

**Learning Programme – A-Level Mathematics – Lower Sixth**

Topic/Teacher	Content/Objectives/Skills	Homework	Assessment	Success Criteria (A-Level grades)	Stretch & Challenge (Thirst for Learning)
<b>Michaelmas First Half Term</b>					
<b>Differentiation Basics (A)</b>	Differentiation from first principles (for small positive powers of $x$ ) to find the gradient. Differentiating simple polynomial expressions with positive and negative integer powers. Notation and nomenclature associated with differentiation; gradient, $dy/dx$ , $f'(x)$ .	Assessment Homework – A-Level Pre-Test		Determined from class work & homework may also be used.	Students will be challenged using extension questions on the topics they are studying, designed to develop their ability to solve multi-staged problems.
<b>Indices (A)</b>	Understand and be able to use the laws of indices for all rational exponents, including multiply, divide, one power to another. Includes negative, fractional and zero indices. Solve problems involving the application of one or more of the laws of indices.				
<b>Differentiation Basics continued (A)</b>	Differentiating polynomial expressions with fractional powers. Re-arranging expressions before differentiation (e.g. multiplying out brackets, separating terms with common denominator, $1/x$ terms).	Assessment Homework – Differentiation 1			
<b>Differentiation to find gradient (A)</b>	Differentiation to find the gradient of a curve at a point. Finding a point on a curve with a given gradient. Equation of the tangent at a given point.  Equation of the normal at a given point.				
<b>Differentiation to find stationary points (A)</b>	Finding stationary points of quadratic and cubic functions. Find the range of $x$ values for increasing and decreasing functions. Basic curve sketching showing stationary points and $y$ intercept.				
<b>Second Derivatives (A)</b>	Differentiate twice to find the rate of change of gradient and to find the nature of stationary points (points of inflection not included). Notation associated with second derivatives; $d^2y/dx^2$ , $f''(x)$ .	Assessment Homework – Differentiation 2			

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<b>Straight lines (B)</b>	<p>Given the co-ordinates of the end points find the :            Length, midpoint &amp; gradient of a line-segment.            Finding gradient and intercept of a straight line from its equation and vice versa, in the form <math>y=mx+c</math>            Finding the equation of a line (and a perpendicular line) from its gradient and a point it passes through, in the forms <math>y-y_1=m(x-x_1)</math> and <math>ax+by+c=0</math>            Finding the coordinates of where a line crosses the axes.            Finding the areas of a right angle triangle with given vertices.            Be able to use straight line graphs to solve rate of change problems.</p>	Assessment Homework – A-Level Pre-Test		Determined from class work & homework may also be used.	Students will be challenged using extension questions on the topics they are studying, designed to develop their ability to solve multi-staged problems.
<b>Surds (B)</b>	<p>Simplifying surds by identifying square factors, simplifying expressions, multiplying brackets involving surds.            Rationalising the denominator.            Fraction arithmetic involving fractional surds.</p>	Assessment Homework – Surds & Straight Lines			
<b>Quadratics (B)</b>	<p>Factorising quadratic expressions, solving quadratic equations by factorising and sketching quadratic equation.            Be able to ‘complete the square’ of quadratic expressions, and using completing the square to solve quadratic equations and to find max/min points (vertex) and the line of symmetry of a quadratic curve.            Solving quadratic equations using the quadratic formula (including using calculator functions).            Determining and using the discriminant.            Solving disguised quadratic equations using substitution.</p>	Assessment Homework – Quadratics			
<b>Simultaneous Equations (B)</b>	<p>Solving linear simultaneous equations by elimination and substitution.            Solving linear &amp; quadratic simultaneous equations by substitution.</p>				