Curriculum Content Map			Subject: Year 10 Combined Physics											
			Term 1				Term 2				Term 3			
Month			September	October	November	December	January	February	March	April	May	June	July	
Cultural Transmission	Units of Work		P1 Conservation and dissipation of energy	P1 Conservation and dissipation of energy P2 Energy transfer by heating	P3 Energy resources	P4 Electric circuits	P4 Electric circuits (cont.) P5 Electricity in the home	P6 Molecules and matter	P7 Radioactivity	P8 Forces in balance	P9 Motion P10 forces and motion	P10 forces and motion	P10 Forces and motion P11 wave properties	
	National Curriculum area – KS3		Energy				Electricity	*Structure of Matter*		Forces Forces and motion	Forces Forces and motion	*Forces and motion*	Forces and motion Wave motion	
	Substantive Knowledge	***The What!***	Changes in energy store Conservation of energy Energy and work Gravitational potential energy stores Kinetic energy and elastic energy stores Energy dissipation Energy and efficiency Electrical appliances Enery and power	Energy transfer by conduction Specific heat capacity Heating and insulating building	Energy demands Energy from wind and water Power from the Sun and the Earth Energy and the environment Big energy issue	Current and charge Potential difference and resistance Component characteristics Series circuits Parallel circuits	Alternating current Cables and plugs Electrical power and potential difference Electrical currents and energy transfer Appliances and efficiency	Density States of matter Changes of state Internal energy Specific latent heat Gas Pressure and temperatur	Atoms and radiation The discovery of the Atom Changes in the nucleus More about alpha, beta, and gamma radiation. Activity and half-life	Vectors and scalars Forces between objects Resultant Forces Centre of mass The parallelogram of forces Resolution of forces	Speed and distance-time graph Velocity and acceleration More about velocity-time graphs Analysing motion graphs Forces and acceleration Weight and terminal velocity Forces and braking Momentum Forces and elasticity	Forces and acceleration Weight and terminal velocity Forces and braking Momentum Forces and elasticity The nature of waves The properties of waves Reflection and refraction	Forces and acceleration Weight and terminal velocity Forces and braking Momentum Forces and elasticity The nature of waves The properties of waves Reflection and refraction	
	Disciplinary knowledge	***The How!***	Students will learn how to measure the work done by a force acting over a distance and how this concept can be used to analyse energy changes in gravitational stores, through lifting and falling, and elastic potential stores during stretching using the relevant mathematical relationships. The conservation of energy through changes in the gravitational, kinetic, and elastic stores will also be discussed.	Students will describe the transfer of energy between objects through absorption and emission of infra-red radiation as a part of the electromagnetic spectrum. This includes the factors that affect the rate of this transfer such as temperature and surface colour. Students will apply this knowledge to the concept of the Greenhouse Effect and its relationship to the wavelength of the radiation penetrating or being absorbed by Earth's atmosphere. All students will analyse the changes in temperature when a material is heated, leading to the experimental determination of specific heat capacity along with corresponding calculations. The concept of specific heat capacity will then be used to explain the choice of materials used in heating systems.	Student will describe and evaluate renewable resources such as wave power, wind power, hydroelectricity and tidal technology and how these can be used to generate electricity in specific locations. In addition, students will describe the operation of geothermal power stations and their links to radioactive decay. The principles of solar cells and both smallscale and large-scale solar heating systems have been outlined.	The students will then describe electric circuits and the components used to construct them using the concept of current as the rate of charge flow through components due to a potential difference between points in the circuit. Resistance was introduced and the cause of a heating effect and corresponding energy transfer. Following AP1 in December 2023, teachers of science used the question by question analysis to identify gaps and misconceptions in students knowledge. Students had gap filling lessons on gravitational potential energy and energy resources. Each student was then given a learning booklet and time was given for students to revisit those topics that they needed in order to fill these gaps, which they personalised using the question by question analysis for their AP1 exam.	Students will investigate the factors affecting the resistance of a wire and the corresponding current-potential difference graphs. Further investigations of the components and analysis of the current-potential difference graphs will show ohmic and non-ohmic behaviours for wires, filaments, and diodes. The relationship between the resistance of a thermistor and its temperature along with the relationship between the resistance of a light-dependent resistor and light level have been investigated. Students will describe the UK mains supply and the wires used within it, outlining the National Grid and the high voltages associated with it. Understanding of mains circuits,including the function of the neutral and earth wires, has been applied to three pin plugs and a simple ring-main. The choice of materials used for construction of mains circuits such as wires, cables and plugs was discussed along with the need for a fuse to prevent overheating and insulation for protection from short circuits. Students will mathematically analyse circuits to determine the power supplied by a current and the relationship between power and the resistance of components. This will be linked back to the charge transfer in a circuit and the concept of electrical heating as charges move within or through components.	Students will increase their understanding of the concept of density as a property of a material or object by measuring and calculating the density of solids and liquids. This leads to a discussion of the states of matter, solid liquid and gas, the properties of matter which is in these states and the changes which occur as a material changes from one state to another. The changes in the properties of matter were used to introduce the kinetic theory and to analyse the changes in temperature occurring during heating and the concept of latent heat. Students move on to discuss the concept of internal energy in more detail; analysing the behaviour of particles in a solid, liquid or gas as the temperature changed. Students will describe latent heat of fusion and vaporisation mathematically, calculating energy changes during the appropriate phase changes and attempted to measure the latent heat of fusion for ice using electrical heating. Students will analyse the relationships between the pressure and temperature of a fixed mass of gas, determining that the pressure is proportional to the absolute temperature.	Students will describe the changes in the nucleus which occur during alpha, beta, and gamma decay along with neutron emission in terms of atomic (proton) number and mass number using the appropriate nuclear notation for isotopes. The properties of alpha, beta, and gamma radiation have been demonstrated leading to a discussion of their use in thickness monitoring and then the safety measures required when using radioactive materials. Students will then move on to discuss the concepts of activity, count rate, and the patterns in radioactive decay that explain half-life and the associated graphs despite the random nature of individual decays. Higher tier students will perform calculations involving the relationship between the initial activity, current activity, and half-life.	Students have compared vectors and scalars using the examples of distance and displacement along with the nature of forces. Representations of vectors using scale diagrams led to descriptions of the forces acting in a wide variety of situations and the identification of Newton's third law. The concept of balanced and unbalanced forces was used to determine the behaviour of objects and the application of Newton's first law of motion. Higher tier students have produced free body diagrams demonstrating the forces acting on an isolated object. The GCSE Physics students have analysed the rotational effects of forces through the idea of moments using both a mathematical approach and an investigation into the turning effect. These students also examined the application of levers and gears in increasing the size of the available force or the movement of an object. While all students determined the centre of mass of an object experimentally	Students have analysed the motion of objects in depth starting from a recap of the concept of speed and this relationship to distance travelled and time taken. The representation of motion using distance-time graphs representing single and multiple objects has been analysed to give detailed descriptions of the movement of the objects. The students have defined acceleration in terms of changes in velocity before analysing it graphically and mathematically. Higher tier students have also outlined circular motion in terms of constant acceleration but with constant speed. All students have then investigated acceleration caused by an unbalanced force on ramp, linking acceleration to the gradient of a line on a velocity-time graph.	Students began this chapter by experimentally determining the relationships between a force acting on an object and the acceleration, and the mass of the object and the acceleration. The results led of the formulation for Newton's second law of motion and its application. Higher-tier students have also defined the inertial mass of an object. The students have then compared the concepts of mass and weight, linking then through the idea of a gravitational field before looking at the forces acting on an object as it falls through a fluid and the resulting terminal velocity. The forces acting during stopping a car have been analysed; identifying two phases of the motion; thinking and braking distance and the effects of a wide range of factors on both of these distances. Students have calculated the size of the accelerations experienced during braking with higher tier students deriving an appropriate equation involving the stopping distance.	students have observed and described the properties of mechanical and electromagnetic waves in terms of energy transfer with or without the need for a transfer medium. They have compared transverse waves and longitudinal waves by examining the relationship between the direction of propagation and the direction of the oscillations. The students have analysed wave properties such as wavelength, amplitude, and period leading to the relationships between period, frequency and wave speed, frequency, and wavelength. They have also measured the speed of sound in air and the speed of ripples on water.	
	Sequencing (Flow)	***Retrieval & Extension***	3.3 Work 3.4 Heating and cooling 3.1 Energy costs 3.4 Energy transfer	3.4 Heating and cooling 3.1 Energy costs 3.4 Energy transfer			3.1 Energy costs 3.4 Energy transfer 2.1 Potential difference and resistance 2.2 Current 2.4 Electromagnets	5.1 Particle model	4.3 wave effects 4.4 wave properties	1.1 Speed 1.2 Gravity 1.3 Contact forces 1.4 Pressure	1.1 Speed 1.2 Gravity 1.3 Contact forces 1.4 Pressure	1.1 Speed 1.2 Gravity 1.3 Contact forces 1.4 Pressure	1.1 Speed 1.2 Gravity 1.3 Contact forces 1.4 Pressure 4.3 Wave effects 4.4 Wave properties	
	Summative Assessment		Educake	AP1- Paper 1	Educake	Educake	Educake	Educake	AP2	Educake	Educake	Educake	AP3	
Personal Empowerment	Virtue	***The opportunity to reflect, think deeply and critically about an issue.***	Friendliness & Civility	Justice & Truthfulness	Courage	Generosity	Gratitude	Good Speech	Good Temper & Humour	Self-Mastery	Self-Mastery	Compassion	Good Sense	
	Link to Virtue													
Preparation for Work	Skill	***Transferable skills***	Listening	Leadership	Problem-Solving	Creativity	Staying Positive	Speaking	Staying Positive	Aiming High	Aiming High	Speaking	Teamwork	
	Link to Skill		Students will need to <u>listen</u> to each other and be able to explain another students' opinion. Students will also need to be <u>listen</u> to the teacher to pull out consistency underlying themes or use of previous skills	Students will lead their learning to ensure they are secure in building on previous knowledge.	Students will need to use their problem-solving skills to be able to draw conclusions from data	Students will use creative writing and techniques to produce posters with links to stem cells and the periodic table. Students will be creating circuits in physics	Students will understand the problems associated with using Earth's resources and will find positive solutions to these problems.	They will describe the problems and solutions linked to obtaining and using Earth's resources using good speech.		Students will be aiming high when carrying out practical activities to collect valid data from forces activities.	Students in physics will be aiming high by applying knowledge of distance time graphs and velocity time graphs and momentum	Students in physics will be demonstrating speaking skills by applying knowledge of distance time graphs and velocity time graphs and momentum and describing them to their peers.	In biology, chemistry and physics students will be carrying out practical activities while working in teams.	
Preparation for Citizenship	SMSC & British Values	*Developing opinions on curent issues*												
	Link to SMSC & British Values													