

## Year 12 Physics Sequence

	Content Taught	Reference	Essential Knowledge	Assessment	Rationale
<p>In year 12, students further develop their understanding of all content studied in year 10 and 11 and also have the opportunity to learn new knowledge not studied before. The year 12 physics curriculum provides all students with the essential knowledge for the first year of the key stage 5 curriculum and challenges students to apply this knowledge in many new situations</p> <ul style="list-style-type: none"> <li>•</li> </ul>					
HT1	<p><b>Measurements and errors</b></p> <p>Students study the essential and transferable disciplinary knowledge through the use of practicals in this first unit. Pupils learn to use the correct units, measuring techniques and mathematical skills required for the KS5 physics curriculum</p> <p><b>Particles</b></p> <p>Students study the atom in terms of it's sub atomic particles,</p>	<p>3.1.1 3.1.2 3.1.3</p> <p>3.2.1</p>	<p>Use of SI units and their prefixes</p> <p>Limitation of physical measurements</p> <p>Estimation of physical quantities</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Measurements and their errors</a></li> <li>• <b>Measurements and errors essential knowledge and practice booklet provided</b></li> </ul> <p>Constituents of the atom</p> <p>Stable and unstable nuclei</p> <p>Particles, antiparticles and photons</p>	<p><b>Formative Assessment:</b></p> <p>Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that 'bring the essential knowledge of the topic together.'</p> <p><b>End of topic Summative Assessments:</b></p> <p>In each topic of; measurements and errors, particles and forces, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.</p>	<p>Students start with an introductory unit that covers the essential knowledge for practical's and mathematical analysis which will be used in every topic area throughout the KS5 physics curriculum. This topic also builds on the mathematical and practical knowledge from the key stage 4 curriculum in both the sciences and maths curriculums.</p>

<p>their interactions and anti-particles. Whilst the topic itself is new, prior knowledge of atomic structure in year 10 and 11 is essential. Students will further learn about the classifications of sub-atomic particles, including baryon number, strangeness, charge and lepton number. Students will learn to apply conservation laws of particles, including quarks</p> <p><b>Forces (mechanics)</b></p> <p>Students will learn about different types of forces, how they are measured as either vectors or scalars, whether the forces are balanced or objects experience a resultant force, stability and turning forces.</p>	<p>3.4.1.1 3.4.1.2</p>	<p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Particles and radiation</a></li> <li>• <b>Particles essential knowledge and practice booklet provided</b></li> </ul> <p>Scalars of vectors Moments</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Mechanics and materials</a></li> <li>• <b>Forces essential knowledge and practice booklet provided</b></li> </ul>		<p>Pupils will move on to Particles and quantum physics and Mechanics and materials in half term 1 of year 12.</p> <p>The topic of particles and quantum phenomena provide students with never before seen concepts which provides students with challenging essential knowledge.</p> <p>The topic of mechanics builds on prior knowledge from year 10 and 11 physics, as well as using mathematical skills developed in the KS4 maths curriculum via the use of equations and trigonometry. This topic provides essential mathematical knowledge that will be used throughout the rest of the course, in particular the further mechanics topic.</p> <p>The topic of materials builds on prior learning in year 10 forces where students gain essential knowledge of Hooke's law. This is further developed by applying this essential knowledge with different materials and leads</p>
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<p><b>HT2</b></p>	<p><b>Electromagnetic radiation and quantum phenomena</b></p> <p>Students will learn about the photoelectric effect and how ionisation and excitation occurs before moving on to gaining essential knowledge about how particles can behave as waves.</p> <p><b>Motion (mechanics)</b></p> <p>Students develop essential knowledge of the motion of displacement, speed, velocity and acceleration and applying equations to graphical situations and projectiles. Students will further develop knowledge of Newton's laws of motion.</p> <p><b>Energy and momentum (mechanics)</b></p>	<p>3.2.2.1 3.2.2.2 3.2.2.3 3.2.2.4</p> <p>3.4.1.3 3.4.1.4 3.4.1.5</p> <p>3.4.1.6 3.4.1.7 3.4.1.8</p>	<p>The photoelectric effect Collisions of electrons with atoms Energy levels and photon emission Wave-particle duality</p> <p><b><i>Essential knowledge reading for consolidation:</i></b></p> <ul style="list-style-type: none"> <li>• <a href="#"><i>PMT - Particles and radiation</i></a></li> <li>• <b>EM radiation and quantum essential knowledge and practice booklet provided</b></li> </ul> <p>Motion along a straight line Projectile motion Newton's law</p> <p><b><i>Essential knowledge reading for consolidation:</i></b></p> <ul style="list-style-type: none"> <li>• <a href="#"><i>PMT - Mechanics and materials</i></a></li> <li>• <b>Motion essential knowledge and practice booklet provided</b></li> </ul> <p>Momentum Work, energy and power</p>	<p><b><u>Formative Assessment:</u></b> Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that 'bring the essential knowledge of the topic together.'</p> <p><b><u>End of topic Summative Assessments:</u></b> In each topic of; EM radiation and quantum phenomena, motion and energy and momentum, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.</p> <p><b><u>Cumulative assessment 1 – summative test</u></b> A cumulative and summative test taken in class and covers all topics studied up to this point. Topics covered:</p> <ul style="list-style-type: none"> <li>• Measurements and errors</li> <li>• Particles</li> <li>• Forces</li> <li>• Electromagnetic radiation</li> <li>• Motion</li> </ul>	<p>students to a brand new area of future science research whilst linking with the properties of materials in chemistry.</p> <p>The waves topic builds on the essential knowledge from the KS4 waves topics. It also provides essential knowledge for the simple harmonic motion topic later in year 12.</p> <p>Students will also learn about electricity throughout half terms 4 and 5, building on prior knowledge in KS3 and KS4. This unit provides essential knowledge for the electric fields and capacitance units in year 13 as well as providing essential skills for students wishing to enter a career in electrical engineering.</p> <p>Students finish the year 12 physics curriculum studying circular motion and SHM. These topics build on prior knowledge of mechanics and waves studied earlier in year 12. It also prepare students for further study in mechanical engineering.</p>
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	Students build upon prior essential knowledge of momentum from year 11 to apply the law of conservation of momentum and apply this to impulse within elastic and inelastic collisions. Students then move on to the law of conservation of energy and apply this essential knowledge to power and efficiency.		<p>Conservation of energy</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Mechanics and materials</a></li> <li>• <b>Energy and momentum essential knowledge and practice booklet provided</b></li> </ul>	Questions are a mix of recall and application questions to assess pupils understanding of essential knowledge up to this point	
HT3	<p><b>Materials</b></p> <p>Students learn about the properties of materials including brittle and ductile materials, then apply this to stress-strain graph curves to find the Young's modulus of different elastic and plastic materials.</p> <p><b>Progressive and stationary waves (start)</b></p>	<p>3.4.2.1</p> <p>3.4.2.2</p> <p>3.3.1.1</p> <p>3.3.1.2</p>	<p>Bulk properties of solids</p> <p>The Young modulus</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Mechanics and materials</a></li> <li>• <b>Materials essential knowledge and practice booklet provided</b></li> </ul> <p>Progressive waves</p>	<p><b>Formative Assessment:</b></p> <p>Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that 'bring the essential knowledge of the topic together.'</p> <p><b>End of topic Summative Assessments:</b></p>	

	Students extend their essential knowledge of wave phenomena from year 10 and 11 through greater understanding of the properties, characteristics and applications of travelling and stationary waves.		<p>Longitudinal and transverse waves</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Waves</a></li> <li>• <b>Progressive and stationary waves essential knowledge and practice booklet provided</b></li> </ul>	In each topic of; materials and progressive and stationary waves, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.	
HT4	<p><b>Progressive and stationary waves (continued)</b></p> <p><b>Current electricity</b></p> <p>Students begin this topic using the essential knowledge of Ohms law and how they apply in ohmic conductors,</p>	<p>3.3.1.3</p> <p>3.5.1.1 3.5.1.2 3.5.1.3</p>	<p>Principle of superposition of waves and formation of stationary waves</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Waves</a></li> <li>• <b>Progressive and stationary waves essential knowledge and practice booklet provided</b></li> </ul> <p>Current electricity IV characteristics Resistivity</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Electricity</a></li> </ul>	<p><b>Formative Assessment:</b> Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p> <p><b>End of topic Summative Assessments:</b> In each topic of; progressive and stationary waves and current electricity, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.</p>	

	semiconductors and non-ohmic conductors such as filament lamps. Students gain greater essential knowledge of resistance and apply this to resistivity and understanding how superconductors work.		<ul style="list-style-type: none"> <li>• <b>Current electricity essential knowledge and practice booklet provided</b></li> </ul>	<p><b><u>Cumulative assessment 2 – summative test</u></b></p> <p>A cumulative and summative test taken in class and covers all topics studied up to this point. Topics covered:</p> <ul style="list-style-type: none"> <li>• Measurements and errors</li> <li>• Particles</li> <li>• Forces</li> <li>• Electromagnetic radiation</li> <li>• Motion</li> <li>• Energy and momentum</li> <li>• Quantum physics</li> <li>• Materials</li> <li>• Progressive and stationary waves</li> </ul> <p>Questions are a mix of recall and application questions to assess pupils understanding of essential knowledge up to this point</p>	
<b>HT5</b>	<p><b>Refraction, diffraction and interference</b></p> <p>Students further develop essential knowledge of the applications of wave phenomena to include refraction, diffraction, superposition and interference.</p>	<p>3.3.2.1</p> <p>3.3.2.2</p> <p>3.3.2.3</p>	<p>Interference</p> <p>Diffraction</p> <p>Refraction at a plane surface</p> <p><b><i>Essential knowledge reading for consolidation:</i></b></p> <ul style="list-style-type: none"> <li>• <a href="#"><i>PMT - Waves</i></a></li> <li>• <b>Refraction, diffraction and interference essential knowledge and practice booklet provided</b></li> </ul>	<p><b><u>Formative Assessment:</u></b></p> <p>Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that ‘bring the essential knowledge of the topic together.’</p>	

	<p><b>Electric circuits</b></p> <p>Students learn to calculate resistance in both series and parallel circuits, then apply Kirchoff's laws for current and potential difference. Students move on to learn about potential dividers before finishing the topic on EMF and internal resistance.</p>	<p>3.5.1.4 3.5.1.5 3.5.1.6</p>	<p>Circuits Potential divider EMF and internal resistance</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Electricity</a></li> <li>• <b>Electric circuits essential knowledge and practice booklet provided</b></li> </ul>	<p><b>End of topic Summative Assessments:</b></p> <p>In each topic of; refraction diffraction and interference, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.</p>	
HT6	<p><b>Periodic motion</b></p> <p>Students learn to use radians as a measure of angles as well as using angular velocity to calculate centripetal acceleration and force. Students will further develop their understanding of angular displacement and velocity in SHM, studying mass-spring systems and simple</p>	<p>3.6.1.1 3.6.1.2 3.6.1.3 3.6.1.4</p>	<p>Circular motion Simple harmonic motion Simple harmonic systems Forced vibrations and resonance</p> <p><b>Essential knowledge reading for consolidation:</b></p> <ul style="list-style-type: none"> <li>• <a href="#">PMT - Further mechanics</a></li> <li>• <b>Periodic motion essential knowledge and practice booklet provided</b></li> </ul>	<p><b>Formative Assessment:</b></p> <p>Daily, Weekly and Monthly Reviews focussing on reviewing material on Essential Knowledge.</p> <p>Use of TLaC techniques in lessons to check pupil understanding of essential knowledge during each lesson.</p> <p>Pupils are challenged with application questions that 'bring the essential knowledge of the topic together.'</p> <p><b>End of topic Summative Assessments:</b></p>	

	pendulums before finishing the final topic of year 12 on resonance and damping.			<p>In each topic of; periodic motion, all pupils are assessed on the application of the essential knowledge that links ideas together throughout each topic.</p> <p><b><u>Cumulative assessment 3 – summative test</u></b></p> <p>A cumulative and summative test taken in class and covers all topics studied in year 12</p> <p>Questions are a mix of recall and application questions to assess pupils understanding of essential knowledge and tested with AS Level Physics paper 1 and 2 taken.</p>	
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