**AS Level Mechanics 1**

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|  | **What You Need To Know** | pe03020_[1] | pe03018_[1] | pe03019_[1] |
| 1. Mathematical Modelling | * Use of assumptions in simplifying reality. * Mathematical analysis of models. * Interpretation and validity of models. This includes commenting on the modelling assumptions made when using the terms such as particle, light, inextensible string, smooth surface and motion under gravity. * Refinement and extension of models. |  |  |  |
| 1. Kinematics in 1 and 2 Dimensions | * Displacement, speed, velocity, acceleration. Understanding the difference between displacement and distance. * Sketching and interpreting kinematics graphs, and use the gradient and area under graphs to solve problems. * Use the constant acceleration equations. * Vertical motions under gravity. * Average speed and average velocity. * Application of vectors in 2D to represent position velocity or acceleration. * Use of unit vectors **i** and **j** * Magnitude and direction of quantities represented by a vector. * Finding position, velocity, speed and acceleration of a particle moving in 2D with constant acceleration. * Problems involving resultant velocities, including solution using either vectors or vector triangles. |  |  |  |
| 1. Static and Forces | * Drawing force diagrams, identifying forces present and clearly labelling diagrams. * Force of gravity. * Friction, limiting friction, coefficient of friction and the relationship of . * Normal reaction forces. * Tensions in strings and rods, thrust in rods. * Modelling forces as vectors. Only in 2D * Finding the resultant force acting on a particle. * Knowledge that the resultant force is zero if the body is in equilibrium. This is used to find unknown forces on a body at rest. |  |  |  |
| 1. Momentum | * Concept of momentum. * The principle conservation of momentum applied to 2 particles. |  |  |  |
| 1. Newton’s Laws of Motion | * Newton’s 3 laws of motion in 1D and 2D. * Simple applications of the above to the linear motion of a particle of constant mass. Including particles moving up or down an inclined plane. * Use of as a model for dynamic friction. |  |  |  |
| 1. Connected Particles | * Connected particle problems that include:   + 2 particles connected by a light inextensible string passing over a smooth fixed peg   + Car and a trailer etc. |  |  |  |
| 1. Projectiles | * Motion of a particle under gravity in 2D and be aware of any assumptions you make. * Calculate the range, time of a flight and maximum height. Also the initial speed or angles of the projectile. * Modification of equations to take account of the height of release. |  |  |  |