

## Year 3 Express Additional Mathematics Course Outline

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<b>Topic 0</b>	<b>Common Conceptual Mistakes in Algebra</b>
0.1	Common Conceptual Mistakes in Algebra
<b>Topic 1</b>	<b>Simultaneous Equations</b>
1.1	Solving Simultaneous Linear and Non-linear Equations in two variables by Substitution and Elimination
1.2	Solving Simultaneous Equations in Word Problems
<b>2</b>	<b>Quadratic Functions, Equations and Inequalities</b>
2.1	Discriminant and Nature of Roots, including conditions for always positive or always negative quadratic functions
2.2	Solving Quadratic Inequalities
2.3	Use of Quadratic Functions as models
<b>Topic 3</b>	<b>Polynomials and Partial Fractions</b>
3.1	Polynomial Identities, Multiplication & Division of Polynomials
3.2	Remainder and Factor Theorem, and Solving Cubic Equations
3.3	Use of sum and difference of cubes
3.4	Partial Fractions
<b>Term 2</b>	
<b>Topic 4</b>	<b>Coordinate Geometry</b>
4.1	Midpoint, Distance, Gradient, Areas of Triangles and Quadrilaterals, Equation of a Straight Line
4.2	Collinear Points, Parallel Lines and Perpendicular Lines, Perpendicular Bisectors
4.3	Coordinate geometry of Circles
<b>Topic 5</b>	<b>Surds and Exponential Equations</b>
5.1	Surds – Four operations on surds, including rationalizing the denominator and solving equations involving surds
5.2	Indices – Laws of Indices and Solving Exponential Equations of the form $a^x = a^m$
5.3	Graphs of Exponential Functions
<b>Topic 6</b>	<b>Logarithms</b>
6.1	Logarithmic Functions including the Laws of Logarithm, Equivalence of $y = a^x \Leftrightarrow x = \log_a y$
6.2	Common and Natural Log, and Change of Base of Logarithms
6.3	Solving Logarithmic Equations and Exponential Equations of the form $a^x = b$
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6.5	Use of exponential and logarithmic functions as models
<b>Term 3</b>	
<b>Topic 7</b>	<b>Linear Law</b>
7.1	Transforming given relationships to linear form to determine unknown constants from given linear graphs
<b>Topic 8</b>	<b>Trigonometric Functions and Graphs</b>
8.1	Six Trigonometric Functions of Angles (in degrees and radians)
8.2	Exact values of trigonometric functions for special angles
8.3	Amplitude, periodicity, and symmetries related to Trigonometric Functions
8.4	Graphs of Trigonometric Functions
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9.1	Use of Trigonometric identities to solve Trigonometric Equations
9.2	Proofs of simple Trigonometric identities
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10.1	Use of Notations $n!$ and ${}^n C_r$
10.2	Use of the Binomial Theorem in binomial expansions
10.3	Use of the General Term ${}^n C_r a^{n-r} b^r$