AS Level Mechanics 1

	What You Need To Know			
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.			
2. 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.			
3. 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 $F \leq \mu R$. • 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.			

4. Momentum	• Concept of momentum. • The principle conservation of momentum applied to 2 particles.			
5. 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 $F \leq \mu R$ as a model for dynamic friction.			
6. Connected Particles	• Connected particle problems that include: o 2 particles connected by a light inextensible string passing over a smooth fixed peg o Car and a trailer etc.			
7. 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.			