**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y13** | **Topic 3.1 Exponentials and Logarithms** |

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| ***What and Why*** “You have already met logarithms in year 12. You have also met the number e and the function e^x, and its inverse the natural logarithm ln(x). In this unit after a short review of all of that you will go on to explore how you can use log graphs to reduce relationships of a power law to a linear law, and to estimate relevant parameters in such a relationship using the graphs. This is of immense practical value in all areas of science- where such power laws are found in everything from astronomy to earthquakes and the science of sound. You will also look more generally at how many situations of growth and decay can be mathematically modelled using exponential functions, as well as understanding the limitations of such models. This is crucial in areas of science from biology to economics.” |

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| **Key terms:**  Power  Exponential  E  Logarithm  Natural Logarithm  Power Law  Linear Law  Parameter | **Key ideas**   * Recap and consolidate understanding of laws of logs * Recap and consolidate understanding of e, e(x) and ln(x) * Understand how a power law can be reduced to a linear law by the use of logs * Understand how to estimate parameters in a power law by interpreting a log graphs and interpreting data. * Understand how exponential function can be used to model situations of growth and decay, and also understand the limitations of such models | **Applications and skills:**   * Become fluent in applying the laws of logarithms, including in solving power and log equations * Become fluent in the properties, graphs and behavior of the functions e(x) and ln(x) * Be able to reduce a power law to a linear law by using a suitable log graph * Use data and graphs to estimate parameters in such a linear law and link them back to parameters in the associated power law * Construct mathematical models in situations of growth and decay using exponential functions, including where the use of calculus is required * Be able in interpret such models, including judging their limitations or range of validity. |

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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| H5 H6 | **Topics you should be confident in prior to unit:**  The material you learned in year 12 on logarithms and the materials you learned in units on functions, differentiation and integration on e(x) and ln(x). | * 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:** Useful overview of where log scales are used in science  [**https://www.youtube.com/watch?v=ESjqQRsOZ\_I**](https://www.youtube.com/watch?v=ESjqQRsOZ_I)  **Enrichment:** Very useful collections of problems that will deepen your understanding of logs and exponentials  [**https://nrich.maths.org/public/topic.php?group\_id=7&code=-109**](https://nrich.maths.org/public/topic.php?group_id=7&code=-109)  [**https://undergroundmathematics.org/exp-and-log**](https://undergroundmathematics.org/exp-and-log) |

**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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