

	Physics	
	Teacher 1	Teacher 2
Y12 Half Term 1	<p><u>Measurements and their errors</u> Base units, using calculator, derived units, prefixes, orders of magnitude, significant figures, estimation, converting between units</p> <p><u>Particles and quantum physics</u> Constituents of the atom Photons Collisions of electrons with atoms Energy levels and photon emission The photoelectric effect Stable and unstable nuclei Antiparticles, annihilation and pair production</p>	<p><u>Measurements and their errors</u> Errors/error analysis. Uncertainty, precision, accuracy, reproducibility Using micrometers and vernier callipers</p> <p><u>Materials</u> Density Springs /Hooke's law Springs in series and parallel The young modulus Required Practical - Determination of the Young modulus by a simple method. Materials and their properties loading/unloading</p>
Y12 Half Term 2	<p>Particle interactions Feynman diagrams Classification of particles Quarks and antiquarks Applications of conservation laws</p> <p><u>Waves</u> Longitudinal and transverse waves The motion of particles in a progressive wave Frequency, amplitude and wavelength/the wave equation Polarisation Phase difference</p>	<p><u>Electricity</u> Basics - current, pd, resistance Current-voltage characteristics Resistors in series and parallel Circuits More complex circuits – rules and calculations Resistivity – definition and calculations Required Practical - Determination of resistivity of a wire using a micrometer, ammeter and voltmeter.</p>
Y12 Half Term 3	<p>Refraction at a plane surface Total internal reflection Optical fibres and their uses/limitations The principle of superposition of waves Interference Diffraction Path difference Required Practicals - Investigation of interference effects to include the Young's slit experiment interference by a diffraction grating.</p>	<p>Potential divider – theory, calculations and uses EMF and internal resistance – definitions and calculations Required Practical -Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it.</p> <p><u>Mechanics - statics</u> Scalars and vectors Finding the resultant of vectors using scale diagrams and pythagoras</p>

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		Moments Centre of mass/stability
Y12 Half Term 4	Stationary waves Comparison of stationary waves and progressive waves Required Practical - Investigation into the variation of the frequency of stationary waves on a string with length, tension and mass/unit length of the string. Wave-particle duality Practical examination skills development	<u>Mechanics - Motion</u> Motion along a straight line Equations of motion/derivation Motion graphs Required Practical - Determination of g by a free-fall method. Projectile motion
Y12 Half Term 5	<u>Thermal physics</u> internal energy/temperature Specific heat capacity Specific latent heat of fusion Specific latent heat of vaporisation Boyle's law/Charles' law/Pressure law Required Practical – investigating Boyles' Law and Charles' law. The ideal gas law/equation	Newton's laws of motion Using $F = ma$ Terminal velocity Braking distances Car safety features Conservation of momentum Elastic/inelastic collisions/explosions Impulse/impact forces work, energy, power, efficiency, conservation of energy
Y12 Half Term 6	Year 12 examination Brownian motion Kinetic theory of gases/derivation of equation and mathematical proof of absolute temperature's direct proportionality to mean KE of particles.	Year 12 examination <u>Circular Motion</u> Angular velocity Centripetal force Circular motion vertically and at an angle
Y13 Half Term 1	<u>Gravitational fields</u> Newton's law of gravitation Gravitational field strength Derivation of Kepler's third law using Newton's law of gravitation Satellites Gravitational potential energy and escape velocity Gravitational potential Equipotentials and potential gradient	<u>Simple Harmonic Motion</u> Variation of velocity with displacement; variation of energy with displacement - graphical analysis Graphs of velocity, acceleration and displacement with time Required Practicals – investigating the time period of a simple pendulum and a mass on a spring Resonance – theory/ consequences Damping
Y13 Half Term 2	<u>Electric fields</u> Electric field patterns The shuttling ball Coulomb's law	<u>Electromagnetism</u> Magnetic fields, the right hand grip rule Electromagnets Fleming's left hand rule, $F = BIl$

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	<p>Electric field strength Electric potential Comparison of electric and gravitational fields</p> <p>Capacitors Construction of capacitors $Q=CV$ Energy stored in a capacitor Required practical – charging and discharging a capacitor through a resistor Time constant for an RC circuit solving exponential equations</p>	<p>Required practical – Force on a current carrying conductor The motor Force on a charged particle in a magnetic field, cyclotron frequency Laws of electromagnetic induction, magnetic flux and flux linkage, $E = Blv$ Required Practical – variation of induced EMF with angle for coil in alternating magnetic field. The generator The transformer- theory/calculations/uses The National Grid</p>
Y13 Half Term 3	<p>Radioactivity Investigating the Properties and nature of alpha, beta and gamma radiation Required Practical – proof of inverse square relationship between count rate and distance between source and detector. Alpha decay and beta decay Activity, the decay constant and Half-life Mathematical treatment of radioactive decay The NZ graph Uses of radioactivity Nuclear energy levels / the Technetium generator Carbon dating Rutherford's alpha scattering experiment Estimating nuclear radius using the closest distance of approach Using electron diffraction to determine relationship between nuclear radius and nucleon number. Nuclear density</p>	<p>Medical Physics The eye – structure of the eye Revision of converging and diverging lenses Correcting defects of vision Rods and cones and spectral response The ear – structure of the ear Logarithmic response to sound intensity Frequency response of ear Equal loudness curves Defects of hearing Ultrasound – properties of ultrasound Basic construction of ultrasound transducer A scans and B scans Comparison of ultrasound scans to X-rays, MRI and CT</p>
Y13 Half Term 4	<p>Nuclear physics Einstein's equation relating energy and mass Mass defect / binding energy / binding energy per nucleon Nuclear stability Graph of binding energy per nucleon and mass number Nuclear fission The thermal nuclear reactor and its components Critical mass The safe handling of radioactive waste Nuclear fusion</p> <p>Medical physics</p>	<p>Medical physics X-Rays – properties and generation of x-rays X-ray machine: construction and function Enhancing the X-ray image: lead grid, artificial contrast media, reducing size of focal spot Real time x-rays using fluoroscopy CT scans MRI Principle of MRI scans/scanner Endoscopy Optical fibres Structure of medical endoscope</p>

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	Nuclear medicine PET scans Gamma camera Tracing Molybdenum generator X-rays for therapy Brachytherapy Biological and physical half life	ECG PQRST wave related to electrical response of heart Arrangements to get a clear ECG
Y13 Half Term 5	Revision and past papers	Revision and past papers