Learning Cycle Year 1	Knowledge and Skills	Vocabulary & Reading	Checking of understanding	Rationale
Autumn Term	Students will study Mechanics through the context of sports including sprinting, weight-lifting, rock-climbing and bungee jumping and be given the opportunity to collect and analyse data using a variety of methods. This is a good start in which to build upon their GCSE understanding of unit analysis, algebraic manipulation and the importance of Scientific Methodology. In their first half term students cover the following: • Base quantities, derived quantities and their corresponding units. • Equations of motion and vectors. • Projectiles. • Force, mass and acceleration. • Kinetic and potential energy. • Simple trigonometrical functions used to solve various problems in mechanics.	Vocabulary and concepts encountered in the first half of the autumn term: Centre of Mass Conservation of Energy Conservation of Momentum Drag Efficiency Elastic Collision Equilibrium Force Friction Potential Energy Inelastic Collision Kinetic Energy Vocabulary and concepts encountered in the Second half of the autumn term: Coherence Constructive Interference Emission Spectrum Excitation	Students will complete 3 assessed core practicals. All work to be recorded in a dedicated lab book. There will be 2 assessment windows for work covered in the Autumn term. These will consist of exam style question papers and carried out under exam conditions. There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities. There will be Interactive white board activities.	Many of the ideas and concepts encountered in this part of the course will be familiar to those students who have studied Physics at GCSE. Concepts such as force and energy are fundamental to the understanding of physics and students will revisit them in almost every part of this course. The content covered this term gives student ample opportunity to carry out practical work and build upon their existing skills of investigation and data analysis. They will learn how to extract additional information from sets of measurements and use data logging as a method of acquiring large data sets. Practical activities are not just motivational and fun: they can also sharpen students' powers of observation, stimulate questions, and help develop new understanding and vocabulary.

	Later in the term students learn about the properties of different waves focusing on the sound produced by different musical instruments and the operation of a CD player. Students also continue to develop their investigation and ICT skills. In their Second half term students cover the following: • Travelling and standing waves. • The use of radians and degrees in analysing waves • String and Pipe musical systems • Path difference, Phase difference and superposition. • Atomic energy levels and line spectra. • Wave-particle duality • Laser light and its application.	Frequency Fundamental Frequency In-Antiphase In-Phase Path Difference Period Phase Phase Difference Students will read the associated course text book and be sign posted to an assortment of online and other appropriately sourced reading material.		
Spring Term	The start of the Spring term gives students the opportunity to study the physics behind the production, testing and packaging of sweets/biscuits and confectionary. Other aspects of the food industry including food quality, safety and recycling and environmental effects will also be discussed.	Vocabulary and concepts encountered in the first half of the spring term: Archimedes' Principle Elastic Deformation Elastic Limit Hooke's Law Plastic Deformation Stoke's Law	Students will complete 2 assessed core practicals. All work to be recorded in a dedicated lab book. There will be 2 assessment windows for work covered in	As an experimental science this section of the course allows our students to learn much more about the calibration of instrumentation. They will be introduced to some new and important handling techniques and become more confident in using the Vernier scale and Micrometer screw gauge. No matter how hard we try to

	In the first half of the spring term students cover the following: • Methods for measuring Viscosity and fluid flow. • The effects of concentration and temperature on fluid flow • Mechanical testing of products • Reflection, Refraction and polarisation • Using refractometry and polarimetry to monitor sugar concentration. Later in the second term knowledge is extended from previous topics to show how Mathematical models are developed to describe ohmic behaviours and the variation of resistance with temperature. Simple conceptual models are used for the flow of charge in a circuit, for the operation of a photocell, and for the variation of resistance with temperature. In the second half in the spring term students cover the following: • DC circuits: resistance, current, emf, power. • Kirchhoff's Laws • Temperature and resistance.	Brittle materials Ductile Materials Laminar Flow Turbulent Flow Viscosity Upthrust Vocabulary and concepts encountered in the Second half of the spring term: Electromotive Force (EMF) Electron Flow Internal Resistance Kirchhoff's First Law Kirchhoff's Second Law Ohm's Law Potential Difference Potential Divider Power Resistance Circuit networks Students will read the associated course text book and be sign posted to an assortment of online and other appropriately sourced reading material.	the Spring term. These will consist of exam style question papers and carried out under exam conditions. There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities. There will be Interactive white board activities.	control things, some level of experimental error is unavoidable. Throughout this spring term students will become more confident in reporting their experimental results with an appropriate uncertainty.

	• Energy and temperature change. • Intensity and efficiency			
Summer Term	The summer term builds on earlier work about electrical circuits and shows students how Geophysics is used for non-destructive testing of archaeological sites and artefacts. In the first half of the spring term students cover the following: • DC electric circuits; resistivity. • Resistivity surveying • X-ray imaging and diffraction • Diffraction and superposition. • Electron microscopy. • Photoelectric effect. A study of the physics associated with spare-part surgery for joint replacements and lens implant. Also, a look at how large-scale material properties can be related to small scale structures ultrasound scanning. In the second half in the summer term students cover the following: • Structure and properties of materials. • Doppler effect. • Reflection, refraction, lenses. • ultrasound imaging.	Vocabulary and concepts encountered in the first half of the summer term: Resistivity Semiconductors Equipotential Diffraction Diffraction Grating Monochromatic Huygens' construction De Broglie wavelength Thermionic emission Vocabulary and concepts encountered in the Second half of the Autumn term: Mechanical Properties Tensile stress Breaking stress Young modulus Energy density Hysteresis Converging Diverging Dioptre Virtual image Thin lens equation	Students will complete 3 assessed core practicals. All work to be recorded in a dedicated lab book. There will be 2 assessment windows for work covered in the Spring term. These will consist of exam style question papers and carried out under exam conditions. There will be a final mock examination during this term. There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities.	In the final term, students will draw upon prior knowledge to devise and carry out their own experimental work and use mathematical techniques to display and analyse data. To be successful, regardless of field or career path, students must learn how to communicate their ideas effectively and now with greater confidence in the subject matter will be encourage to present their finding to a wider audience.

	• lens implants and the optical system of the eye	Magnification Ultrasound. Students will read the associated course text book and be sign posted to an assortment of online and other appropriately sourced reading material.	There will be Interactive white board activities.	

Learning Cycle Year 2	Knowledge and Skills	Vocabulary & Reading	Checking of understanding	Rationale
Autumn Term	Students start their year 13 studies by looking at the application of physics in our modern rail transportation system with an emphasis on safety and control. In the first half of the autumn term students cover the following: • DC circuits and switching. • Force, momentum, work and energy. • Magnetic fields: electromagnetic force. • Electromagnetic induction. • Capacitors: exponential discharge.	Vocabulary and concepts encountered in the first half of the Autumn term: Momentum Magnetic flux density Flemings Left hand Rule Eddy currents Induced current Flux Linkage Faradays Law Lenz's Law Capacitance Vocabulary and concepts encountered	Students will complete 2 assessed core practicals. All work to be recorded in a dedicated lab book. There will be 2 assessment windows for work covered in the Autumn term. These will consist of exam style question papers and carried out under exam conditions.	The autumn term starts with students consolidating their understanding of basic circuit principles and the mechanics of motion learnt in year 12. Ideas encountered in their study of GCSE Physics also provides an excellent avenue in which to learn more about electromagnetism, electric motors and the laws of electromagnetism. Students will investigate

	Later students see how physics is used in the context of aircraft. They learn about modern communication and display techniques: transmission of signals, CCD imaging, cathode-ray tube, LCD and LED displays. In the second half of the autumn term students cover the following: • Capacitors: energy. • Fibre optics: exponential attenuation. • Uniform electric field. • Charged particles in a magnetic field.	in the second half of the Autumn term: Exponentials Attenuation Electric Fields Electric Potentials Equipotential r.m.s Voltage and current Thermionic emission	There will also be a mock examination at the start of this year. There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities. There will be Interactive white board activities.	circuits containing capacitors and revisit concepts of momentum and energy conservation. There will be opportunities to complete a wide range of practical activities, many of which will have an electrical basis. This will allow our students to learn much more about the physics of charge, voltage and capacitance and the role these play in cathode ray tubes, light emitting diodes and plasma displays.
Spring Term	The Spring term introduces the area of fundamental physics that is the subject of current research. This involves the acceleration and detection of high-energy particles and the interpretation of experimental results. In the first half of the spring term students cover the following: • Alpha scattering: nuclear model of atom.	Vocabulary and concepts encountered in the first half of the Spring term: Grand unified theory Fundamental particles Quarks & Leptons Annihilation reactions Conservation Laws Rest-mass energy Angular displacement Centripetal acceleration	Students will complete 5 assessed core practicals. All work to be recorded in a dedicated lab book. There will be 2 assessment windows for work covered in the Spring term. These will consist of exam style question	Students really enjoy the spring term content as they learn about the discovery of fundamental particles and the role of the large hadron collider at CERN. Students see how we can use beams of particles to probe matter and how electrostatic and magnetic forces are used to maintain circular motion. We revisit

	• Electrostatic force between point charges. • Collisions: momentum and energy. • Motion in a circle. • Mass–energy interconversion. • Charged particles in electric and magnetic fields. • The quark–lepton model. Later in the spring term students explore building design and how these can withstand earthquake damage. vibration isolation and sound-proofing. In the second half of the spring term students cover the following: • Simple harmonic motion. • Forced vibrations • Resonance and damping • Waves in solids; • Refraction • Mechanical properties of solids.	Vocabulary and concepts encountered in the Second half of the Spring term: Richter & Mercalli scale Free oscillation Natural frequency Resonance Harmonic motion Angular Frequency Damping Specific heat capacity Specific latent heat of vaporisation	papers and carried out under exam conditions. There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities. There will be Interactive white board activities.	conservation laws and forces in the analysis of particle collisions in 2 dimensions. Later in the spring term we look at simple harmonic motion. This motion underlies most studies of waves and students will use mathematics to make predictions about the behaviour of oscillating systems. Before encountering more difficult concepts in the summer term, students are introduced to ideas about heat transfer and methods of insulation.
Summer Term	This unit focuses on the physical interpretation of observations, and on the formation and evolution of stars. In the first half of the summer term students cover the following:		Students will complete 1 assessed core practical. All work to be recorded in a dedicated lab book.	The final term sees our students bring together their mathematical and problem-solving skills to learn about the more challenging concepts that advanced level physics has to offer. Simple harmonic motion,

	• Inverse-square law for radiation. • Universal gravitation; gravitational field. • Energy conservation: gravitational, kinetic. Motion in a circle. • Nuclear fusion, fission and radioactive decay. Molecular kinetic theory		There are Weekly assignments. There will be Quick fire Q&A sessions. There will be Card sorting activities. There will be Interactive white board activities.	radioactivity, Universal Gravitation, kinetic theory of gasses, black body radiation and the expansion of the universe are all covered and give our students a rich and diverse understanding of the universe and our place within it.