**Little Heath Sixth Form**

**Mathematics (Mechanics 1)**

 Personal Learning Checklist

**Student Name: ……………………….…………………………………..………**

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| **Unit Name:** **Mathematics (Mechanics 1)** | **Unit Code:** **MM1B** |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

*KEY:* ***Red =*** *with difficulty* ***Amber*** *= not sure* ***Green*** *= yes*

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| --- | --- | --- | --- |
| **GCSE Re-Cap (Skills and Knowledge)** | **Red** | **Amber** | **Green** |
| * SOHCAHTOA and Pythagoras’ Theorem
 |  |  |  |
| * Sine rule and cosine rule
 |  |  |  |
| * Substitution into formulae
 |  |  |  |
| * Changing the subject of an equation
 |  |  |  |

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| --- | --- | --- | --- | --- |
| **Skills/Knowledge/Specification** | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| **KINEMATICS OF A PARTICLE MOVING IN A STRAIGHT LINE WITH CONSTANT ACCELERATION** |  |  |  |  |
| * Know and use v = u + at
 |  |  |  |  |
| * Know and use v2 = u2 + 2as
 |  |  |  |  |
| * Know and use s = ut + $\frac{1}{2}$at2
 |  |  |  |  |
| * Know and use s = vt - $\frac{1}{2}$at2
 |  |  |  |  |
| * Know and use s = $\frac{\left(u + v\right)}{2}t$
 |  |  |  |  |
| * Apply the above equations to vertical motion under gravity using g = 9.8ms-2
 |  |  |  |  |
| * Sketch velocity/time graphs from given information
 |  |  |  |  |
| * Use the gradient of a section of a velocity/time graph to calculate acceleration
 |  |  |  |  |
| * Use the area under a velocity/time graph to calculate/equate to total distance
 |  |  |  |  |
| **DYNAMICS OF A PARTICLE MOVING IN A STRAIGHT LINE WITH CONSTANT ACCELERATION** |  |  |  |  |
| * Know and use F = ma
 |  |  |  |  |
| * Resolve forces into horizontal and vertical components and use with F = ma
 |  |  |  |  |
| * Resolve forces into perpendicular and parallel components on a slope and use with F = ma
 |  |  |  |  |
|  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Use friction = µR in problems involving F = ma in any of the above contexts
 |  |  |  |  |
| * Understand tension and thrust and how to represent them on a force diagram
 |  |  |  |  |
| * Solve connected particle problems involving pulleys, including particles on slopes
 |  |  |  |  |
| * Solve connected particle problems involving a car and trailer including on a slope
 |  |  |  |  |
| **MOMENTUM** |  |  |  |  |
| * Calculate the momentum of a body using mass x velocity
 |  |  |  |  |
| * Use conservation of momentum with colliding particles
 |  |  |  |  |
| * Use conservation of momentum with exploding shells and bullets/guns
 |  |  |  |  |
| * Use conservation of momentum in 2-d form using vector notation
 |  |  |  |  |
| **STATICS OF A PARTICLE** |  |  |  |  |
| * Use the cos and sin rules to find the magnitude and direction of a resultant force
 |  |  |  |  |
| * Use resolving and trig/Pythagoras’ to find the magnitude and direction of a resultant force
 |  |  |  |  |
| * Use resolving to find an unknown force in equilibrium situations
 |  |  |  |  |
| * Use friction = µR in equilibrium problems, including on slopes
 |  |  |  |  |
| * Resolve forces into horizontal and vertical components in equilibrium problems
 |  |  |  |  |
| * Resolve forces into perpendicular and parallel components on a slope in equilibrium problems
 |  |  |  |  |
| **VECTORS** |  |  |  |  |
| * Understand that vectors can represent any quantity with magnitude and direction
 |  |  |  |  |
| * Calculate the magnitude and direction of a given vector and interpret the magnitude
 |  |  |  |  |
| * Understand how to calculate and use unit vectors
 |  |  |  |  |
| * Use **F** = m**a** and **v** = **u** + **a**t as vector equations for 2-D acceleration problems
 |  |  |  |  |
| * Use **r** = **r0** + t**v** to find the position of a particle moving in 2-D at time t
 |  |  |  |  |
| * Use **ArB** = **rA - rB** to find the position vector of A relative to B
 |  |  |  |  |
| * Calculate the closest distance between two moving objects using modulus of **ArB**
 |  |  |  |  |
| * Calculate the time for which two objects are within a certain distance of each other
 |  |  |  |  |
| **PROJECTILES** |  |  |  |  |
| * Calculate the motion of a particle in two dimensions. You may quote the formula x = V cos αt and y = Vsin αt – ½ gt2 or use suvat
 |  |  |  |  |
| * Calculate the range
 |  |  |  |  |
| * Calculate the time of flight
 |  |  |  |  |
|  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| * Calculate the maximum height
 |  |  |  |  |
| * Find the initial speed and the angle of projection
 |  |  |  |  |
| * Solve questions taking into account different release heights
 |  |  |  |  |

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| **REVISION****Use the information on this checklist to make revision cards and notes** |

**Grade tracking:**

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| --- | --- | --- | --- | --- | --- |
| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
|  |  |  |  |  |  |
| *Grade* | *Date* | *Grade* | *Date* | *Grade* | *Date* |
|  |  |  |  |  |  |

*Note: You should discuss this checklist regularly with your subject teacher/mentor*