**LANGDON PARK SIXTH FORM**

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| **Subject: Mathematics** | **Year: Y13** | **Topic 3.2 Mechanics- Kinematics in 2D** |

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| ***What and Why*** “You have already met kinematics, the mathematics of motion, in year 12. There all the problems you looked at were in one dimension. In this unit we extend that knowledge of kinematics to problems in 2D, such as projectiles and also in situations where you need to use 2D vectors. As well as situations in which acceleration is constant you will also explore situations where acceleration is variable and you need to use calculus. This mathematic is crucial to more realistic modelling of the real world, and a vital foundation for anyone thinking of going on to do a degree in science or engineering.” |

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| **Key terms:**KinematicsDisplacementDistanceVelocitySpeedAccelerationConstant Variable | VectorCanonicalProjectileResolveComponentResultantMagnitudeRange | **Key ideas*** Recap and consolidate understanding of 1D kinematics and "suvat" constant acceleration equations in 1D from year 12
* Understand how to resolve motion of a projectile into vertical and horizontal components and use this to solve problems
* Understand how to represent motion using vectors in 2D, including the use of canonical vectors i and j
* Understand how to generalise the constant acceleration equations to 2D situations involving vector representation
* Understand that in situations with variable acceleration you cannot use the constant acceleration equations but instead must use calculus
* Understand the differential and integral relations between different kinematic quantities in situations of variable acceleration
* Understand how kinematic situations can me modelled use all of the above mathematics
 | **Applications and skills:*** Become fluent in applying the suva constant acceleration equations to all 1D situations
* Be able to accurately apply your understanding of resolving vectors to deal with projectiles by using horizontal and vertical components
* Become fluent in using 2D vector representations, including canonical vectors i and j
* Construct suitable kinematic models in 2D and using vector kinematics to solve and interpret solutions
* Be able to apply calculus to kinematic situations with variable acceleration, and be fluent in using differentiation and integration to move between different kinematic quantities
* Be able to use initial or boundary conditions to find values of arbitrary constants when using integration to solve kinematic problems
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| **Specification point** | **Pre-reading** | **Application and Assessment (date)** | **Independent learning** | **Extension – Cultural Capital and Reading** |
| Q1- Q5 | **Topics you should be confident in prior to unit:**The material you learned in year 12 kinematics, especially velocity time graphs and the “suvat” constant acceleration equations | * 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 history of mathematical understanding of projectiles[**https://www.gresham.ac.uk/lectures-and-events/mathematics-war-peace**](https://www.gresham.ac.uk/lectures-and-events/mathematics-war-peace)**Enrichment:** Useful collections of problems that will deepen your understanding of kinematics[**https://nrich.maths.org/9050**](https://nrich.maths.org/9050) |

**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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