Year 12 Physics Curriculum Overview

Rationale: The Year 12 Biology curriculum is designed to further explore and investigate Physics by building a mind-set that allows skills to be continuously developed. Students will study and experience modules such as particles and radiation, waves, electricity, and forces and motion. In doing so, pupils will develop their practical, numeracy and investigative skills.

Term/Length of Time	Outline	Assessment/Teacher Feedback Opportunities	Homework and Literacy resources
Section 1 27 lessons including assessments and feedback	<u>Particles and radiation</u> This section introduces students both to the fundamental properties of matter, and to electromagnetic radiation and quantum phenomena. We begin with this topic to provide a new interest and knowledge dimension beyond GCSE. Through a study of these topics, students become aware of the way ideas develop and evolve in physics. They will appreciate the importance of international collaboration in the development of new experiments and theories in this area of fundamental research. <u>Skills</u> • Use of prefixes for small and large distance measurements. • Detection of gamma radiation. • The PET scanner could be used as an application of annihilation. • Demonstration of the photoelectric effect using a photocell or an electroscope with a zinc plate attachment and UV lamp. • Observation of line spectra using a diffraction grating.	Matter and radiation and quantum phenomenon end of topic assessments in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	Homework is set weekly and contains a mixture of recall exam-style questions as well as more detailed application based exam style questions. All homework is reviewed with at least one detailed FAR (Feedback, Action, Response) marked by the teacher approximately once every 2 weeks <u>Optional homework tasks and Literacy resources:</u> SoL on science shared area, including PowerPoints, details of practical investigations, worksheets, revision resources, a range of AFL (assessment for learning) activities, research based tasks, model answers, short answer questions, exam questions, mark schemes, examiner's reports as well as homework. Physics offers many opportunities to develop and extend students' literacy skills. There is a large amount of new, subject-specific vocabulary, and so each unit includes a PLC (Personnel Learning checklist) which students will engage with throughout the unit. Students will use texts to find out information for themselves, using the functional layout of such texts, including index, contents and glossary sections of text books used in class, and

	• Demonstration using an electron diffraction tube. <u>Waves</u> GCSE studies of wave phenomena are extended through a development of knowledge of the characteristics, properties, and applications of travelling waves and stationary waves. Topics treated include refraction, diffraction, superposition and interference. <u>Skills</u> • Laboratory experiment to determine the speed of sound in free air using direct timing or standing waves with a graphical analysis. • Students investigate the factors that determine the speed of a water wave. • Investigation of two-source interference with sound, light and microwave radiation. • Investigation of interference effects to include the Young's slit experiment and interference by a diffraction grating.		also at home in an online format. Students will also review and connect information within topics.
Section 2 22 lessons including assessment and feedback		Waves and Optics end of topic assessments in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	<u>Useful websites:</u> https://www.physicsandmathstutor.com/ https://senecalearning.com/en-GB/ https://www.youtube.com/c/MalmesburyEducation https://www.aqa.org.uk/subjects/science/as-and-a-level/physics-7407-7408 https://www.savemyexams.co.uk/a-level/physics/aqa/17/revision-notes/ <u>Reading list:</u> 1. A Brief History of Time - Stephen Hawking 2. Surely You're Joking Mr Feynman: Adventures of a Curious Character - Ralph Leighton and Richard Feynman 3. Blackholes and Timewarps: Einstein's Outrageous Legacy - Kip Thorne 4. The First Three Minutes - Steven Weinberg 5. Six Easy Pieces - Richard P. Feynman 6. Seven Brief Lessons on Physics - Carlo Rovelli 7. Mr Tompkins in Paperback – George Gamow 8. Why Does E=mc^2 ? - Brian Cox and Jeff Forshaw 9. Does God Play Dice? - Ian Stewart 10. A Short History of Nearly Everything - Bill Bryson 11. Invention and Evolution: Design in Nature and Engineering – Michael French 12. Cosmos – Carl Sagan
Section 3 22 lessons including assessment and feedback	<u>Mechanics and materials</u> Vectors and their treatment are introduced followed by development of the student's knowledge and understanding of forces, Newton's laws, energy and momentum. The section continues with a study of materials considered in terms of their bulk properties and tensile strength. <u>Skills</u>	Forces in equilibrium, Motion in a Straight Line, Newton's Laws of Motion, Fore and Momentum, Work, Energy and Power, and Materials end of topic assessments in the style of exam questions Written and verbal feedback given throughout	

Section 4 22 lessons including assessment and feedback	• Investigation of the conditions for equilibrium for three coplanar forces acting at a point using a force board. • Distinguish between instantaneous velocity and average velocity. • Measurements and calculations from displacement–time, velocity–time and acceleration–time graphs. • Calculations involving motion in a straight line. • Determination of g by a freefall method. • Students can apply conservation of momentum and rate of change of momentum to a range of examples. • Estimate the volume of an object leading to an estimate of its density. <u>Electricity</u> This section builds on and develops earlier study of these phenomena from GCSE. It provides opportunities for the development of practical skills at an early stage in the course and lays the groundwork for later study of the many electrical applications that are important to society. <u>Skills</u> • Students can construct circuits from the range of components. • Investigation of the variation of resistance of a thermistor with temperature.	module through in-class activities and homework. Electric current, and DC circuits end of topic assessments in the style of exam questions Written and verbal feedback given throughout module through in-class activities and homework.	13. Moondust: In Search of the Men Who Fell to Earth - Andrew Smith 14. Quantum Theory Cannot Hurt You: Understanding the Mind-Blowing Building Blocks of the Universe - Marcus Chown 15. A Short History of Nearly Everything - Bill Bryson 16. Thing Explainer: Complicated Stuff in Simple Words - Randall Munroe

	• Students can investigate the behaviour of a potential divider circuit. • Determination of resistivity of a wire using a micrometer, ammeter and voltmeter. • Investigation of the emf and internal resistance of electric cells and batteries by measuring the variation of the terminal pd of the cell with current in it.			