Curriculum map - Year 11 combined physics

YEAR 11	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC(s)	**Forces**	**Forces**	**Waves**	**Waves**	**Magnetism and GCSE exams**	**GCSE exams**
What students will know	Distance time graphs represent the journey of objects. Displacement is a vector and tells the overall change in position of an object. Speed, factors affecting speed and typical values for speed for walking, running and cycling. Velocity is a vector, objects in circular motion are constantly accelerating. Acceleration is the rate of change of velocity. Velocity time graphs show the motion of objects. Terminal velocity and acceleration due to gravity. Newton's second law.	The stopping distance of a vehicle is the sum of the distance the vehicle travels during the driver's reaction time (thinking distance) and the distance it travels under the braking force (braking distance). Human reaction times are between 0.2-0.9 seconds. In a closed system, the total momentum before an event is equal to the total momentum after the event. The extension of an elastic object, such as a spring, is directly proportional to the force applied, provided that the limit of proportionality is not exceeded. An object that does not return to its original shape after the forces have been removed has been inelastically deformed.	In a transverse wave the oscillations are perpendicular to the direction of energy transfer. In a longitudinal wave the oscillations are parallel to the direction of energy transfer. Calculations of wave speed, frequency, wavelength and time period using the equation and from an oscilloscope trace. Waves are reflected, refracted, absorbed or transmitted at boundaries between two mediums.	Electromagnetic waves are transverse waves that transfer energy from the source of the waves to an absorber. Electromagnetic waves form a continuous spectrum and all types of electromagnetic wave travel at the same velocity through a vacuum (space) or air. The waves that form the electromagnetic spectrum are grouped in terms of their wavelength. The uses and dangers of each electromagnetic wave. How electromagnetic waves are produced and transmitted.	A permanent magnet produces its own magnetic field. An induced magnet is a material that becomes a magnet when it is placed in a magnetic field. The Earth has a magnetic field due to the core being made of molten iron and nickel. When a current flows through a conducting wire a magnetic field is produced around the wire. When a conductor carrying a current is placed in a magnetic field the magnet producing the field and the conductor exert a force on each other. This is called the motor effect. The principles behind a simple electric motor.	

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What students will be able to do	Calculate speed, distance or time of an object using the equation. Draw and interpret distance-time graphs and velocity-time graphs Calculate acceleration using suitable equations. Analyse a velocity-time graph of an object reaching terminal velocity. Complete the acceleration required practical's using rulers, stopwatches, trolleys, slotted masses. Evaluate the accuracy and suggest improvements to apparatus and techniques.	State factors affecting stopping distances of vehicles. Estimate stopping distances and braking forces, describe factors that affect thinking distance, braking distance and stopping distance. Calculate human reaction time using a ruler. Apply conservation of momentum to calculations Complete the required practical to investigate the relationship between force and extension for a spring.	Identify a wave as either transverse or longitudinal. Draw and label the features of both waves. Calculate wave speed, frequency, wavelength and time period using the equation. Complete the wave speed required practical using stopwatches, metre rulers, ripple tank, frequency generator, string. Produce labelled diagrams to show reflection and refraction of waves. Produce wave front diagrams of refraction.	State and explain the uses of electromagnetic waves based on their properties. Evaluate risks associated with ionising radiation. Investigate how the nature of surfaces affect the level of infrared radiation emitted or absorbed. Complete the infrared emission and absorption required practical and suggesting variables and safety precautions for the practical.	Find the magnetic field of permanent magnets using iron filings and plotting compasses. Build an electromagnet. Investigate how to change the strength of an electromagnet. Use Flemmings left hand rule to predict the direction of magnetic forces. Use the corkscrew rule for predicting the direction of a magnetic field in a current carrying wire. Perform calculations using the magnetic flux formula.	
Beyond the classroom		Know your stopping distances: https://www.theaa.com/breakdown-cover/advice/stopping-distances		TV programme about electromagnetic waves: https://www.youtube.com/watch?v=-EGRtLPhHAA&ab_channel=LammasScience	Earth's magnetic field affecting migration patterns: https://www.economist.com/the-economist-explains/2018/09/25/how-some-animals-use-the-earths-magnetic-field-to-navigate	