

A Level Physics

Units of Work

Year – Term	Summary of Learning Content
Year 12 – Autumn	<p>Foundations of Physics</p> <ul style="list-style-type: none">• Quantities and units• Derived units• Scalar and vector quantities• Adding vectors• Resolving vectors• More on vectors <p>Motion</p> <ul style="list-style-type: none">• Distance and Speed• Displacement and velocity• Acceleration• Velocity – time graphs• Equations of motion• Car stopping distances• Free fall and g• Projectile motion <p>Forces in Action</p> <ul style="list-style-type: none">• Force, mass and weight• Centre of mass• Free-body diagrams• Drag and terminal velocity• Moments and equilibrium• Couple and torques• Triangle of forces• Density and pressure• $\rho = h\rho g$ and Archimedes' principle

	<p>Work, Energy, Power</p> <ul style="list-style-type: none"> • Work done and energy • Conservation of energy • Kinetic energy and gravitational potential energy • Power and efficiency •
<p>Year 12 – Spring</p>	<p>Materials</p> <ul style="list-style-type: none"> • Springs and Hooke’s Law • Elastic potential energy • Deforming materials • Stress-strain and the Young modulus <p>Laws of Motion and Momentum</p> <ul style="list-style-type: none"> • Newton's first and third laws of motion • Linear momentum • Newton's second law of motion • Impulse • Collisions in two dimensions <p>Charge and Current</p> <ul style="list-style-type: none"> • Current and charge • Moving charges • Kirchhoff's first law • Mean drift velocity <p>Energy, Power, and Resistance</p> <ul style="list-style-type: none"> • Circuit symbols • Potential difference and electromotive force • The electron gun • Resistance • I-V characteristics • Diodes • Resistance and resistivity • The thermistor • The LDR

	<ul style="list-style-type: none"> • Electrical energy and power • Paying for electricity
<p>Year 12 – Summer</p>	<p>Electrical Circuits</p> <ul style="list-style-type: none"> • Kirchoff's laws and circuits • Combining resistors • Analysing circuits • Internal resistance • Potential divider circuits • Sensing circuits <p>Waves 1</p> <ul style="list-style-type: none"> • Progressive waves • Wave properties • Reflection and refraction • Diffraction and polarisation • Intensity • Electromagnetic waves • Polarisation of electromagnetic waves • Refractive index • Total internal reflection <p>Waves 2</p> <ul style="list-style-type: none"> • Superposition of waves • Interference • The Young double-slit experiment • Stationary waves • Harmonics • Stationary waves in air columns <p>Quantum Physics</p> <ul style="list-style-type: none"> • The photon model • The photoelectric effect • Einstein's photoelectric effect equation • Wave-particle duality

<p>Year 13 – Autumn</p>	<p>Thermal Physics</p> <ul style="list-style-type: none"> • Temperature • Solids, liquids, and gases • Internal energy • Specific heat capacity • Specific latent heat <p>Ideal Gases</p> <ul style="list-style-type: none"> • The kinetic theory of gases • Gas laws • Root mean square speed • The Boltzmann constant <p>Circular Motion</p> <ul style="list-style-type: none"> • Angular velocity and the radian • Angular acceleration • Exploring centripetal forces <p>Oscillations</p> <ul style="list-style-type: none"> • Oscillations and simple harmonic • Analysing simple harmonic motion • Simple harmonic motion and energy • Damping and driving • Resonance <p>Gravitational Fields</p> <ul style="list-style-type: none"> • Newton's law of gravitation • Gravitational field strength for a point mass • Kepler's laws • Satellites • Gravitational potential • Gravitational potential energy <p>Stars</p> <ul style="list-style-type: none"> • Objects in the Universe • The life cycle of stars

	<ul style="list-style-type: none"> • The Hertzsprung-Russell diagram • Energy levels in atoms • Spectra • Analysing starlight • Stellar luminosity •
<p>Year 13 – Spring</p>	<p>Cosmology (the Big Bang)</p> <ul style="list-style-type: none"> • Astronomical distances • The Doppler effect • Hubble's law • The Big Bang theory • Evolution of the Universe <p>Capacitance</p> <ul style="list-style-type: none"> • Capacitors • Capacitors in circuits • Energy stored by capacitors • Discharging capacitors • Charging capacitors • Uses of capacitors <p>Electric Fields</p> <ul style="list-style-type: none"> • Coulomb's law • Uniform electric fields and capacitance • Charged particles in uniform electric fields • Electric potential and energy <p>Magnetic Fields</p> <ul style="list-style-type: none"> • Understanding magnetic fields • Charged particles in magnetic fields • Electromagnetic induction • Faraday's law and Len's law • Transformers <p>Particle Physics</p> <ul style="list-style-type: none"> • Alpha-particle scattering experiment

	<ul style="list-style-type: none"> • The nucleus • Antiparticles, hadrons, and leptons • Quarks • Beta decay <p>Radioactivity</p> <ul style="list-style-type: none"> • Nuclear decay equations • Half-life and activity • Radioactive decay calculations • Modeling radioactive decay • Radioactive dating •
<p>Year 13 – Summer</p>	<p>Nuclear Physics</p> <ul style="list-style-type: none"> • Einstein' mass-energy equation • Binding energy • Nuclear fission • Nuclear fusion <p>Medical Imaging</p> <ul style="list-style-type: none"> • X-rays • Interaction of X-rays with matter • CAT scans • The gamma camera • PET scans • Ultrasound • Acoustic impedence • Doppler imaging <p>Revision and Exams</p>

End of Course Assessments

Component	Marks	Duration	Weighting
Modelling physics (01)	100	2 hours 15 mins	37%
Exploring physics (02)	100	2 hours 15 mins	37%
Unified physics (03)	70	1 hour 30 mins	26%
Practical endorsement in physics (04)	-		