Physics 0625 – Extended - Revision Plan

Chapter 1: Motion, Forces and Energy

Student Name: _____ Year: _____

#	Syllabus content	Studying completed on (Write the date)	Revision is done on (Write the date)	Status (Tick the appropriate)	Comments
1.1 Physical quantities and measurement techniques					
1	Describe the use of rulers and measuring cylinders to find a length or a volume.			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe how to measure a variety of time intervals using clocks and digital timers.			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Determine an average value for a small distance and for a short interval of time by measuring multiples (including the period of oscillation of a pendulum)			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Understand that a scalar quantity has magnitude (size) only and that a vector quantity has magnitude and direction			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Know that the following quantities are scalars: distance, speed, time, mass, energy and temperature			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Know that the following quantities are vectors: force, weight, velocity, acceleration, momentum, electric field strength and gravitational field strength			❒ confident ❒ requires a second revision ❒ some doubts remain	

7	Determine, by calculation or graphically, the resultant of two vectors at right angles, limited to forces or velocities only			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.2 Motion					
1	Define speed as distance travelled per unit time; recall and use the equation $v = \frac{s}{t}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Define velocity as speed in a given direction			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Recall and use the equation $\text{average speed} = \frac{\text{total distance travelled}}{\text{total time taken}}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Sketch, plot and interpret distance–time and speed–time graphs			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Determine, qualitatively, from given data or the shape of a distance–time graph or speed–time graph when an object is: (a) at rest (b) moving with constant speed (c) accelerating (d) decelerating			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Calculate speed from the gradient of a straight-line section of a distance–time graph			❒ confident ❒ requires a second revision ❒ some doubts remain	
7	Calculate the area under a speed–time graph to determine the distance travelled for motion with constant speed or constant acceleration			❒ confident ❒ requires a second revision ❒ some doubts remain	

8	State that the acceleration of free fall g for an object near to the surface of the Earth is approximately constant and is approximately 9.8 m/s^2			❒ confident ❒ requires a second revision ❒ some doubts remain	
9	Define acceleration as change in velocity per unit time; recall and use the equation $a = \frac{\Delta v}{\Delta t}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
10	Determine from given data or the shape of a speed–time graph when an object is moving with: (a) constant acceleration (b) changing acceleration			❒ confident ❒ requires a second revision ❒ some doubts remain	
11	Calculate acceleration from the gradient of a speed–time graph			❒ confident ❒ requires a second revision ❒ some doubts remain	
12	Know that a deceleration is a negative acceleration and use this in calculations			❒ confident ❒ requires a second revision ❒ some doubts remain	
13	Describe the motion of objects falling in a uniform gravitational field with and without air/liquid resistance (including reference to terminal velocity)			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.3 Mass and weight					
1	State that mass is a measure of the quantity of matter in an object at rest relative to the observer			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	State that weight is a gravitational force on an object that has mass			❒ confident ❒ requires a second revision ❒ some doubts remain	

3	Define gravitational field strength as force per unit mass; recall and use the equation $g = \frac{W}{m}$ and know that this is equivalent to the acceleration of free fall			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Know that weights (and masses) may be compared using a balance			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Describe, and use the concept of, weight as the effect of a gravitational field on a mass			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.4 Density					
1	Define density as mass per unit volume; recall and use the equation $\rho = \frac{m}{V}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe how to determine the density of a liquid, of a regularly shaped solid and of an irregularly shaped solid which sinks in a liquid (volume by displacement), including appropriate calculations			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Determine whether an object floats based on density data			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Determine whether one liquid will float on another liquid based on density data given that the liquids do not mix			❒ confident ❒ requires a second revision ❒ some doubts remain	

1.5 Forces (1.5.1 – Effects of Forces)					
1	Know that forces may produce changes in the size and shape of an object			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Sketch, plot and interpret load–extension graphs for an elastic solid and describe the associated experimental procedures			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Determine the resultant of two or more forces acting along the same straight line			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Know that an object either remains at rest or continues in a straight line at constant speed unless acted on by a resultant force			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	State that a resultant force may change the velocity of an object by changing its direction of motion or its speed			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Describe solid friction as the force between two surfaces that may impede motion and produce heating			❒ confident ❒ requires a second revision ❒ some doubts remain	
7	Know that friction (drag) acts on an object moving through a liquid			❒ confident ❒ requires a second revision ❒ some doubts remain	
8	Know that friction (drag) acts on an object moving through a gas (e.g. air resistance)			❒ confident ❒ requires a second revision ❒ some doubts remain	
9	Define the spring constant as force per unit extension; recall and use the equation $k = \frac{F}{x}$			❒ confident ❒ requires a second revision ❒ some doubts remain	

10	Define and use the term 'limit of proportionality' for a load–extension graph and identify this point on the graph (an understanding of the elastic limit is not required)			❒ confident ❒ requires a second revision ❒ some doubts remain	
11	Recall and use the equation $F = ma$ and know that the force and the acceleration are in the same direction			❒ confident ❒ requires a second revision ❒ some doubts remain	
12	Describe, qualitatively, motion in a circular path due to a force perpendicular to the motion as: (a) speed increases if force increases, with mass and radius constant (b) radius decreases if force increases, with mass and speed constant (c) an increased mass requires an increased force to keep speed and radius constant ($F = \frac{mv^2}{r}$ is not required)			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.5 Forces (1.5.2 Turning effect of forces)					
1	Describe the moment of a force as a measure of its turning effect and give everyday examples			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Define the moment of a force as moment = force × perpendicular distance from the pivot; recall and use this equation			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Apply the principle of moments to situations with one force each side of the pivot, including balancing of a beam			❒ confident ❒ requires a second revision ❒ some doubts remain	

4	State that, when there is no resultant force and no resultant moment, an object is in equilibrium			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Apply the principle of moments to other situations, including those with more than one force each side of the pivot			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Describe an experiment to demonstrate that there is no resultant moment on an object in equilibrium			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.5 Forces (1.5.3 Centre of gravity)					
1	State what is meant by centre of gravity			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe an experiment to determine the position of the centre of gravity of an irregularly shaped plane lamina			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Describe, qualitatively, the effect of the position of the centre of gravity on the stability of simple objects			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.6 Momentum					
1	Define momentum as mass × velocity; recall and use the equation $p = mv$			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Define impulse as force × time for which force acts; recall and use the equation $impulse = F\Delta t = \Delta(mv)$			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Apply the principle of the conservation of momentum to solve simple problems in one dimension			❒ confident ❒ requires a second revision ❒ some doubts remain	

4	Define resultant force as the change in momentum per unit time; recall and use the equation $F = \frac{\Delta p}{\Delta t}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.7 Energy, work and power (1.7.1 Energy)					
1	State that energy may be stored as kinetic, gravitational potential, chemical, elastic (strain), nuclear, electrostatic and internal (thermal)			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe how energy is transferred between stores during events and processes, including examples of transfer by forces (mechanical work done), electrical currents (electrical work done), heating, and by electromagnetic, sound and other waves			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Know the principle of the conservation of energy and apply this principle to simple examples including the interpretation of simple flow diagrams			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Recall and use the equation for kinetic energy $E_k = \frac{1}{2}mv^2$			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Recall and use the equation for the change in gravitational potential energy $\Delta E_p = mg\Delta h$			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Know the principle of the conservation of energy and apply this principle to complex examples involving multiple stages, including the interpretation of Sankey diagrams			❒ confident ❒ requires a second revision ❒ some doubts remain	

1.7 Energy, work and power (1.7.2 Work)					
1	nderstand that mechanical or electrical work done is equal to the energy transferred			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Recall and use the equation for mechanical working $W = Fd = \Delta E$			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.7 Energy, work and power (1.7.3 Energy resources)					
1	Describe how useful energy may be obtained, or electrical power generated, from: (a) chemical energy stored in fossil fuels (b) chemical energy stored in biofuels (c) water, including the energy stored in waves, in tides, and in water behind hydroelectric dams (d) geothermal resources (e) nuclear fuel (f) light from the Sun to generate electrical power (solar cells) (g) infrared and other electromagnetic waves from the Sun to heat water (solar panels) and be the source of wind energy including references to a boiler, turbine and generator where they are used			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe advantages and disadvantages of each method in terms of renewability, availability, reliability, scale and environmental impact			❒ confident ❒ requires a second revision ❒ some doubts remain	

3	Understand, qualitatively, the concept of efficiency of energy transfer			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Know that radiation from the Sun is the main source of energy for all our energy resources except geothermal, nuclear and tidal			❒ confident ❒ requires a second revision ❒ some doubts remain	
5	Know that energy is released by nuclear fusion in the Sun			❒ confident ❒ requires a second revision ❒ some doubts remain	
6	Know that research is being carried out to investigate how energy released by nuclear fusion can be used to produce electrical energy on a large scale			❒ confident ❒ requires a second revision ❒ some doubts remain	
7	Define efficiency as: (a) $(\%)\ \text{efficiency} = \frac{(\text{useful energy output})}{(\text{total energy input})} (\times 100\%)$ (b) $(\%)\ \text{efficiency} = \frac{(\text{useful power output})}{(\text{total power input})} (\times 100\%)$ recall and use these equations			❒ confident ❒ requires a second revision ❒ some doubts remain	
1.7 Energy, work and power (1.7.4 Power)					
1	Define power as work done per unit time and also as energy transferred per unit time; recall and use the equations (a) $P = \frac{W}{t}$ (b) $P = \frac{\Delta E}{t}$			❒ confident ❒ requires a second revision ❒ some doubts remain	

1.8 Pressure					
1	Define pressure as force per unit area; recall and use the equation $P = \frac{F}{A}$			❒ confident ❒ requires a second revision ❒ some doubts remain	
2	Describe how pressure varies with force and area in the context of everyday examples			❒ confident ❒ requires a second revision ❒ some doubts remain	
3	Describe, qualitatively, how the pressure beneath the surface of a liquid changes with depth and density of the liquid			❒ confident ❒ requires a second revision ❒ some doubts remain	
4	Recall and use the equation for the change in pressure beneath the surface of a liquid $\Delta p = \rho g \Delta h$			❒ confident ❒ requires a second revision ❒ some doubts remain	