



Year 12

Knowledge	Skills
<p>Scientific working: I know the SI units and derived units.</p> <p>I know the commonly used power prefixes</p>	<p>I apply these consistently within calculations to the correct quantities.</p> <p>I use these with appropriate symbols and index in calculations.</p>
<p>Mechanics: I understand the differences between vector and scalar quantities</p> <p>I understand resultant forces.</p> <p>I can recall the four kinematics equations.</p> <p>I understand the principle of moments.</p> <p>I can recall Newton’s laws of motion.</p> <p>I understand the principle of energy conservation.</p> <p>I understand the link between work, energy and power.</p> <p>I understand the concept of momentum.</p>	<p>I can use this to calculate motion equations and interpret motion graphs.</p> <p>I can resolve vectors.</p> <p>I can use these to calculate unknowns.</p> <p>I can calculate the moment of a force and find the centre of gravity of an object.</p> <p>I can explain the acceleration of objects I can use Newton’s second law in calculations I can identify pairs of forces in Newton’s third law.</p> <p>I can calculate transfers of energy and energy exchanges in terms of gravitational potential and kinetic energy.</p> <p>I can calculate work done, power and efficiency.</p> <p>I can calculate momentum and gain or loss of momentum.</p>
<p>Electric Circuits: I understand what an electric current is and the relationship between current, charge, energy and potential difference and resistance.</p> <p>I understand conduction and resistance in terms of movement of electrons.</p> <p>I recognise series, parallel and potential divider circuits.</p>	<p>I can make calculations with these quantities and apply them to practical laboratory work.</p> <p>I can calculate the drift velocity of conduction electrons in metals. I can describe an investigation and make calculations of internal resistance.</p> <p>I can show the relationship between I and V in these circuits in calculations and in practical work.</p>



Fundamentals

Belfairs Academy Physics

<p>I understand the relationship between work and power in electric circuits.</p>	<p>I can make calculations of work, power, and efficiency in electric circuits.</p>
<p>Fluids: I understand density and upthrust</p> <p>I understand laminar flow and turbulent flow</p> <p>I understand viscosity and viscous drag.</p>	<p>I can calculate density and upthrust using the correct equations.</p> <p>I can apply this to explain real-life examples of when these need to be reduced.</p> <p>I can relate this viscosity to temperature. I can use the equation for viscous drag in calculations and laboratory investigations.</p>
<p>Materials: I understand Hooke's law</p> <p>I understand the tensile / compressive stress and tensile / compressive strain.</p>	<p>I can investigate and calculate elastic strain energy and interpret for-extension graphs.</p> <p>I can calculate the Young modulus. I can interpret stress / strain graphs.</p>
<p>Waves: I understand amplitude, frequency, wavelength and period and the relationship between them.</p> <p>I understand the difference between longitudinal and transverse waves.</p> <p>I know what is meant by wavefront, superposition and phase.</p> <p>I can explain coherent waves and standing waves.</p> <p>I understand diffraction and the factors which affect it.</p> <p>I understand wave interference.</p>	<p>I can investigate the speed of sound and explain the use of pulse-echo techniques.</p> <p>I can interpret graphs, molecule diagrams and earthquake vibrations in terms of these waves.</p> <p>I can interpret graphical representations of these. I can use radians and degrees to measure phase.</p> <p>I can identify nodes and antinodes. I can use the equation for the speed of transverse waves. I can investigate the factors which affect frequency of standing waves.</p> <p>I can describe an experiment to observe diffraction effects.</p> <p>I can interpret the relationship between phase difference and path difference. I can investigate two-source interference.</p>



Fundamentals

Belfairs Academy Physics

<p>Optics:</p> <p>I understand what refraction is.</p> <p>I can explain total internal reflection in terms of reflection, transmission and critical angle.</p> <p>I understand how lenses focus rays of light. I understand the terms focal length and power.</p> <p>I understand what is meant by plane polarisation.</p>	<p>I know how to measure the refractive index of a solid material. I can use the Snell's law equation.</p> <p>I can investigate total internal reflection using prisms. I can calculate the critical angle.</p> <p>I can use the equations for the power of a lens and combinations of twin lenses. I can investigate the path of rays through lenses in the laboratory. I can use the lens formula to calculate magnification.</p> <p>I can explain how to investigate stresses in structures.</p>
<p>Quantum Physics:</p> <p>I can describe EM radiation in terms of photons and waves.</p> <p>I can explain the photoelectric effect and the evidence for it.</p> <p>I can explain evidence for the wave nature of electrons.</p> <p>I understand atomic line spectra.</p>	<p>I can calculate the energy of photons of EM radiation.</p> <p>I can make experimental observations and explain these. I can use the photoelectric effect equation.</p> <p>I can use the de Broglie equation. I can interpret two-slit electron interference experiments.</p> <p>I can interpret energy level diagrams. I can interpret the frequency of radiation emitted or absorbed in electron energy transition.</p>