Year 10 Physics Curriculum

Unit	Core knowledge/skill development	Sequence	Assessment	Literacy, numeracy, PSHE, FBV, other links	Key areas of ACP and VAA development	Home learning and enrichment
Waves	Students will revise the terms used to describe waves and the definitions of transverse and longitudinal waves with reference to different types of waves. They will apply the equations v=f x λ and v= x/t to different types of waves. Students will also learn how to measure the velocity of sound in air and determine the speed of ripples on a water surface. All students will investigate refraction and find that waves change direction when passing from one medium into another. Students will also find out how different substances absorb transmit and reflect waves and	SP4a Describing Waves SP4b Gravity and Orbits SP4b Core Practical- Investigating Waves SP4c Refraction SP4d Waves Crossing Boundaries SP4e Ears and Hearing SP4f Ultrasound SP4g Infrasound	Starter questions Exam-type questions Hinge questions Use of web-based applications to assess knowledge in lesson (e.g. Isaac Physics, Educake, Active Learn etc.) End-of-topic tests. End of year exam (PPE). Mathematical skills will be assessed through examinations. The minimum level of mathematics in the foundation tier examination papers will be equivalent to	Literacy: key words, definitions, summary notes. Numeracy: summary notes, equation practice, students are advised to practice using the free 23 Equations app, General maths skills (e.g. rearranging equations, graph plotting, standards form , SI prefixes) Equations students are required to recall	**Connection finding (linking)** to use connections from past experiences (KS3) to seek generalisations in the topic **Speed and accuracy** to work at speed and with accuracy when working through tasks such as the plotting of angles of incidence and refraction	Homework typically set via online platforms such as Tassomai, Isaac Physics, Active Learn. Exam preparation via exam papers

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	consider the suitability of equipment to measure speed, frequency, and wavelength of waves in solids and fluids. For students following the separate Physics route we extend those key ideas by studying total internal reflection, the use of reflection in echo sounding, sonar and radar including the use of ultrasound and infrasound. Refraction can be revisited and then extended by studying its application in converging and diverging lenses.		Key Stage 3 mathematics. The minimum level of mathematics in the higher tier examination papers will be equivalent to foundation tier GCSE in Mathematics.	and apply (list a) and which they are required to select from a list and apply (list b).		
Light and the Electromagnetic (EM) Spectrum	Students will learn the properties common to all electromagnetic waves and be able to recall the groupings	SP5a Ray Diagrams SP5b Colour SP5c Lenses SP5d EM waves			**Connection finding (linking)** to use connections from past experiences (KS3) and Waves to seek	

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	of the spectrum in order of decreasing wavelength. Learn the colours of the visible spectrum and recognise that visible light is the limited range of frequencies in the electromagnetic spectrum that can be detected by the human eye. A core practical will also be carried out to investigate the refraction of light as it passes from air into a glass block. For Separate Physics, ray diagrams to include reflection, total internal reflection and some properties of lenses are needed. For a longitudinal wave, the determination of speed of sound in a solid is studied. For	SP5e The EM Spectrum SP5f Using the Long Wavelengths SP5g Radiation and Temperature SP5g Core Practical – Investigating Radiation SP5h Using the Short Wavelengths SP5i EM Radiation Dangers			generalisations in the topic. Self-regulation to monitor, evaluate and self-correct as this topic generalises 'waves' to EM waves then onto specific properties depending on the type of EM wave differentiated only by frequency and wavelength.	

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	transverse waves, the absorption, transmission, and reflection of electromagnetic waves is also covered and the uses of each of the groupings of waves in the electromagnetic spectrum. Students learn that almost all the waves in the electromagnetic spectrum are radiated due to changes in the electron structure of the emitting energy. It is only gamma rays that are produced by changes in the nucleus of the atom and radio waves are generally produced by oscillations in electrical circuits. The potential danger of exposure to electromagnetic radiations is linked to					

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	increasing frequency and specific dangers of exposure for particular groups of radiation are studied. For Separate Physics, the radiation and absorption of thermal energy is studied, and this is exemplified by the core practical investigating how the nature of a surface affects the amount of thermal energy (infrared) radiated or absorbed.					
Radioactivity	Revision of atomic size and structure, charges, and relative masses of atomic particles. Learn that some elements are radioactive and that these elements emit radioactive particles or waves from unstable nuclei. Know that the emission of radiation is a random process	SP6a Atomic Models SP6b Inside Atoms SP6c Electrons and Orbits SP6d Background Radiation SP6e Types of Radiation SP6f Radioactive Decay SP6g Half-life SP6h Using Radioactivity			**Complex and multi-step problem solving** to break down a task (e.g., equations), decide on a suitable approach, and then act. For example half-life and nuclear equations. **Risk-taking** Being brave enough to work in unfamiliar contexts such as the half-	

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	and that alpha (λ) particles, beta minus (β-) particles, positrons (β+) particles and gamma (Y) radiation can all be emitted randomly by unstable nuclei. Know that an alpha particle is a helium nucleus, a beta minus particle is an electron, a beta plus particle is an electron with a positive charge and that gamma radiation is a high frequency electromagnetic wave. The ionising properties and penetration properties and background radiation will also be studied. Radioactive emissions from an unstable nucleus are random (unpredictable). However, because substances have large	SP6i Dangers of Radioactivity SP6j Radioactivity in Medicine SP6k Nuclear Energy SP6l Nuclear Fission SP6m Nuclear Fusion			life of a radioactive sample or the different types of radiation.	

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	numbers of atoms, the time taken for half the unstable atoms in a substance to decay can be predicted and measured. This is called the half-life. Carry out calculations and plot graphs to show half-life. Learn the dangers of ionising radiations and relate this to precautions to limit exposure to radiation for the safety of those people that wok with radiations. Compare the hazards associated with contamination and irradiation by radioactive sources. Students will discuss the advantages and disadvantages of nuclear power for generating electricity compared with the use of other fuels and					

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	methods. The use of nuclear reactions as a source of energy will then be considered. Students learn that it is a controlled chain reaction in a nuclear reactor that provides the energy for the generation of electricity in a nuclear power station and that the products of nuclear fission are radioactive. Nuclear fission is then compared with nuclear fusion as the process of energy generation in stars. The conditions required for nuclear fusion are also considered.					
Astronomy	This topic is only required for separate physics. Revision of mass and weight and forces at a distance. Learn that our solar	SP7a The Solar System SP7b Gravity and Orbits SP7c Life Cycles of Stars SP7d Red-shift			**Enquiring** challenge assumptions/ concepts and seek evidence for assertions eg the evolution of ideas and	Homework typically set via online platforms such as Tassomai, Isaac Physics, Active Learn.

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	system is made up of various bodies with different characteristics which includes learning the order in terms of distance from the Sun of the eight planets. Learn that planets, moons, comets, and artificial satellites have orbits of different shape. Explain for circular orbits that velocity changes but speed is constant and that the orbital speed of a satellite depends on the radius of its orbit. Describe the evolutionary stages of a star similar in mass to the sun and how the balance between thermal expansion and gravity affects the life cycle. Also know the evolution of stars with a much larger mass than our sun. Students will also study how methods of observing the universe have changed over time.	SP7e Origin of the Universe			discoveries of Ptolemy, Copernicus, Galileo Generalisation to see how knowledge of physics from Earth based theory and experiment is extrapolated to situations beyond the Earth.	Exam preparation via exam papers and mark schemes

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	Students will compare the steady state and Big Bang theories of the origin of the Universe by being able to describe the evidence which is used to support the theories and explain the relevance of the evidence to each of the theories.					
Energy – Forces Doing Work	The idea that work is done when energy is transferred will be expressed mathematically E = F x d so that students can calculate changes in energy when work is done by a force. Power will then be defined as the rate at which energy is transferred and the equation P=E/t recalled and used. The unit of power will be given as the watt which is one joule per second.	SP8a Work and Power			**Risk-taking** Being brave enough to work in the unfamiliar context of forces doing work ie more than a 'push' or a 'pull' or rotation **Generalisation** Prior physics learning of distinct topics of 'forces' and 'energy' become joined where forces are seen to do work, ie transfer energy.	
Forces and Their Effects	Students will revise contact forces and forces at a distance and	SP9a Objects Affecting Each Other SP9b Vector Diagrams			**Complex and multi-step problem solving**	

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	then show these forces using examples represented in vector diagrams. Scalars and vectors will also be used to explain the difference between speed and velocity when an object moves in a circle and why the centripetal force produced is always towards the centre of the circle. Vector diagrams to scale will be used to illustrate resolution of forces and forces will be shown acting in free body diagrams. In separate physics, students will also study moments and the rotational effects of forces.	SP9c Rotational Forces			to break down a task (e.g., equations), decide on a suitable approach, and then act. For example, in the idea of turning moments. Vector addition and resolving vectors such as forces. Generalisation The idea of vectors generally representing various phenomena such as force, velocity, acceleration. The non-contact forces and concept of a field applied to gravity, magnetism and electrostatics	
Electricity and Circuits	During year 7, many of the basic ideas regarding current electricity were introduced including the representation of circuits using standard symbols and the effects of adding bulbs to	SP10a Electric Circuits SP10b Current and Potential Difference SP10c Current, Charge and Energy SP10d Resistance SP10e More About Resistance			Complex and multi-step problem solving to break down a task (e.g., equations), decide on a suitable approach, and then act. For example, in calculating resistance of networks.	

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	series circuits. This will be revised and extended with a more quantitative approach to current electricity and an understanding of the differences between series and parallel circuits. Circuits will be set up using circuit symbol diagrams and current and potential difference measured. Students will recall the structure of the atom and that electrons make up the extra–nuclear structure and carry a negative charge. They will and learn that current is the rate of flow of and that energy is transferred when charges move. This will be expressed quantitatively. Students will also add variable resistors to circuits to show changing resistance in the circuit changes the current. Students investigate the total resistance when	SP10e Core Practical – Investigating Resistance SP10f Transferring Energy SP10g Power SP10h Transferring Energy by Electricity SP10i Electrical Safety			Generalisation Current thus far only dc and of low value desk-top power supply range is expanded to ac and applied to the domestic situation with the attendant safety features of the modern domestic installation up to 13A supply.	

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	resistors used in series and parallel and study the relationship between current, potential difference and resistance using the equation V=1 x R. They also investigate the relationship between current and potential difference for filament lamps, diodes, and fixed resistors. Students design circuits to test the variation in resistance of thermistors, diodes, filament lamps and LDRs. Students then consider the energy transfer that heats a resistor and the mechanism which causes this energy transfer, together with ways of reducing unwanted energy transfer and apply the equation E =I x V x t. Students will learn that energy transferred each second is power, and how the power transfer					

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	in a circuit device is related to the potential difference across it and the current in it. Students will study domestic supply of electricity by battery and mains. and will learn the difference between d.c. and a.c. They will also learn the functions of the three wires, switches and fuses in the domestic mains supply and consider safety features and power ratings.					