SUBJECT: Physics

KS5 CURRICULUM PLAN

KS4 Knowledge and key skills

YEAR 12	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC						
Knowledge	**Constituents of the atom. Stable and unstable nuclei. Particles, antiparticles and photons. Particle interactions. Classification of particles. Quarks and antiquarks. Applications of conservation laws. Scalars and vectors. Moments. Motion along a straight line.**	**The photoelectric effect. Collisions of electrons with atoms. Energy levels and photon emission. Wave-particle duality. Projectile motion. Newton's laws of motion. Momentum. Work, energy and power. Conservation of energy.**	**Progressive waves. Longitudinal and transverse waves. Principle of superposition of waves and formation of stationary waves. Bulk properties of solids. The Young modulus. Basics of electricity. Current-voltage characteristics. Resistivity.**	**Interference. Diffraction. Refraction at a plane surface. Potential divider. Electromotive force and internal resistance.**	**Measurements and their errors. Revision towards AS external examination.**	**External Examination AS. Periodic Motion. Circular motion.**
Skills	Apply knowledge and understanding of how vectors can be resolved.Use algebraic equations for moments, couples and the principle of moments.Apply knowledge and understanding of displacement, speed, velocity and acceleration in calculations.Apply knowledge and understanding in the analysis of motion graphs. Demonstration of knowledge of simple models of the atom.Demonstrate knowledge and understanding isotopes and analyse isotope data.Demonstration of knowledge of strong nuclear force. Apply knowledge and understanding of alpha and beta decay to analyse and complete equations representing the decay.Substitute numerical values into algebraic equations to calculate energies of photons using frequency and wavelength.Apply knowledge and understanding in the importance of conservation laws when constructing Feynman diagrams.Apply knowledge and understanding of how	Apply knowledge and understanding of the independence of horizontal and vertical motion when considering projectiles.Apply knowledge and understanding of Newton's laws in practical situations.Apply knowledge and understanding of the conservation of momentum in the analysis of collisions.Apply knowledge and understanding of work done using the appropriate equation.Apply knowledge and understanding of the formulae for gravitational potential energy and kinetic energy. Analyse, interpret and evaluate scientific ideas and evidence to see why the wave model of light does not explain the photoelectric effect.Apply knowledge and understanding of the electron volt to perform calculations to convert energies in joules to electron volts.Apply knowledge and understanding of discrete energy levels and the energies associated with them to calculate frequencies and wavelengths of emitted	Demonstration of knowledge and understanding electromagnetic waves and their properties.Demonstration of knowledge and understanding of the polarisation of transverse waves.Demonstration of knowledge and understanding of standing waves including the meaning of nodes and antinodes. Demonstration of knowledge and understanding of the meaning of density.Demonstration of knowledge and understanding of tensile stress and tensile strain.Apply knowledge and understanding of plastic behaviour, fracture and brittle behaviour when relating them to force extension graphs.Apply knowledge and understanding of the Young modulus in calculations. Apply knowledge and understanding of electric current, potential difference and resistance.Demonstration of knowledge and understanding of current-voltage characteristics of	Apply knowledge and understanding of path difference to determine whether interference is constructive or destructive.Use light source or laser to investigate interference.Apply knowledge and understanding of interference patterns to explain the diffraction pattern produced by a plane diffraction grating.Demonstration of knowledge and understanding of refractive index and its relationship to wave speed.Demonstration of knowledge and understanding of Snell's law.Apply knowledge and understanding of using potential dividers in sensing circuits.Apply knowledge and understanding of emf and internal resistance in circuit calculations. Translate data from experiments to determine internal resistance into graphical form.	A working knowledge of the specified fundamental (base) units of measurement is vital. Likewise, practical work in the subject needs to be underpinned by an awareness of the nature of measurement errors and of their numerical treatment. The ability to carry through reasonable estimations is a skill	Demonstrate knowledge and understanding of circular motion as an accelerated motion.Apply knowledge and understanding of forces to identify and calculate centripetal forces.

Key Vocab	Annihilation Antimatter BaryonAcceleration Displacement Efficiency Equilibrium Gravitational Momentum Projectile Scalar Vector Velocity Weight Conservation Electromagnetic Hadron Interaction Isotopes Kaon Lepton Meson Muon Neutrino Nucleon Particle Pion Positron Quark Strangeness	De Broglie Excitation Fluorescence Photoelectric Photon Threshold Absorption spectrum Nucleon Particle Pion Positron Quark StrangenessAcceleration Displacement Efficiency Equilibrium Gravitational Momentum Projectile Scalar Vector Velocity Weight	Amplitude Antinode Cancellation Coherent Diffraction Dispersion Harmonic Interference Longitudinal polarised Progressive Refraction Reinforcement Spectrometer Superposition Transverse WavelengthBrittle Deformation Ductile Elasticity Modulus Proportionality	Amplitude Antinode Cancellation Coherent Diffraction Dispersion Harmonic Interference Longitudinal polarised Progressive Refraction Reinforcement Spectrometer Superposition Transverse WavelengthCoulomb Resistance Resistivity Semiconductor Thermistor	Uncertainty	Centripetal Acceleration

YEAR 13	SUMMER 2	SUMMER 1	SPRING 2	SPRING 1	AUTUMN 2	AUTUMN 1
TOPIC						
Knowledge	**External examinations**	**Thermal energy transfer.** **Ideal gases.** **Molecular kinetic theory model.** **Revision towards external examinations.**	**Moving charges in a magnetic field.** **Magnetic flux and flux linkage.** **Electromagnetic induction.** **Alternating currents.** **The operation of a transformer.** **The discovery of photoelectricity.** **Wave-particle duality and Electron microscopes.** **The Michelson-Morley experiment and Einstein's theory of special relativity.** **Time dilation, Length contraction, and Mass and energy.**	**Capacitance, Parallel plate capacitor and Energy stored by a capacitor.** **Capacitor charge and discharge.** **Magnetic flux density.** **Cathode rays, Thermionic emission of electrons and Specific charge of the electron.** **Principle of Milikan's determination of the electronic charge, e.** **Newton's corpuscular theory of light, Significance of Young's double slits experiment and Electromagnetic waves.**	**Gravitational fields.** **Newton's law.** **Gravitational field strength.** **Gravitational potential.** **Orbits of planets and satellites.** **Coulomb's law and Electric field strength.** **Electric potential.** **Mass and energy.** **Induced fission.** **Safety aspects.**	**Simple Harmonic motion.SHM.** **Simple harmonic systems.** **Forced vibrations and resonance.** **Rutherford scattering.** **α, β and γ radiation.** **Radioactive decay.** **Nuclear instability.** **Nuclear radius.**

Key Knowledge Transfer

Skills		Demonstrate knowledge and understanding of specific heat and specific latent heat.Apply knowledge and understanding of scientific ideas to solve problems involving transfer of thermal energy.Demonstrate knowledge and understanding of the Ideal Gas equation.Analyse and interpret data from gas law experiments to find a value for absolute zero and evaluate this value.Demonstrate knowledge and understanding of Brownian motion and the development of kinetic theory.Apply knowledge and understanding of mechanics to derive the kinetic theory equations.	Apply knowledge and understanding to explain machines that use magnetic forces to guide the motion of charged particles.Demonstrate knowledge and understanding of magnetic flux.Demonstrate knowledge and understanding of how changing flux linkage produces an emf.Apply knowledge and understanding of scientific ideas to explain electromagnetic braking.Analyse and interpret data from oscilloscope display to find rms and peak values.Demonstrate knowledge and understanding of construction and operation of a transformer.Demonstrate knowledge and understanding of the evidence for the electromagnetic nature of light.Demonstrate knowledge and understanding of the TEM and STM.Demonstrate knowledge and understanding of Einstein's two relativity postulates.Apply knowledge and understanding of length contraction / time dilation to explain the observed properties of muons.	Apply knowledge and understanding of capacitors to solve problems in a variety of contexts.Demonstrate knowledge and understanding of capacitor discharge by sketching graphs of Q, V and I against time.Apply knowledge and understanding to predict direction of motion of a spinning motor.Demonstrate knowledge and understanding of the cathode ray tube.Analyse, interpret and evaluate scientific information, ideas and evidence, to make judgements and reach conclusions about the quantisation of charge in the Milikan oil drop experiment.	Demonstrate knowledge and understanding of Newton's Law of gravitation.Apply knowledge and understanding of gravitational field strength to solve problems in different contexts.Demonstrate knowledge and understanding of the concept of gravitational potential when solving problems.Students use graphical representations to investigate relationships between v, r and g.Apply knowledge and understanding of gravitational potential when explaining energy considerations in the orbit of satellites.Apply knowledge and understanding of electric fields and circular motion to describe and explain the trajectory of a charge particle in a uniform electric field.Demonstrate knowledge and understanding of binding energy, fission and fusion.Demonstrate knowledge and understanding of nuclear fission, fusion and the construction of a nuclear power station.Analyse, interpret and evaluate scientific information, ideas and evidence, including in relation to issues, to make judgements and reach conclusions on the development of nuclear power.	Demonstrate knowledge and understanding of conditions for SHM by investigating different examples of oscillations.Analyse and interpret data from to reach conclusions on the relationship between x, v and a in a system executing SHM.Apply knowledge and understanding of scientific ideas to derive the equations for the mass spring and pendulum systems.Analyse and interpret data from to reach conclusions on the relationship between variables in oscillating systems.Demonstrate knowledge and understanding of resonance.Analyse and interpret data from Rutherford Scattering experiment to draw a conclusion.Apply knowledge and understanding of the properties of radiation in medicine and industry.Apply knowledge and understanding of radioactive decay to the storage of radioactive waste and radioactive dating.Demonstrate knowledge and understanding of decay processes.Apply knowledge and understanding of Coulomb's Law and diffraction to calculate nuclear radii	
Key Vocab		Latent Specific Momentum Brownian	Alternating Electromagnetic Photoelectric Induction Generator	Capacitance Cathode Thermionic Milikan Flux	Gravitational Fission Fusion Isotope	Harmonic Oscillation Resonance Radiation	