Physics

The Ellesmere Port C of E College

Part of the Frank Field Education Trust

KS5 Curriculum Plan 2024-2025

		LP1	LP2	LP3	LP4	LP5
Year 12	**TOPIC**	Foundations of physics. Describing motion.	Describing motion continued. Forces in action.	Forces in action continued	Work, energy and power	Thermal physics
		SI base quantities and units. Derived units. Prefixes and symbols. Error and uncertainty. Scalar and vector quantities. Vector addition and subtraction. Determining resultants of vectors. Resolving vectors. Distance and speed, distance and velocitySI base quantities and units. Derived units. Prefixes and symbols. Error and uncertainty. Scalar and vector quantities. Vector addition and subtraction. Determining resultants of vectors. Resolving vectors. Interpreting velocity and displacement time graphs. Equations of motion. Projectiles. Forces in action. Free body diagrams. Terminal velocity. Moments.	Acceleration, interpreting velocity-time graphs, equations of motion, car stopping distances, free fall and g. Projectile motion. Force, mass and weight. Centre of mass.	Free body diagrams Drag and terminal velocity Moments and equilibrium, couples and torques. Triangle of forces, Density and pressure. P=hρg and Archimedes' principle. Work done and energy	Conservation of energy. Kinetic energy and gravitational potential energy. Power and efficiency. Newtons 1st and 2nd laws of motion. Linear motion. Newtons second law. Impulse. Collisions in 2 dimensions Superposition of waves. Interference. Young's double slit experiment. Stationary waves. Harmonics. Application to musical instruments	Temperature. Solids, liquids and gases. Internal energy. Specific heat capacity. Specific latent heat. Kinetic theory of gases. Gas laws. Root mean square speed. The Boltzmann constant
	Skills	Converting units. Rearranging equations. Calculating error and uncertainty. Interpreting graphs. Trigonometry. Making measurements (including using micrometers and Vernier calipers). Applying multiple physics principles to scenarios. Investigation: springs in series and parallel. Investigation: calculating density. Interpreting graphs. Making measurements (including using micrometers and Vernier calipers). Researching, referencing, report writing, presentation. Method writing, risk assessments, analysing data.				
	Key Vocab	error, absolute, accuracy, reliability, precision, uncertainty, vector, scalar, displacement,	acceleration, projectile, free-body diagram, terminal velocity, torque, moment, momentum terminal velocity, resultant, pressure,	Archimedes' principle, equilibrium, tensile, stress, strain,	Young's Modulus, momentum, impulse.	error, absolute, accuracy, reliability, precision, uncertainty, bias, independence. equilibrium, kelvin, brownian, specific heat, latent heat, vaporisation, fusion, mean square speed, root mean square speed.

		LP1	LP2	LP3	LP4	LP5
Year 13	**TOPIC**	Thermal physics. Ideal gases. Circular motion. Oscillations.	Gravitational fields. Stars.	Cosmology. Capacitance. Electric fields. Magnetic fields.	Particle physics. Radioactivity. Nuclear physics. Medical imaging.	
	Knowledge	Thermal equilibrium. The absolute temperature scale. Brownian motion. Internal energy. Specific heat capacity. Specific Latent Heat. Kinetic theory of gases. pV = nRT. Root mean square speed and the Boltzmann constant. Internal energy. Calculate angular velocity. Circular motion. Centripetal acceleration. Phase difference. Simple harmonic motion. Energy changes during SHM. Damping.	Newton's law of gravitation. Gravitational field strength. Kepler's laws of motion. Centripetal force and gravity. Gravitational potential. Gravitational potential energy. Escape velocity. Star formation. Stellar evolution. Electron degeneracy. HR diagrams. Luminosity. Brightness. Positions of star types on the HR diagrams. Absorption and emission spectra	Astronomical distances, including derivation of a parsec. The doppler effect. Hubble's Law. The Big Bang Theory. Evolution of the universe. Define capacitance. Calculate capacitance in series and parallel. Describe the discharging and charging of capacitors using exponentials. Coulomb's Law. Electric field strength. Permittivity. Charged particles in uniform electric fields. Electric potential and electric potential difference. Magnetic fields. Fleming's Left Hand Rule. Particle accelerators and velocity selectors. Magnetic flux and magnetic flux linkage. Faraday's law and Lenz's law. Fields and the inverse square law were introduced properly in LP2. We then transfer the concept of fields to electric and magnetic fields in LP3. This LP allows us to build on the electricity topic from Y12 and revisit (and develop) the concept of electromagnetism introduced in GCSE.	Rutherford and the alpha particle scattering experiment. The nucleus. Antiparticles, hadrons and leptons. Quarks. The strong and weak nuclear forces. Radioactivity. Alpha, beta and gamma decay. Half life and activity. Decay calculations. Einstein's mass-energy equation. Binding energy. Nuclear fission and fusion. X-rays and their interaction with matter. CAT scans. Gamma cameras. PET scans. Ultrasound. Doppler imaging.	
	Skills	Modelling. Derivation of ideal gas law from Newtonian mechanics. Investigation into specific heat capacity. Investigation into the time period of a pendulum. Calculations in radians and degrees. Presenting information via sketch graphs. Utilising and explaining inverse square laws. Using fields. Logarithmic scales. Application of prior knowledge to astrophysical situations .Use of small angle approximation. Use of exponentials and natural logs. Converting units such as arc minutes and arc seconds. Investigation: charging and discharging capacitors. Modelling radioactive decay. Investigation: penetration depths of nuclear radiation. Half life calculations using logarithmic functions.				
	Key Vocab	equilibrium, kelvin, brownian, specific heat, latent heat, vaporisation, fusion, mean square speed, root mean square speed, angular, centripetal, oscillation, simple harmonic motion.	gravitation, displacement, amplitude, centripetal, gravitational potential, main sequence, red giant, white dwarf.	Parsec, light year, astronomical unit, doppler, cosmic microwave background radiation, permittivity, faraday, lenz, weber, tesla,	Nucleus, antimatter, quark, lepton, hadron, meson, baryon, alpha, beta, gamma, standard model, half life, decay, fission, fusion, decay, doppler.	