**Little Heath Sixth Form**

**Physics A2** Personal Learning Checklist

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

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| **Unit Name:** Unit 4 –Fields and further mechanics  (Side A teacher) | **Unit Code:**PHYA4 |
| *Minimum Target Grade:* | *Aspirational Target Grade:* |

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

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| **Knowledge/Specification**  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| 3.4.1 **Further Mechanics** |  |  |  |  |
| **Momentum concepts** |  |  |  |  |
| * Force as the rate of change of momentum

 |  |  |  |  |
| * Impulse is FΔt = Δ(mv)
 |  |  |  |  |
| * I know that the area under a force-time graph is the change in momentum (impulse) FΔt
 |  |  |  |  |
| * I can use the above equations to explain how to:
1. Reduce the force in collisions
2. Increase the change of momentum in sports
 |  |  |  |  |
| * I can use the above equations to calculate the force applied to a surface which stops moving water or air (e.g knowing the density, speed and cross-sectional area of the air/water).
 |  |  |  |  |
| * I can explain the difference between an elastic and an inelastic collision or explosion.
 |  |  |  |  |
| * I can apply the principles of conservation of linear momentum to both elastic and inelastic collisions and explosions.
 |  |  |  |  |
| **Circular motion** |  |  |  |  |
| * I understand and can explain that if an object is moving in a circular path at constant speed it is acceleration as its direction and therefore velocity is constantly changing and so requires a centripetal force, which acts to the centre of curvature.
 |  |  |  |  |
| * I can explain why the centripetal force must act at right-angles to the velocity
 |  |  |  |  |
| * I can derive the equation for Angular speed:

$$ω= \frac{2π}{T}=2πf$$and is measured in$ $rads-1  |  |  |  |  |

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| **Knowledge/Specification**  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| **Circular motion (continued)** |  |  |  |  |
| * I can derive the equation for linear speed:

$$v= \frac{2πr}{T}= ωr$$and is measured in$ $ms-1 |  |  |  |  |
| * Centripetal acceleration is given by:

 |  |  |  |  |
| * Centripetal force is give by the equation:

 |  |  |  |  |
| * I can identify the force which provides the centripetal force in a number of situations and calculate it, e.g:
* Car going round a corner/roundabout
* Person on a revolving roundabout
* Car going round on a banked track
* Air craft turning in the air
* Car going over a humpback bridge
* Person on a rollercoaster loop the loop at the bottom of the ride.
* Person on a rollercoaster loop the loop at the top of the ride
* Electron orbiting the nucleus
* Moving charged particle in an magnetic field
 |  |  |  |  |
| **Simple harmonic motion** |  |  |  |  |
| * Characteristic features of simple harmonic motion.
 |  |  |  |  |
| * Condition for shm:

 |  |  |  |  |
| * Graphical representations linking *x*, *v*, *a* and *t* .
 |  |  |  |  |
| * Velocity as gradient of displacement-time graph.
 |  |  |  |  |
| * Maximum speed = 2πfA
 |  |  |  |  |
| * Maximum acceleration = (2πf)2A
 |  |  |  |  |
| **Simple harmonic systems** |  |  |  |  |
| * Study of mass-spring system.

 |  |  |  |  |
| * Study of simple pendulum.

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| * Variation of *E*k, *E*p and total energy with displacement, and with time.
 |  |  |  |  |

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| **Knowledge/Specification**  | **Red** | **Amber** | **Green** | **To address this before the exam I will:-** |
| Forced vibrations and resonance |  |  |  |  |
| * Qualitative treatment of free and forced vibrations.
 |  |  |  |  |
| * Resonance and the effects of damping on the sharpness of resonance.
 |  |  |  |  |
| * Phase difference between driver and driven displacements.
 |  |  |  |  |
| * Examples of these effects in mechanical systems and stationary wave situations.
 |  |  |  |  |
| **3.4.2 Gravitation** |  |  |  |  |
| Newton's law |  |  |  |  |
| * Gravity as a universal attractive force acting between all matter.

Force between point masseswhere *G* is the gravitational constant. |  |  |  |  |
| **Gravitational field strength** |  |  |  |  |
| * Concept of a force field as a region in which a body experiences a force.

Representation by gravitational field lines. |  |  |  |  |
| * g as force per unit mass defined by

 |  |  |  |  |
| * Magnitude of *g* in a radial field given by

 |  |  |  |  |
| **Gravitational potential** |  |  |  |  |
| * Understanding of the definition of gravitational potential, including zero value at infinity, and of gravitational potential difference.
 |  |  |  |  |
| * Work done in moving mass *m is* given by:

 |  |  |  |  |
| * Gravitational potential of *V* in a radial field given by:

 |  |  |  |  |
| * Graphical representations of variations of *g* and *V* with *r.*
* V related to *g* by

 |  |  |  |  |
| **Orbits of planets and satellites** |  |  |  |  |
| * Orbital period and speed related to radius of circular orbit.
 |  |  |  |  |
| * Energy considerations for an orbiting satellite.
 |  |  |  |  |
| * Significance of a geosynchronous orbit.
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| **REVISION****Use the information on this checklist to make revision cards and notes** |

**Grade tracking:**

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| **Graded activity for unit 4 Side A** | **Grade** | **Date** |
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*Note: You should discuss this checklist regularly with your subject teacher/mentor*