| Mathematics | **Y10 Higher** | Chapter 15 (N8, A4, A11, A12, A18, A19, A20, A21, A22, R16) | **The Bigger Picture: Quadratics and quadratic graphs** | **Lessons 15** |
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| **Essential Knowledge** | **Teaching Points** |
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| • Sketch a graph of a quadratic function, by factorising or by using the formula, identifying roots, $y$-intercept and turning point by completing the square;<br>• Be able to identify from a graph if a quadratic equation has any real roots;<br>• Find approximate solutions to quadratic equations using a graph;<br>• Expand the product of more than two linear expressions;<br>• Sketch a graph of a quadratic function and a linear function, identifying intersection points;<br>• Sketch graphs of simple cubic functions, given as three linear expressions;<br>• Solve simultaneous equations graphically:<br>• find approximate solutions to simultaneous equations formed from one linear function and one quadratic function using a graphical approach;<br>• find graphically the intersection points of a given straight line with a circle;<br>• solve simultaneous equations representing a real-life situation graphically, and interpret the solution in the context of the problem;<br>• Solve quadratic inequalities in one variable, by factorising and sketching the graph to find critical values;<br>• Represent the solution set for inequalities using set notation, i.e. curly brackets and 'is an element of' notation;<br>• for problems identifying the solutions to two different inequalities, show this as the intersection of the two solution sets, i.e. solution of $x^2 - 3x - 10 < 0$ as $\{x: -3 < x < 5\}$;<br>• Solve linear inequalities in two variables graphically;<br>• Show the solution set of several inequalities in two variables on a graph;<br>• Use iteration with simple converging sequences. | • The extent of algebraic iteration required needs to be confirmed.<br>• You may want to extend the students to include expansions of more than three linear expressions.<br>• Practise expanding 'double brackets' with all combinations of positives and negatives.<br>• Be mindful that set notation is a new topic. |
| **Assumed Prior Knowledge/ Links / Interleaving** | |
| • Students should be able to solve quadratics and linear equations.<br>• Students should be able to solve simultaneous equations algebraically. | |

| Potential Barriers to Access /Misconceptions | Opportunities for Reasoning/Problem Solving/Proofs |
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| • When estimating values from a graph, it is important that students understand it is an 'estimate'.<br>• It is important to stress that when expanding quadratics, the $x$ terms are also collected together.<br>• Quadratics involving negatives sometimes cause numerical errors. | • Match equations to their graphs and to real-life scenarios.<br>• "Show that"-type questions will allow students to show a logical and clear chain of reasoning |

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| **Key Mathematical Vocabulary** | Sketch, estimate, quadratic, cubic, function, factorising, simultaneous equation, graphical, algebraic |