KS5 Curriculum Overview: **A-Level Physics**

	Autumn Term	Spring Term	Summer Term
Year 12	**Curriculum and Skills:** Motion (Teacher 1) This section provides knowledge and understanding of key ideas used to describe and analyse the motion of objects in both one-dimension and in two-dimensions. It also provides learners with opportunities to develop their analytical and experimental skills. The motion of a variety of objects are analysed using data-logging techniques. Learners also have the opportunity to analyse and interpret experimental data by recognising relationships between physical quantities. The analysis of motion gives many opportunities to link to How Science Works. Examples relate to detecting the speed of moving vehicles, stopping distances and freefall. Forces & Motion (Teacher 1) This section provides knowledge and understanding of the motion of an object when it experiences several forces and also the equilibrium of an object. Learners will also learn how pressure differences give rise to an upthrust on an object in a fluid. Learners will also be introduced to contemporary applications of terminal velocity, moments, couples, pressure, and Archimedes principle. Charge and Current (Teacher 2) This section introduces the ideas of charge and current. Understanding electric current is essential when dealing with electrical circuits. This section does not lend itself to practical work but to introducing important ideas. The continuity equation (I = Anev) is developed using these key ideas. This section concludes with categorising all materials in terms of their ability to conduct. Energy, Power and Resistance (Teacher 2) This section provides knowledge and understanding of electrical symbols, electromotive force, potential difference, resistivity and power. The scientific vocabulary developed here is a prerequisite for understanding electrical circuits. There is a desire to use energy saving devices, such as LED lamps, in homes. Learners have the opportunity to understand the link between environmental damage from power stations and the impetus to use energy saving devices in the home and how	**Curriculum and Skills:** Work, Energy & Power (Teacher 1) Words like energy, power and work have very precise meaning in physics. In this section the important link between work done and energy is explored. Learners have the opportunity to apply the important principle of conservation of energy to a range of situations. The analysis of energy transfers provides the opportunity for calculations of efficiency and the subsequent evaluation of issues relating to the individual and society. Materials (Teacher 1) This section examines the physical properties of springs and materials. Learners can carry out a range of experimental work to enhance their knowledge and skills, including the management of risks and analysis of data to provide evidence for relationships between physical quantities. There are opportunities to consider the selection of appropriate materials. Laws of Motion (Teacher 1) This section provides knowledge and understanding of Newton's laws – fundamental laws that can be used to predict the motion of all colliding or interacting objects in applications such as sport). Newton's law can also be used to understand some of the safety features in cars, such as air bags, and to evaluate the benefits and risks of such features. Learners should be aware that the introduction of mandatory safety features in cars is a consequence of the scientific community analysing the forces involved in collisions and investigating potential solutions to reduce the likelihood of personal injury. Waves (Teacher 2) This section provides knowledge and understanding of wave properties, electromagnetic waves, superposition and stationary waves. The wavelength of visible light is too small to be measured directly using a ruler. However, superposition experiments can be done in the laboratory to determine wavelength of visible light using a laser and a double slit. There are opportunities to discuss how the double-slit experiment demonstrated the wave-like behaviour of light. The breadth of the topic covering sound waves and the electromagnetic	**Curriculum and Skills:** Quantum Physics (Teacher 1) This section provides knowledge and understanding of photons, the photoelectric effect, de Broglie waves and wave–particle duality. In the photoelectric effect experiment, electromagnetic waves are used to eject surface electrons from metals. The electrons are ejected instantaneously and their energy is independent of the intensity of the radiation. The wave model is unable to explain the interaction of these waves with mater. This single experiment led to the development of the photon model and was the cornerstone of quantum physics. Learners have the opportunity to carry out internet research into how the ideas of quantum physics developed and how scientific community validates the integrity of new knowledge before its acceptance. Waves (continued) (Teacher 2) This section continues from the previous section and focuses on the concept of standing waves and how they are formed. Revision During this time students prepare for their summer mocks and complete any outstanding PAGs.

	customers can make informed decisions when buying domestic appliances.. Electrical Circuits (Teacher 2) This section provides knowledge and understanding of electrical circuits, internal resistance and potential dividers. LDRs and thermistors are used to show how changes in light intensity and temperature respectively can be monitored using potential dividers. Setting up electrical circuits, including potential divider circuits, provides an ideal way of enhancing experimental skills, understanding electrical concepts and managing risks when using power supplies. Learners are encouraged to communicate scientific ideas using appropriate terminology. This section provides ample opportunities for learners to design circuits and carry out appropriate testing for faults and there are opportunities to study the many applications of electrical circuits.	spectrum provides scope for learners to appreciate the wide ranging applications of waves and their properties.	
	Assessment: • Motion – Past Paper Assessment • Motion - Review/Test • Forces – Past Paper Assessment • Forces & Motion - Review/Test • Charge & Current/Energy, power and Resistance - Past Paper Assessment • Charge & Current/Energy, power and Resistance – Review • Electrical Circuits – Past Paper Assessment	**Assessment:** • Y12 January Mock Exam • Materials & Laws of Motion – Past Paper Assessment • Materials & Laws of Motion - Review/Test	**Assessment:** • Summer Mock Exam I • Waves I & Waves II – Past Paper Assessment • Waves I & Waves II - Review/Test • Quantum Physics - Past Paper Assessment • Quantum Physics - Review/Test
Year 13	**Curriculum and Skills:** Thermal Physics & Ideal Gases (Teacher 1) This section provides knowledge and understanding of temperature, mater, specific heat capacity and specific latent heat with contexts involving heat transfer and change of phase. Experimental work is carried out to safely investigate specific heat capacity of materials. It also provides an opportunity to discuss how Newton's laws can be used to model the behaviour of gases and significant opportunities for the analysis and interpretation of data. Electric Fields (Teacher 1) This section provides knowledge and understanding of Coulomb's law, uniform electric fields, electric potential and energy. Magnetic Fields (Teacher 1) This section provides knowledge and understanding of magnetic fields, motion of charged particles in magnetic fields, Lenz's law and Faraday's law. The application of Faraday's law may be used to demonstrate how science has benefited society with important devices such as generators and transformers.	**Curriculum and Skills:** Particle Physics & Nuclear Physics (Teacher 1) This section provides knowledge and understanding of the atom, nucleus, fundamental particles, radioactivity, fission and fusion. Nuclear power stations provide a significant fraction of the energy needs of many countries. They are expensive; governments have to make difficult decisions when building new ones. The building of nuclear power stations can be used to evaluate the benefits and risks to society (HSW9). Ethical, environmental and decision-making issues may also be discussed. The development of the atomic model also addresses issues of scientific development and validation. Medical Physics (Teacher 1) This section provides knowledge and understanding of X-rays, CAT scans, PET scans and ultrasound scans. This section shows how the developments in medical imaging have led to a number of valuable non-invasive techniques used in hospitals. Not all hospitals in this country are equipped with complex scanners. Learners have the chance to discuss the ethical issues in the treatment of humans and the ways in which society uses science to inform decision making.	**Curriculum and Skills:** Revision During this time students prepare for their summer exams and complete any outstanding PAGs to ensure they pass the PAG component of the course.

	Transformers are used in the transmission of electrical energy using the national grid and are an integral part of many electrical devices in our homes. The application of Lenz's law allows discussion of the use of scientific knowledge to present a scientific argument. Capacitance (Teacher 2) This section introduces the basic properties of capacitors and how they are used in electrical circuits. The use of capacitors as a source of electrical energy is then developed. This section introduces the mathematics of exponential decay, which is also required for the decay of radioactive nuclei. This section provides knowledge and understanding of capacitors and exponential decay. Experimental work provides an excellent way to understand the behaviour of capacitors in electrical circuits and the management of safety and risks when using power supplies. There are many opportunities for learners to use spreadsheets in the analysis and presentation of data. The varied uses of capacitors give the opportunity for the consideration of their use in many practical applications. Circular Motion (Teacher 2) There are many examples of objects travelling at constant speed in circles, e.g. planets, artificial satellites, charged particles in a magnetic field, etc. The physics in all these cases can be described and analysed using the ideas developed by Newton. The concepts in this section have applications in many contexts present in other sections of this specification, such as planetary motion. This section provides knowledge and understanding of circular motion and important concepts such as centripetal force and acceleration Oscillations (Teacher 2) Oscillatory motion is all around us, with examples including atoms vibrating in a solid, a bridge swaying in the wind, the motion of pistons of a car and the motion of tides. This section provides knowledge and understanding of simple harmonic motion, forced oscillations and resonance.	Gravitational Fields (Teacher 2) This section provides knowledge and understanding of Newton's law of gravitation, planetary motion and gravitational potential and energy. Newton's law of gravitation can be used to predict the motion of orbiting satellites, planets and even why some objects in our Solar system have very little atmosphere with the opportunity to analyse evidence and look at causal relationships. Geostationary satellites have done much to improve telecommunications around the world. They are expensive; governments and industry have to make difficult decisions when building new ones. Learners have the opportunity to discuss the societal benefits of satellites and the risks they pose when accidents do occur. Stars & Cosmology (Teacher 2) This section provides knowledge and understanding of stars, Wien's displacement law, Stefan's law, Hubble's law and the Big Bang. Learners have the opportunity to appreciate how scientific ideas of the Big Bang developed over time and how its validity is supported by research and experimental work carried out by the scientific community.	
	Assessment: • Summer Mock Exam II • Thermal Physics & Ideal Gases - Review/Test • Thermal Physics & Ideal Gases – Past Paper Practice • Capacitance - Past Paper Assessment • Capacitance - Review/Test • Circular Motion - Past Paper Assessment • Circular Motion - Review/Test • Magnetic Fields - Past Paper Assessment • Oscillations - Past Paper Assessment	**Assessment:** • Y13 January Mock Exam (Y13 content) • Y13 March Mock Exam (Y12&Y13 content) • Particle Physics - Past Paper Assessment • Radioactivity & Nuclear Physics - Past Paper Assessment • Medical Physics - Past Paper Assessment • Gravitational Fields - Past Paper Assessment • Stars & Cosmology - Past Paper Assessment	**Assessment:** • A- Level Physics Exam Paper 1 – Modelling Physics – Component 1 • A- Level Physics Exam Paper 2 – Exploring Physics – Component 2 A- Level Physics Exam Paper 3