



Fundamentals

Belfairs Academy

Physics

Year 12

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



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



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<p>Optics: 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: 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>