Unit 2 Physics Name………………………

Key knowledge	Level of understanding		
	L	M	H
Area of Study 1: How can motion be described and explained			
identify parameters of motion as vectors or scalars			
analyse graphically, numerically and algebraically, straight-line motion under constant acceleration: $v = u + at,\ v^2 = u^2 + 2as,\ s = \frac{1}{2}(u + v)t,\ s = ut + \frac{1}{2}at^2,\ s = vt - \frac{1}{2}at^2$			
graphically analyse non-uniform motion in a straight line			
apply concepts of momentum to linear motion: $p = mv$.			
explain changes in momentum as being caused by a net force: $F_{net} = \frac{\Delta p}{\Delta t}$			
model the force due to gravity, F_g, as the force of gravity acting at the centre of mass of a body, $F_g = mg$, or $W = mg$ where g is the gravitational field strength (9.8 N kg^{-1} near the surface of Earth)			
model forces as vectors acting at the point of application (with magnitude and direction), labelling these forces using the convention 'force on A by B' or $F_{\text{on A by B}} = -F_{\text{on B by A}}$			
apply Newton's three laws of motion to a body on which forces act: $a = \frac{F_{net}}{m}$, $F_{\text{on A by B}} = -F_{\text{on B by A}}$			
apply the vector model of forces, including vector addition and components of forces, to readily observable forces including the force due to gravity, friction and reaction forces			
calculate torque: $\tau = r_{\perp}F$			
investigate and analyse theoretically and practically translational forces and torques in simple structures that are in rotational equilibrium.			
apply the concept of work done by a constant force using: —work done = constant force × distance moved in direction of force: $W = Fs$ —work done = area under force-distance graph			
investigate and analyse theoretically and practically Hooke's Law for an ideal spring: $F = -k\Delta x$			
analyse and model mechanical energy transfers and transformations using			

energy conservation: —changes in gravitational potential energy near Earth's surface: $E_g = mg\Delta h$ —potential energy in ideal springs: $E_s = \frac{1}{2}k\Delta x^2$ —kinetic energy: $E_k = \frac{1}{2}mv^2$			
analyse rate of energy transfer using power: $P = \frac{E}{t}$			
calculate the efficiency of an energy transfer system: $\eta = \frac{\text{useful energy out}}{\text{total energy in}}$			
analyse impulse (momentum transfer) in an isolated system (for collisions between objects moving in a straight line): $I = \Delta p$			
investigate and analyse theoretically and practically momentum conservation in one dimension.			
Area of study 3: Practical Investigation			
the physics concepts specific to the investigation and their significance, including definitions of key terms, and physics representations			
the characteristics of scientific research methodologies and techniques of primary qualitative and quantitative data collection relevant to the selected investigation; precision, accuracy, reliability and validity of data; and identification of uncertainty			
methods of organising, analysing and evaluating data to identify patterns and relationships including sources of error and uncertainty, and limitations of data and methodologies			