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**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y13** | **Topic 1.2 Differentiation** |

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| ***What and Why*** “Learning how to deal with continuously varying quantities and their rates of change through the idea of calculus and the derivative, and developing you technical ability to carry out a wide range of differentiation and apply all of this to modelling and problem solving situations. Differential calculus is one the cornerstones of higher mathematics and central to the mathematics A Level specification.” |

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| **Key terms**  Gradient  Secant  Tangent  Limit  Tend to  Derivative  Differentiate  First principles  Composite function  Chain rule | Product Rule  Quotient Rule  Parametric  Implicit  Second derivative  Modelling  Rate of change  Maxima and minima  exponential  natural logarithm | **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/use the gradient of the tangent as a limit * Understand and interpret derivative 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 * Identify where functions are increasing or decreasing using derivative * Understand the exponential function and its inverse, the natural logarithm | **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 * Understand and apply the relation between dy/dx and dx/dy * Differentiate simple functions and relations defined implicitly or parametrically, for first derivative only. * Construct and solve simple models involving rates of change and derivatives * Solve maximisation and minimisation problems using the second derivative * Be able to use numerical methods such as Newton-Raphson which use the derivative to find approximate roots to equations- and understand the limitations of such methods |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| G1-G5 and F1-F3 | **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, which will also include selected year 12 material * 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>  History of calculus (**video** done in a fun way on Maths with Lisa):<https://www.youtube.com/watch?v=6wb60tcilMQ> |

**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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