**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y12** | **Topic 5.2 Coordinate Geometry, Circles and Differentiation** |

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| ***What and Why*:** In this unit, you will begin by learning about circles, the equations that define them, and their properties. You will then move on to one of the most important concepts that we learn in A-level maths – Differentiation. You will apply your understanding of limits to smoothly changing functions, applying it to the formal understanding of gradients and learning rules for some common functions. |

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| **Key terms**  **Coordinate Geometry (Straight lines)**   * Understand and use the equation of a straight line, including the forms y − y1 = m x − x1 and * ax + by + c = 0 * Use and apply gradient conditions for two straight lines to be parallel or perpendicular | **Coordinate Geometry (Circles)**   * Understand and use the coordinate geometry of the circle including using the equation of a circle in the form (x – a)2 +(y – b)2 = r2 * completing the square to find the centre and radius of a circle * use of the following properties:  1. the angle in a semicircle is a right angle 2. the perpendicular from the centre to a chord bisects the chord 3. the radius of a circle at a given point on its circumference is perpendicular to the tangent to the circle at that point. | **Differentiation**   * Understand and use the derivative of f(x) as the gradient of the tangent to the graph of y = f x at a general point ( x , y ) * Understand and use the gradient of the tangent as a limit * Understand and interpretation as a rate of change * Sketching the gradient function for a given curve * second derivatives * differentiation from first principles for small positive integer powers of x and for sin x and cos x * Understand and use the second derivative as the rate of change of gradient * connection to convex and concave sections of curves and points of inflection. * Apply differentiation to find gradients, tangents and normals, maxima and minima and stationary points, points of inflection. * Identify where functions are increasing or decreasing. | **Applications of Differentiation**   * Differentiate x n , for rational values of n , and related constant multiples, sums and differences. * Differentiate e kx and a kx , sin kx , cos kx , tan kx and related sums, differences and constant multiples. Understand and use the derivative of ln x * Differentiate using the product rule, the quotient rule and the chain rule, including problems involving connected rates of change and inverse functions Differentiate simple functions and relations defined implicitly or parametrically, for first derivative only. * Construct simple differential equations in pure mathematics and in context |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| G1-G6 | **Topics you should be confident in prior to unit:**   * Linear coordinate geometry including gradients, tangents * Equation of a circle * Indices and Surds   **Websites**  <https://revisionmaths.com/advanced-level-maths-revision/pure-maths/calculus/differentiation-first-principles> | * End of unit assessment * 50% seen * 50% unseen * 90% pass needed or resit required. | Kerboodle Online Login  My Maths  Exam Solutions  Maths Genie | **Article**: The history of the Morse Code: <https://nrich.maths.org/2198>  **Ted Talk**  Mathematics is the sense you never knew you had  <https://www.youtube.com/watch?v=PXwStduNw14> |

**Pre-assessment content review**

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| I feel secure in | I need to focus on | My action plan |

**Pre-assessment skills review**

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| I feel secure in | I need to focus on | My action plan |

**Post-assessment review**

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| Weaknesses in content knowledge | Skills I need to focus on | My action plan |
| Retest / review – teacher and student comment | | |

**Revision planning**

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| Spec point | Notes complete | Revision materials | Past paper Qs | Timed conditions |
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