**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y13** | **Topic 4.1 Mechanics- Dynamics** |

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| ***What and Why*** “You have already worked on Kinematics, the mathematical analysis of motion. So far we have only considered what happens in motion without considering what causes the motion or change in motion. Now you will do just that by studying the mathematics of dynamics - looking at the forces which cause motion or change in motion. You will look at Newton’s Laws, the key to all dynamics, and study their application in situations of equilibrium and of acceleration. These will include looking at problems involving smooth surfaces but also where friction comes into play. You will also look at the dynamics of connected particles. Finally you will look ash important idea of turning force and moments. This unit is crucial to applying mathematics to the real world and is vital for anyone going on to do any kind of mathematics, science or engineering degree.” |

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| **Key terms:**ForceEquilibriumResolveResultantComponentMoment | **Key ideas*** Understand what force is and its relation to acceleration
* Know and understand Newton’s three laws of motion
* Know that equilibrium requires zero resultant force in any direction
* Know that acceleration will be in the direction and of a magnitude given the net resultant force
* Understand what friction is, the idea of limiting friction, and the empirical laws governing friction including the coefficient of friction
* Understand modelling assumptions such as a light inextensible string in the case of connected particles
* Understand how connected particles behave
* Understand what a moment is and how to find the resultant turning force
 | **Applications and skills:*** Be able to apply Newton’s 3 laws fluently in situations both of static equilibrium and of resultant force causing acceleration
* Be able to use 2D vector representations, including canonical vectors i and j, to solve problems involving Newton’s laws
* Be able to apply this understanding to problems involving smooth inclined planes
* Be able to apply an understanding of friction to problems on both horizontal and inclined rough surfaces
* Be able to use Newton’s laws to deal with connected particle problems
* Be able to apply understanding of moments to solve simple static problems
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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| R1- R6 and S1 | **Topics you should be confident in prior to unit:**The material you learned in year 12 and 13 on Kinematics | * End of unit assessment, which will also include selected year 12 material
* 50% seen
* 50% unseen
* 90% pass needed or resit required.
 | Kerboodle Online LoginMy MathsExam SolutionsMaths Genie  | **VIDEOS:** Useful video on the maths of Newton’s Laws:[**https://www.gresham.ac.uk/lectures-and-events/newtons-laws**](https://www.gresham.ac.uk/lectures-and-events/newtons-laws)and another video on the achievements of Newton:[**https://www.gresham.ac.uk/lectures-and-events/newton**](https://www.gresham.ac.uk/lectures-and-events/newton)**Enrichment:** Large collection of problems and articles that will really depend your understanding of mechanics:[**https://nrich.maths.org/9012**](https://nrich.maths.org/9012) |

**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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