Long Term Plan: Physics Year 13 (Teacher 1)

Half term	Unit title	Key knowledge/ Content to learn and retain	Essential skills to acquire (subject & generic)	Link to subject ethos and driver	Anticipated misconceptions	Links to previous KS	Links to future KS	Opportunity for stretch for high prior attainers	SMSC & British Values	Cultural Capital	Career Link
One (Teacher 1)	Further Mechanics	Circular motion Simple harmonic motion Simple harmonic systems Forced vibrations & resonance	Application of mathematics throughout this unit of work. Working scientifically Modelling of complex concepts Use of data logging equipment CPAC 7 – Pendulum Investigation	Abstract concepts – promotes questioning & curiosity Experimental phenomena – generates curiosity	With circular motion at a constant speed, an object is not accelerating.	Circular motion at KS4 This module builds directly on the Mechanics & Waves units taught in Y12	Engineering at University	The complexity of the mathematics within this unit is going to stretch and challenge even those with the highest prior attainment. The challenge can be further raised by the applications used following the basic teaching of these concepts.	Social & cultural implications of waves travelling through the Earth and Oceans. (Earthquakes & Tsunamis) Social development through practical work and the safety aspects associated with this.	Clear link to STEM careers through engineering.	Engineering e.g. Civil, Aeronautical, Environmental, Nuclear, Mechanical
Two (Teacher 1)	Nuclear Physics	Y13 PPE 1 are during this half term. Rutherford scattering Alpha, beta, gamma radiation Radioactive decay Nuclear instability Nuclear radius Mass and energy Induced fission Safety aspects	Application of mathematics throughout this unit of work. Working scientifically H & S associated with handling radioactive materials Modelling of complex concepts CPAC 12 –Inverse square law for gamma radiation	Abstract concepts – promotes questioning & curiosity Experimental phenomena – generates curiosity	Ionising radiation only comes from nuclear power plants. Irradiation & contamination are the same thing. The understanding of risk of radiation & radioactive materials is based strongly on everyday information (e.g. media, fiction & film)	Radioactivity topic at KS4 Nuclear fission & fusion taught in the GCSE Physics course	Nuclear Physics studies at University	The complexity of the mathematics within this unit is going to stretch and challenge even those with the highest prior attainment. The challenge can be further raised by the applications used following the basic teaching of these concepts.	Moral & social implications of working with radioactive materials Social development through practical work and the safety aspects associated with this.	Historical view and developments in using and handling radioactive materials	Nuclear physics – research & fuels/energy Medical physics diagnosis & applications Radiation protection practitioner
Three (Teacher 1)	Astrophysics	This unit will take 2 x half terms to complete	Application of mathematics throughout this unit of work.	Curiosity around what is in the Universe	Universe has an outer edge Big bang was the	Space topic taught in the GCSE Physics	Astro physics at University	The complexity of the mathematics within this unit is going to stretch and	Is there life beyond Earth? Mutual respect	Historical view and developments in the use of equipment to	Space industry SETI

		Astronomical telescope (2 converging lenses) Reflecting telescopes Single dish radio telescopes Advantages of large diameter telescopes Classification of Stars by luminosity Absolute magnitude Classification of stars by temperature Principles of the use of stellar spectral classes The Hertzsprung-Russell diagram Supernova, neutron stars and black holes Doppler effect Hubble's law Quasars Detection of exoplanets	Working scientifically Modelling of complex concepts Use of optical telescopes	Abstract concepts – promotes questioning & curiosity Experimental phenomena – generates curiosity	birth of space and time The Sun is yellow	course (Students who studied combined science will not have this prior knowledge – other than that gained through their own personal reading and interests)		challenge even those with the highest prior attainment. The challenge can be further raised by the applications used following the basic teaching of these concepts.	& tolerance. Appreciation that not all religions accept the "Big Bang" theory of Universe formation. (Spiritual development)	study the Universe Potential to attend external event with Prof Brian Cox *et al*	Astronomy & the study of the Universe Academic researcher Medical physics Cosmology & galaxy formation
Four (Teacher 1)	Astrophysics	This unit will take 2 x half terms to complete. Y13 PPE 2 are during this half term. Astronomical telescope (2 converging lenses) Reflecting telescopes	Application of mathematics throughout this unit of work. Working scientifically Modelling of complex concepts Use of optical telescopes	Curiosity around what is in the Universe Abstract concepts – promotes questioning & curiosity Experimental phenomena – generates	Universe has an outer edge Big bang was the birth of space and time The Sun is yellow	Space topic taught in the GCSE Physics course (Students who studied combined science will not have this prior	Astro physics at University	The complexity of the mathematics within this unit is going to stretch and challenge even those with the highest prior attainment. The challenge can be further raised by the applications used following the basic teaching of	Is there life beyond Earth? Mutual respect & tolerance. Appreciation that not all religions accept the "Big Bang" theory of Universe formation.	Historical view and developments in the use of equipment to study the Universe Potential to attend external event with Prof Brian Cox *et al*	Space industry SETI Astronomy & the study of the Universe Academic researcher Medical physics

		Single dish radio telescopes Advantages of large diameter telescopes Classification of Stars by luminosity Absolute magnitude Classification of stars by temperature Principles of the use of stellar spectral classes The Hertzsprung-Russell diagram Supernova, neutron stars and black holes Doppler effect Hubble's law Quasars Detection of exoplanets		curiosity		knowledge – other than that gained through their own personal reading and interests)		these concepts.	(Spiritual development)		Cosmology & galaxy formation Aeronautical engineering
Five	Revision for A2 exams										
Six	Revision & completion of A2 exams										