Subject	Year 12 Core Knowledge –	How to support students' learning
	Autumn/Spring/Summer term	
Science –	Autumn Term	
Physics	Particles and radiation –	
Physics	 Particles and radiation – Demonstrate and show an understanding of constituents of the atom. Demonstrate and show an understanding of stable and unstable nuclei. Demonstrate and show an understanding of particles, antiparticles and photons. Demonstrate and show an understanding of particle interactions. Demonstrate and show an understanding of classification of particles. Demonstrate and show an understanding of quarks and antiquarks. Demonstrate and show an understanding of applications of conservation laws. Demonstrate and show an understanding of applications of conservation and understanding of the photoelectric effect. Demonstrate and show an understanding of the photoelectric effect. 	 CGP AQA A level Physics year 1 revision guide (can be bought through the school). CGP AQA A level Physics year 1 textbook (can be bought through the school). Seneca: <u>https://senecalearning.com/en-GB/</u> Free revision resource. Free science lessons: <u>https://www.freesciencelessons.co.uk/a-level-revision-videos/a-level-chemistry/</u> Physics and maths tutor: <u>https://www.physicsandmathstutor.com/physics-revision/a-level-aqa/</u>
	electrons with atoms.	
	Electromagnetic Radiation and Quantum	
	Phenomena –	
	 Demonstrate and show an understanding of energy levels and photon emissions. Demonstrate and show an understanding of wave particle duality. 	
	Electricity –	
	 Construct and demonstrate understanding of circuit diagrams. Define, calculate and show an understanding of current and potential difference. Define, calculate and graphically demonstrate an understanding of resistance and Ohm's Law. 	

15.	Recognise and show and	
	understanding of I-V and V-I graphs	
	for an ohmic conductor, a	
	semiconductor diode and a	
	filament lamp.	
16.	Demonstrate an understanding of	
	resistance in thermistors and light	
	dependent resistors and their	
	applications.	
17.	Demonstrate an understanding of	
	superconductors and their	
10	applications.	
18.	Define, calculate and practically	
10	Investigate resistivity of a wire.	
19.	calculate the power of a	
	transforred in a circuit	
20	Define, calculate and show an	
20.	understanding of e m f and internal	
	resistance	
21	Practically investigate e m f and	
21.	internal resistance in cells and	
	batteries.	
22.	Show an understanding of the	
	relationship between current,	
	potential difference and resistance	
	in series and parallel circuits.	
23.	Demonstrate an understanding of	
	how a potential divider can be	
	used to supply a constant or	
	variable potential difference from a	
	power supply.	
Spring	Term	
Mecha	nics –	
24.	Describe the difference between	
25	Scalar and vector quantities.	
25.	construct scale diagrams and work	
	out the resultant vector on those scale diagrams	
26	From a set of instruction set up the	
20.	practical to work out the conlanar	
	forces	
27	Calculate moments	
27. 28	Demonstrate how to find the	
20.	centre of mass of regular and	
	irregular shapes.	
29.	Understand complex motion	
25.	questions selecting the correct	
	SUVAT equations to calculate	
	uniform motion.	

 30. Know how to use a distance-time and velocity-time and acceleration-time graphs to calculate velocity, distance travelled and acceleration. 31. Confidently carry out a practical to find the acceleration due to gravity. 32. Calculate components of projectile motion. 33. Explain the forces involved when an object reaches terminal velocity. 34. Explain conservation of momentum. 35. Calculate momentum. 36. Apply newtons three laws of motion. 37. Calculate energy work and power. Waves - 38. Describe and fully label a wave using key terms such as: amplitude, displacement, frequency, wavelength, phase and phase difference. 39. Demonstrate how to calculate the frequency, wavelength, phase and phase difference. 39. Demonstrate now to calculate the frequency and an understanding of polarisation and give applications of this. 40. Compare longitudinal and transverse waves in terms of their displacement, energy propagation and give examples of both. 41. Show an understanding of polarisation and give applications of this. 42. Define the principle of superposition and show an understanding of hours and give graphical explanation to support this. 43. Describe how stationary waves are formed and give graphical explanation to support this. 44. Demonstrate an understanding of harmonics and the properties of such, plus give examples of stationary waves e.g. on musical instrument strings. 45. Practically investigate resonant frequency using knowledge of the first harmonic on a string. (Required Practical 1). 		
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	46. Show an understanding of the	
	diffraction patterns that are made	
	by monochromatic and white light.	
	47. Describe the variation of the width	
	of the central diffraction maximum	
	in a single slit diffraction pattern	
	with wavelength and slit width.	
	48. Describe and explain how	
	interference is produced and link to	
	coherence and path difference.	
	49. Practically investigate two-source	
	Interference of light using a	
	conerent source (Required Practical	
	2).	
	50. Demonstrate awareness of the	
	salety issues associated with using	
	Idsels. 51 Show the ability to use Voung's	
	double-slit formula	
	52 Practically investigate interference	
	of light caused by a diffraction	
	grating (Required Practical 2)	
	53. Derive the equation for diffraction	
	gratings.	
	54. Show an understanding of the	
	pattern produced by light when	
	directed normally at a diffraction	
	grating and give examples of the	
	applications of diffraction gratings.	
	55. Show an understanding of	
	refractive index and demonstrate	
	how to calculate it.	
	56. Use Snell's law of refraction for a	
	boundary between two	
	substances.	
	57. Describe total internal reflection	
	and the significance of the critical	
	angle.	
	58. State and describe applications of	
	total internal reflection e.g. optical	
	fibres, including the function of	
	cladding, pulse broadening and	
	absorption, material and modal	
	dispersion.	
	Summer Term	
	Materials –	
	59 Define and calculate density	
	60. Recall and use the Hooke's law	
	formula. $F=k\Lambda L$.	

 61. Demonstrate an understanding of plastic behaviour and the elastic limit of a material. 62. Practically investigate Hooke's law. 63. Define tensile stress, tensile strain and breaking stress. 64. Demonstrate an understanding of energy conservation in springs. 65. Use the formula for the Young modulus. 66. Describe and carry out a method to determine the Young modulus using stress-strain graphs. 67. Interpret simple stress-strain curves and compare to force-extension graphs. 68. Describe and explain fracturing and brittle behaviour and recognise it on stress-strain & force-extension graphs. 	
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