$ • find $g(-4)$ • Show that $gf(x) = 4x^2 - 12x + 11$ Solve $fg(x) = gf(x)$ • Inverse: Find f^{-1}		• Sketch translations and reflections of a given function	
• Solve linear equations & terms on both sides • Able to form and solve an equation from a simple situation • Harder type: Solve $\frac{2}{y+1} + \frac{3}{2y-3} = 1$ or $\frac{x+1}{2} + \frac{x-3}{4} = 2$ (Cross multiply)		• 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	
• Solve quadratics by • Factorisation: $x^2 + 8x + 15 = 0$ *and* $5x^2 - 14x - 3 = 0$, • Completing the square: Find the values of a and b such that $x^2 + 10x + 40 = (x + a)^2 + b$ and solve giving answer in surd form Using the formula: Solve $2x^2 - 4x - 3 = 0$ (answer to 2dp) By finding approximate solutions from graph		• Calculate gradient: gradients of linear graphs = height / base (draw a rt-angled triangle) or use step method or formula $y_2 - y_1 / x_2 - x_1$ • Areas under graphs: (including quadratic and other non-linear graphs) Split into triangles / trapezia to find the area and interpret results in cases such as distance-time graphs, velocity-time graphs and graphs in financial contexts	

• Solve simultaneous equations • Linear: 2x + 3y = 9 and 3x + 2y = 1, • Non-linear: $x^2 + y^2 = 16$ and $y = 3x - 1$ or $y = x + 2$ and $y = 3x^2$ • Graphically (linear/linear, linear/quadratic, linear/circle) • Worded simultaneous equations		• Recognise and use the equation of a circle with centre at the origin $x^2 + y^2 = r^2$ $x^2 + y^2 = 9^2$ radius = 3 • Find the equation of a tangent to a circle at a given point: perpendicular gradient = -1/m	
• Iteration – find approximate solutions to equations • Show that the equation $x^3 + 5x - 4 = 0$ has a solution between $x = 0$ and $x = 1$ • Show that the equation $x^3 + 5x - 4 = 0$ can be arranged to give $x = \frac{4}{x^2 + 5}$ • Starting with $x_0 = 0$, use the iteration formula $x_{n+1} = \frac{4}{x_n^2 + 5}$ twice, to find an estimate for the solution of $x^3 + 5x - 4 = 0$			
• Solve linear and quadratic inequalities • Represent the solution set on a number line, using set notation and on a graph			
• Recognise and use triangular, square and cube sequences, arithmetic progressions, Fibonacci type sequences, quadratic sequences, and simple geometric sequences (exponential) using ar^{n-1}			
• Calculate the *n*th term of: • A linear sequence: 2, 5, 7, 9 3n -1 • Quadratic sequence 3, 8, 15, 24 $n^2 + 2n + 1$			
• Simplify algebra $\frac{x^2 + 3x - 4}{2x^2 - 5x + 3}$ (factorise first) • Write $\frac{4}{x+2} + \frac{3}{x-2}$ as a single fraction in its simplest form (find a common denominator)			