Name: ……. GCE AS Physics Unit 1

Measurements and their errors		
Fundamental	Can you name the units for mass, length, time, temperature, electric current and weight?	
Base Units		
SI Units	Can you express these prefixes in standard form? T, G, M, k, c, m, μ, n, p, f	
SI Prefixes		
Convert	Can you convert between different units of the same quantity? E.g. eV to Joules	
Limits of physical measurements		
Precision	Can you explain the difference between random and systematic errors?	
Repeatability		
Reproducibility	Can you explain the terms precise and accurate?	
Resolution		
Accuracy	Can you decide the uncertainty of a measurement based on its smallest scale?	
Uncertainty		
Absolute, Percentage and fractional	Can you calculate the percentage uncertainty for a given measurement?	
Combining uncertainties		
Particles		
Constituents	Can you describe a simple model of the atom?	
Relative Mass		
Atomic Number	Can you explain the difference between an atom, ion and isotope?	
Specific Charge		
Nuclide Notation	Can you write a decay formula using nuclide notation?	
Isotopes		
Mass	Can you calculate the specific charge of a given ion, nuclei or particle?	
Charge		
Electron	Can you recall the units for specific charge?	
Proton		
Neutron	Can you identify the atomic mass unit for a given element?	
Atomic Mass Unit		
Ions	Can you recall the exact charges of electrons, protons and neutrons?	

Stable and unstable nuclei The Strong Nuclear Force Stability Femtometres Alpha decay Beta decay Gamma decay Repulsion Attraction Neutrino Conservation of Energy	Can you explain the role of the Strong Nuclear Force? Can you describe how its action changes over a specific range from 0.5 fm to 3 fm? Can you describe what causes alpha, beta and gamma decay? Can you explain the need for neutrinos in beta decay? Can you draw a diagram of the influence of the Strong Nuclear Force?	
Particles and Radiation Particle Anti-particle Positron Anti-proton Anti-neutron Anti-neutrino Rest Energy Planck's Constant Annihilation Pair Production	Can you write decay equations for alpha, beta – and beta + decay? Can you name the corresponding antiparticles for protons, electrons and neutrons? Can you calculate the rest energy for a particle/anti-particle pair? Can you use Planck's law to find the energy of a high frequency photon? Can you describe annihilation and pair production?	
Particle Interactions Electron Capture Electron-Proton Collision W+, W- boson exchange particles. Electron Repulsion Feynman diagrams Interaction Weak Interaction B-, B+ Decay Electromagnetic force	Can you recall the correct exchange particle for each type of decay? Can you draw Feynman diagrams for each type of interaction? Can you recall the direction that the boson acts in each decay? Can you recall which particles are affected by the weak interaction and which aren't? Can you name the exchange particle for the electromagnetic force? (such as in electron repulsion)	

Classifying Particles Hadron Baryon Meson Lepton Pion Kaon Muon Cosmic Ray Showers Muon decay Strangeness Charge Baryon number	Can you describe the difference between Hadrons and Leptons? Can you name the Hadron and Leptons and their sub groups of Mesons and Baryons? Can you explain where Strange particles are produced? Can you explain why strangeness is not always conserved in a weak interaction? Can you recall what Muons decay into? Can you explain how you would measure a cosmic ray shower using two Geiger counters and a cloud chamber?	
Quarks and Anti-Quarks Up Down Strange Anti-quark Quark Character Conservation laws	Can you state the quark configurations of the baryons, mesons and their antiparticles? Can you state the change in quark character in beta decay? Can you check that the conservation laws for Baryon, Lepton, Charge and Strangeness are conserved in an interaction?	
Photoelectric effect Work function Photoelectric equation Electron Volt Joules Ionisation Excitation Fluorescence Line Spectra Discrete energy levels	Can you explain what the work function is for an atom? Can you calculate the work function for an atom and express it in Joules or eV? Can you explain how a fluorescent bulb works using ideas about ionisation and excitation? Can you explain why line spectra are evidence of transitions between discrete energy levels in atoms? Can you describe the photoelectric effect in a 6 mark written description?	

Wave-Particle Duality		
Electron diffraction	Can you explain why electron diffraction suggests that electrons have a wave like nature?	
Wave properties		
De Broglie Wavelength	Can you calculate the De Broglie wavelength for a given particle?	
Momentum		
Charge and Current		
Coulombs	Can you define electrical current and potential difference?	
Amperes		
Ohms	Can you define resistance using Ohms law?	
Current/Voltage Characteristics		
Ohmic conductor	Can you describe the behaviour of an Ohmic conductor at room temperature?	
Semiconductor diode		
Filament Lamp	Can you draw graphs to show the behaviour of semiconductor diodes and lamps V-I curves?	
Ohms law		
Ideal instruments	Can you describe the ideal assumptions we make about ammeters and voltmeters?	
Ammeter		
Voltmeter	Can you use Ohms law to calculate the value for Current, Voltage or Resistance in a circuit?	
Resistivity		
Temperature	Can you calculate the resistivity of a material using the appropriate formula?	
Superconductivity		
Critical Temperature	Can you explain the conditions where superconductivity occur?	
Thermistors		
Applications	Can you state what the critical temperature is for a material and explain what a negative coefficient means?	
Strong electromagnets		
Energy loss in electrical transmission	Can you explain why superconductors are useful giving some applications?	
Circuits		
Resistor calculations	Can you reduce a set of resistors in series and parallel into an equivalent circuit?	
Series		
Parallel	Can you explain why a high current is needed for a starter motor in a car?	

Energy Starter motors Conservation of charge Potential Dividers Variable Resistors Light Dependent Resistors Thermistors Potentiometers Electromotive force Internal Resistance Alternating currents Mains electricity Peak to Peak voltage values Oscilloscopes AC and DC waveforms Root Mean Square	Can you explain how a potentiometer can be used to vary the voltage across a load? Can you explain how a thermistor, LDR and variable resistor can function in a potential divider circuit? Can you calculate the emf of a circuit including its internal resistance? Can you describe situations where high emf and low internal resistance are important such as in car batteries? Can you perform calculations for circuits where the internal resistance is not zero? Can you calculate the root mean square for a given sinusoidal waveform? Can you apply this root mean square calculation to the mains electricity supply? Can you describe how to use an Oscilloscope as an ammeter or voltmeter? Including how to change the time-base and other features to show a waveform within the small screen for measurement?	
	That's it.	