

Archbishop Beck Catholic College Long Term Plan for A level Physics

Year 12 Physics

Autumn Half Term 1	Half Term 2	Key Vocabulary/Reading Opportunities
<p>Topic Areas to be covered:</p> <p>Section 3.</p> <p><u>3.1 Measurements and their Errors</u> Use of SI units and their prefixes Limitation of physical measurements Estimation of physical quantities (To be covered throughout the course as part of the practical endorsement)</p> <p><u>3.2 Particles and Radiation/3.2.1 Particles</u></p> <p>Constituents of the atom Stable and unstable nuclei Particles, antiparticles and photons Particle interactions Classification of particles Quarks and antiquarks Applications of conservation laws</p> <p><u>3.2.2 Electromagnetic Radiation and Quantum Phenomena</u></p> <p>The photoelectric effect Collisions of electrons with atoms Energy levels and photon emission Wave-particle duality</p> <p><u>AP1 Assessment</u></p>	<p>Topic Areas to be covered:</p> <p><u>3.3 Waves</u></p> <p><u>3.3.1 Progressive and Stationary Waves</u> Progressive waves Longitudinal and transverse waves Principle of superposition of waves and formation of stationary waves</p> <p>Required practical 1</p> <p><u>3.3.2 Refraction, Diffraction and Interference</u> Interference</p> <p>Required practical 2 Diffraction Refraction at a plane surface</p> <p><u>AP 2 Assessment</u></p>	<p>S.I. Units, Terra, Giga, Mega, kilo, centi, milli, micro, nano, pico and femto. Electronvolt (eV). Uncertainty, random error and systematic error. Estimation and order of magnitude.</p> <p>Atomic mass unit (amu), specific charge, proton number, nucleon number, isotope. Stable and unstable nuclei, strong and weak nuclear force, alpha and beta particles, gamma rays or photons and neutrinos. Antiparticles, positron, annihilation, pair production and Planck's constant. Exchange particle, virtual photon, W-boson, beta decay and electron capture. Hadrons, baryons, mesons (pion, kaon), leptons (muon). Baryon number, lepton number and strangeness. Quarks and antiquarks (up, down and strange). Photo-electric effect, threshold frequency and work function. Ionisation, excitation and fluorescence. Energy levels, photon emission and line spectra. Wave particle duality, electron diffraction and de Broglie wavelength.</p> <p>Progressive and stationary waves, amplitude, frequency, wavelength, wave speed, phase difference and radians. Longitudinal, transverse and polarisation. Nodes, antinodes, fundamental frequency, harmonics and overtones. Refraction, diffraction and interference. Path difference, coherence and monochromatic light. Single slit, Young's slits and diffraction grating. Refractive index, Snell's law and total internal reflection. Optic fibre, cladding, modal and material dispersion, pulse broadening and absorption.</p>

Spring Half Term 3	Half Term 4	Key Vocabulary/Reading Opportunities
<p><u>3.4 Mechanics and Materials</u> <u>3.4.1 Force, Energy and Momentum</u></p> <p>Scalars and vectors Moments Motion along a straight line Required practical 3 Projectile motion Newton's laws of motion Momentum Work, energy and power Conservation of energy <u>3.4.2 Materials</u> Bulk properties of solids The Young modulus</p> <p>Required practical 4</p>	<p><u>3.5 Electricity</u> <u>3.5.1 Current Electricity</u></p> <p>Basics of electricity Current-voltage characteristics Resistivity Required practical 5 Circuits Potential divider Electromotive force and internal resistance</p> <p>Required practical 6</p> <p><u>AP3 Assessment</u></p>	<p>Force, energy, momentum, scalar, vector, resultant, component, resolution, conditions of equilibrium, moment, couple, principle of moments and centre of mass. Displacement, velocity, acceleration, average and instantaneous, uniform and non-uniform. Projectiles and terminal velocity. Inertia, impulse, crumple zone, elastic and inelastic, power and efficiency. Density, Hooke's law, elastic limit, stiffness, spring constant, stress, strain and Young's modulus.</p> <p>Current, charge, potential difference, resistance, ampere, coulomb, volt and ohm. Ohmic conductor, semi-conductor diode, filament bulb, thermistor and light dependant resistor (LDR). Superconductivity and critical temperature. Series, parallel, potential divider, electromotive force, internal resistance and terminal p.d..</p>
Summer Half Term 5	Half Term 6	Key Vocabulary/Reading Opportunities
<p><u>Section 3.3</u> <u>Review & consolidation of:</u> Knowledge & understanding Use of correct terminology Data analysis Application of K&U Maths skills Practical / investigative skills <i>Consolidation of topics from information from assessments in all areas.</i></p>	<p>Revision until exams. Following exams start year 13 content.</p>	

Year 12

Wider learning experiences to support this A Level	Learning Characteristics instilled in the curriculum	Career Opportunities
<p>University visits Reading opportunities Documentaries recommended Science in the News Use of Seneca to support independent study</p>	<p>Confidence Use of consolidations to revisit prior learning and allow to students to feel open to making mistakes. Encourage discussion. Build practical investigative skills throughout the course.</p> <p>Positive High expectations in presentation of exercise books and homework. Supporting understanding of AO1, AO2, AO3 through modelling and scaffolding responses.</p> <p>Resilience Learners are challenged from the start with high expectations and high challenge. Regular use of exam style questions, the focus of which is on learning from mistakes.</p>	<ul style="list-style-type: none"> • Science careers week • Work experience • University visits • Visiting speakers

Metacognition Methods applied in Teaching

- Consolidation exercise at the beginning of every lesson to revisit prior learning.
- Give sufficient thinking time during discussions.
- Split topics into appropriate chunks depending on student ability to reduce cognitive overload.
- Practical skills

- Modelling of exam questions, particularly numeracy and practical techniques
- Valiant vocabulary highlighted
- Independent learning tasks.
- Wider reading recommended and encouraged.
- Regular linking of topics

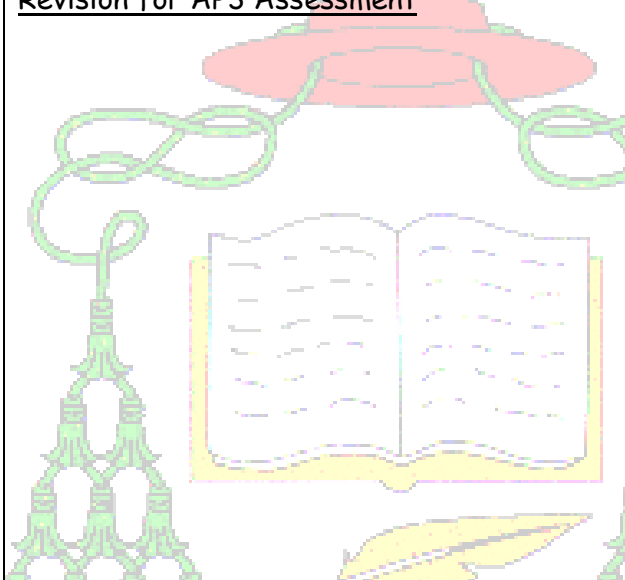


Archbishop Beck Catholic College Long Term Plan for Physics

Year 13

Autumn Half Term 1	Half Term 2	Key Vocabulary/Reading Opportunities
<p><u>3.6 Further Mechanics and Thermal Physics</u></p> <p><u>3.6.1 Periodic Motion</u> Circular motion Simple harmonic motion (SHM) Simple harmonic systems Forced vibrations and resonance REQUIRED PRACTICAL 7</p>	<p><u>3.6.2 Thermal Physics</u> Thermal energy transfer Ideal gases Molecular kinetic theory model REQUIRED PRACTICAL 8</p> <p><u>3.7 Fields and their Consequences</u> Gravitational Field</p>	<p><u>3.6 Further Mechanics and Thermal Physics</u></p> <p><u>3.6.1 Periodic Motion</u> Angular displacement in radians, Angular velocity, Period, Frequency, Centripetal acceleration, Periodic motion, Displacement, Phase, Angular frequency, Amplitude, S H M, Damping, Natural frequency, Forced vibration, Resonance,</p> <p><u>3.6.2 Thermal Physics</u> Internal Energy, Potential and Kinetic energy, Ideal gas,</p>

<p><u>3.9 Astrophysics</u></p> <p><u>3.9.1 Telescopes</u> Magnification Reflecting Telescopes</p> <p><u>Revision for AP1 Assessment to include content from AS</u></p>	<p>Planets and satellites</p> <p><u>3.9.1 cont.</u></p> <p>Non Light Telescopes Large Diameter Telescopes</p> <p><u>Revision for AP2 Assessment</u></p>	<p>Assumptions, Pressure, Volume, Thermodynamic temperature, Kelvin, Absolute zero, Specific latent heat of fusion and vaporisation, Specific heat capacity, Gas Laws, Brownian motion, Boltzman's constant, Root mean square velocity, Avogadro's number, Mole.</p> <p><u>3.7 Fields and their Consequences</u> Field strength, Mass, Charge, Newton's law of Gravitation, Coulomb's law, Potential, Equipotential, Capacitance, Permittivity, Time constant, Charge and discharge.</p>
<p>Spring Half Term 3</p>	<p>Half Term 4</p>	<p>Key Vocabulary/Reading Opportunities</p>
<p><u>3.7 cont.</u> Electrical Fields Capacitance Charging and discharging Magnetic Fields and Motor REQUIRED PRACTICAL 9 REQUIRED PRACTICAL 10 Induction REQUIRED PRACTICAL 11 Alternating currents and transformers</p> <p><u>3.9.2 Classification of Stars</u></p>	<p><u>3.8 Nuclear Physics</u> Radioactivity REQUIRED PRACTICAL 12 Decay, instability and nuclear density Mass defect, Fission and Fusion</p> <p><u>3.9.3 Cosmology</u> Use Doppler effect equation. Hubble's law.</p>	<p><u>3.8 Nuclear Physics</u></p> <p><u>3.8.1 Radioactivity</u> Rutherford scattering, Alpha, beta and gamma, Absorption, Exposure, Contamination, Inverse-square law, Radioactive decay, Decay constant, Half-life, Nuclear instability, Unstable nuclei, Nuclear excited states, Nuclear radius, Mass and energy, Atomic mass unit, Fission, Fusion, Binding energy, Induced fission, Chain reaction, Critical mass, Moderator, Control rods, Coolant, Thermal nuclear reactor, Safety aspects, Remote handling of fuel, Shielding, Emergency shut-down.</p> <p><u>3.9 Astrophysics</u></p>

<p>Luminosity</p> <p>Black bodies</p> <p>Stellar evolution</p>	<p>Quasars.</p> <p>Detection of exoplanets.</p> <p><u>Revision for AP3 Assessment</u></p> 	<p>3.9.1 Telescopes Reflecting, Refracting, Principal focal point and axis, Chromatic and spherical aberration, Aperture, Collecting power, Resolving power, Airy discs, Rayleigh criterion, CCD, Quantum efficiency.</p> <p>3.9.2 Classification of Stars Apparent and absolute magnitude, Hipparcos scale, luminosity, Parsec, Light years, Astronomical unit, Wien's Law and Stefan's Law, Spectral class, Hydrogen Balmer absorption, Stellar evolution. Hertzsprung Russell diagram, Supernovae, Neutron stars, Black holes, Type 1a supernovae, Dark energy, Schwarzschild radius.</p> <p>3.9.3 Cosmology Doppler effect, Quasars, Red shift, Hubble's law, Big Bang theory, Cosmological microwave background radiation, Detection of exoplanets.</p>
<p>Summer Half Term 5</p>	<p>Half Term 6</p>	<p>Key Vocabulary/Reading Opportunities</p>
<p>Consolidation of all topics from both Year 1 and 2 to support exam success.</p> <p>Information used from assessment to highlight focus of topics</p> <p>External Exams</p>	<p>Consolidation of all topics from both Year 1 and 2 to support exam success.</p> <p>Information used from assessment to highlight focus of topics</p> <p>External Exams</p>	<p>All key vocab from the course.</p>

Year 13 Physics

<p>Wider learning experiences to support this A Level</p>	<p>Learning Characteristics instilled in the curriculum</p>	<p>Career Opportunities</p>
<p>University visits</p>	<p>Confidence Use of consolidations to revisit prior learning and allow to students</p>	<ul style="list-style-type: none"> • Science careers week

<p>Reading opportunities Documentaries recommended Science in the News Use of Seneca to support independent study</p>	<p>to feel open to making mistakes. Encourage discussion. Build practical investigative skills throughout the course.</p> <p>Positive High expectations in presentation of exercise books and homework. Supporting understanding of AO1, AO2, AO3 through modelling and scaffolding responses.</p> <p>Resilience Learners are challenged from the start with high expectations and high challenge. Regular use of exam style questions, the focus of which is on learning from mistakes.</p>	<ul style="list-style-type: none"> • Work experience • University visits • Visiting speakers
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<p>Metacognition Methods applied in Teaching</p>
<ul style="list-style-type: none"> • Consolidation exercise at the beginning of every lesson to revisit prior learning. • Give sufficient thinking time during discussions. • Split topics into appropriate chunks depending on student ability to reduce cognitive overload. • Practical skills • Modelling of exam questions particularly extended response, numeracy and practical techniques • Valiant vocabulary highlighted • Independent learning tasks. • Wider reading recommended and encouraged. • Regular linking of topics • Regular retrieval practice