Curriculum map - Year 10 combined physics

YEAR 10	AUTUMN 1	AUTUMN 2	SPRING 1	SPRING 2	SUMMER 1	SUMMER 2
TOPIC(s)	**Electricity**	**Particle Model**	**Particle Model**	**Atomic Structure**	**Atomic structure**	**Forces**
What students will know	The resistance of an LDR increases as light intensity decreases. The resistance of a thermistor increases as temperature decreases. There are two ways to connect components: Series and parallel. Electrical power is the rate of energy transfer. Mains electricity has a potential difference of 230 V and a frequency of 50 Hz The three-core cable consists of a blue neutral wire, brown live wire and a green and yellow neutral wire. The National Grid	The density of a material is its mass per unit volume. The particle model and what happens during a change of state. Mass is conserved during a change of state. Physical and chemical changes. Energy changes during a change of state. Energy is stored inside a system by the particles (atoms and molecules) Internal energy is the sum of the kinetic and potential energy stores of the particles.	The specific heat capacity of a substance is the amount of energy required to raise the temperature of one kilogram of the substance by one degree Celsius. The specific latent heat of a substance is the amount of energy required to change the state of one kilogram of the substance with no change in temperature. Gas pressure is caused by gas particles colliding with surfaces. Gas pressure can be changed by changing the temperature.	Atoms consist of protons, neutrons and electrons. Protons and neutrons are in the nucleus and electrons orbit in energy levels at specific distances away from the nucleus. Ions and isotopes. How the atomic model has changed over time. Some atomic nuclei are unstable and they go through radioactive decay to become stable. Radioactive decay is a random process. Alpha, beta, gamma and neutron radiation.	The half-life of a radioactive isotope is the time it takes for the number of nuclei of the isotope in a sample to halve, or the time it takes for the count rate from a sample containing the isotope to fall to half of its initial level. Radioactive contamination and irradiation and the uses of each. A peer review is where scientists publish their work and other scientists validate it. The safety precautions taken when dealing with radioactive sources.	Scalar and vector quantities. Contact and non-contact forces. Resultant forces are one force that represents all the forces acting on an object. Free body force diagrams show all the forces acting on an object. A single force can be resolved into two components acting at right angles to each other. Work done on an object is the force applied over a distance. Weight is the force acting on an object due to gravity. Centre of mass.

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What students will be able to do	Give everyday examples of circuits which contain LDR's and thermistors. Draw graphs to show the relationship between light intensity / temperature and resistance. Perform calculations to calculate current, potential difference and resistance, for series and parallel circuits. Perform calculations of electrical power using suitable equations. State the function of each of the three core cables. Explain why the National Grid is an efficient way of distributing electricity.	Perform complex unit conversions such as m^3 to cm^3 Complete the required practical to calculate the density of regular shapes using a balance and ruler, calculate the density of irregular liquids using displacement and calculate the density of liquids using measuring cylinders. Calculate uncertainties in results, evaluate methods and suggest possible improvements to make results more precise. Explain why changes of state are physical changes. Draw and analyse a heating / cooling curve.	Calculate thermal energy, mass, specific heat capacity and temperature change using the equation. Complete the specific heat capacity required practical to determine the specific heat capacity of materials using a joule meter, ammeter, voltmeter, heater, and thermometer. Calculate thermal energy, mass and specific latent heat using the equation.	Calculate the number of protons, neutrons and electrons. Explain how an electron can change energy levels. Explain how ions are formed. Explain what an isotope is. Explain how and why the model of the atom has changed. Explain why alpha, beta, gamma and neutron radiation has certain properties. Complete nuclear decay equations for alpha and beta radiation.	Calculate the half-life of a radioactive source from a graph. Calculate the half-life from a radioactive source using information. Explain the uses of radioactive sources and why they have those uses. Explain the dangers of using radiation and suggest suitable safety precautions to reduce the hazard of working with radiation.	Classify forces as scalar / vector and contact / non-contact. Draw and interpret free body force diagrams. Newton's first law of motion: an object accelerates when a resultant force acts. Calculate resultant forces horizontally, at right angles, and at angles other than right angles using appropriate methods. Resolve resultant forces into horizontal and vertical components. Calculate the work done, force and distance an object moves using the equation. Calculate the weight, mass and strength of gravitational field using the equation.

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Beyond the classroom	Pass My Exams – Electrical Power and Electricty Bill https://www.sciencejournalforkids.org/articles/can-electricity-reach-the-billion-people-who-live-without-it/	YouTube: Flat Tire Science – Liquid Nitrogen Experiment			Radioactive seagulls - https://www.independent.co.uk/climate-change/news/sellafield-struggles-with-radioactive-gulls-311821.html https://www.sciencejournalforkids.org/articles/what-can-tree-frogs-in-chernobyl-tell-us-about-radiation/ YouTube: Food irradiation: Is it safe?	Hammer and feather on the moon: https://www.youtube.com/watch?v=Oo8TaPVsn9Y Video clip: The Effects of Forces