**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y13** | **Unit 8 Numerical Methods** |

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| ***What and Why*** “There are many problems in maths where finding an exact “analytic” solution is either impossible or impartially difficult. But there are a host of methods for finding solutions using numerical methods or approximations. In the age of digital computers these have become ever more important. In this unit you will study some of these. You have already met some, the Netwon-Raphson method, when you studied differentiation, and the trapezium rule when you studied integration. You will revise both of these and also learn others from change of sign to cobweb and staircase diagrams.” |

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| **Key terms:**  Root  Interval  Iteration  Well-behaved  Converge  Diverge  Cobweb  Staircase  Limit  Trapezium | **Key ideas**   * Understand what is meant by the root of an equation * Understand the difference between an exact analytic and a numerical solution to an equation * Understand why change of sign indicates a root in an interval, and when this approach fails * Understand what a cobweb and staircase iteration converges to a root, and when they will fail and diverge * Deepen your understanding of, and the limitations, of both Newton-Raphson for finding roots and the trapezium rule for finding definite integrals * Understand how trapeziums can be used to approximate definite integrals * Understand the derivation of the Trapezium rule and how it is used- and its limitations | **Applications and skills:**   * Be able to use change of sign to find a root to a given accuracy in an interval, and judge when this method will fail * Be able to construct cobweb and staircase diagrams to converge on a root to a given degree of accuracy- and judge when these will fail and diverge * Apply general iterative formulae to find roots * Become fluent in using Newton-Raphson to find roots, and identify when and how this will fail * Become fluent in using trapezium rule to find definite integrals, and identify when this will give under or over estimates of solution. |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| I1- I4 | **Topics you should be confident in prior to unit:**  The material you learned on Newton-Raphson in Differentiation and on Trapezium rule in Integration 1. Also you need to be confident in using a graphical calculator to carry out iterations. | * 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 | **VIDEOS: ????**  **Enrichment:** Some interesting problems on numerical methods, including exploring how Archimedes calculated the value of PI more accurately than anyone had ever done before  [**https://nrich.maths.org/8603**](https://nrich.maths.org/8603) |

**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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