Year 10 Separate PHYSICS Curriculum Map

Note: KS4 (Yr10-11) Topics often span half terms and can be up to 20+ lessons long, for simplicity the main topic each term has been identified but this may start the term before and or spill over into the following term.

** Higher Tier Only

Term	Topic/Unit title	Essential Skills / Knowledge (what students should know and be able to apply by the end of the unit/topic)
Autumn 1	AQA Paper 1 Particle Models	Describe the different states of matter and their properties using the particle model. Recall the formula for density Calculate the density of materials and give the correct units. Convert kg/m3into g/cm3and back again. Explain why different states of matter have different densities using the particle model. Find the density of regular shaped solids.(e.g. cube, sphere etc) (PRAC) Find the density of irregular solids. (PRAC) Find the density of a liquid and a gas Describe changes of state using correct terminology. Describe what internal (thermal) energy of a solid is. Calculate the specific heat capacity of a material (formula Given). Find the specific heat capacity of a material. (PRAC) Give the unit of specific heat capacity. Explain what latent heat is. (vaporization and fusion) Calculate latent heat using E = mL (formula given).

		Describe heating and cooling graphs and identify a change of state. Explain the motion of gas particles and the effect of temperature. Explain why gases exert a pressure on the walls of a container. Explain why changing the temperature of a gas affects the pressure. Describe the relationship between the pressure and volume of a gas. Use pV=constant to calculate a change in pressure or volume for a gas. **Explain how doing work on a gas affects its temperature (eg a bike pump).
Autumn 2	AQA Paper 1 Energy	Define a system as an object or group of objects and state examples of energy changes. Identify energy stores (eg Chemical) and transfer mechanisms (eg Heating). Describe and calculate energy changes in a system. Recall the formula for kinetic energy Ek = ½mv2 Calculate the kinetic energy of an object and rearrange the formula. Calculate the elastic potential energy using Ee= ½ke2 (formula given) Rearrange Ee= ½ke2 and give the unit of the spring constant N/m Recall the formula for potential energy Ep = mgh Calculate the potential energy of an object and rearrange the formula. Define the term 'specific heat capacity' Calculate the specific heat capacity of a material (formula given). Find the specific heat capacity of different materials (PRAC) Define power (the rate at which energy is transferred) 1 watt = 1 J/s Recall, rearrange and applying the equations P = E/t & P = W/t

		Understand energy can be transferred usefully, stored or dissipated. Explain how energy can be (wasted) dissipated to the surroundings Explain ways of reducing unwanted energy transfers. Describe how the rate of cooling of a building can be reduced Investigate effectiveness of (thermal) insulators (PRAC) Recall , rearrange and apply the efficiency equation Efficiency = Useful Energy / Total Energy **Suggest and explain ways to increase the efficiency of an energy transfer.** List renewable and non-renewable energy resources and define “renewable energy” Compare ways that different energy resources are used. Explain why some energy resources are reliable and explain patterns and trends in use. Evaluate the use of different energy resources.
Spring 1	AQA Paper 1 Electricity	Draw and interpret circuit diagrams, including all common circuit symbols Define electric current as the rate of flow of electrical charge. Calculate charge and current by recalling and applying the formula: Q = It Recall, rearrange, calculate energy using E=Pt and E=QV Explain what causes current and that it is the same at all points in a series circuit. Describe the relationship between current, voltage and resistance in a component. Recall, rearrange, calculate and use Ohm’s Law V = IR Investigate resistance of wires and resistors (in series and parallel) (PRAC) Sketch and Interpret I-V graphs for Ohmic Resistors, Filament Lamps and Diodes

Spring 2	AQA Paper 1 Electricity	Explain and draw a circuit to measure the resistance of a component Construct circuits to investigate the I–V characteristics of components (PRAC) Recall the properties of LDRs and thermistors. State components in a parallel circuit have the same voltage across them. Calculate the total resistance of two components in series. (Resistances add together) Explain why adding resistors in parallel decreases the total resistance. Solve problems for circuits finding voltage, current and resistance. Explain the difference between DC and AC, stating UK mains voltage and current. Describe the function of each wire in a three-core cable connected to the mains. State that the voltage between the live wire and earth is about 230 V and that neutral wire and our bodies are close to 0 V. Explain why a live UK mains wire is dangerous. Due to providing a connection to earth. Explain how the power transfer is related to the voltage and current. Recall, rearrange and calculate power by applying the equations: P = VI and P = I2 R Explain how power is transferred from power stations to people's homes and why voltage is changed. Explain what static is and how static is formed. Draw and explain electric field patterns around a point.

Summer 1	AQA Paper 2 Forces	Identify and describe scalar quantities and vector quantities. Identify and give examples of forces as contact or non-contact forces. Describe the interaction between two objects and the force produced. Describe weight and explain that how it varies depends on the gravitational field strength Recall and calculate weight using the equation: [W = mg]. Identify an objects centre of mass. Calculate the result of two forces. **Use Free body diagrams to calculate the resultant of multiple forces & equilibrium conditions. Describe energy transfers when work is done and recall + calculate using [W = Fs]. Describe what a Joule is & convert between Nm and J. Explain that work done against friction causes the temperature of an object to rise. Describe examples of the forces involved in stretching, bending or compressing an object. Describe the difference between elastic and inelastic deformation. Describe the extension of an elastic object and calculate it by recalling & using: [F = ke]. Calculate energy stored in a spring using [E=12ke2] (GIVEN).
Summer 2	AQA Paper 2 Forces	PRAC: Investigate stretching springs. Describe forces that cause objects to rotate and identify them as moments. Recall and apply [M=Fd] the moment equation. Explain and apply the moment equation to balanced moments. Explain that levers and gears can be used to transmit rotational forces Define a fluid and how they cause pressure.

		Recall and apply [P=F/A] the Pressure equation. **Explain the pressure in a column of liquid and apply [p=hg] (GIVEN) **Calculate pressure at different depths and on different objects. Describe structure of the atmosphere explain why pressure varies with height Define & explain distance and displacement, speed and velocity as scalar or vector quantities. Recall typical speeds of walking, running, cycling and factors that affect it. Calculate average speed for non constant speed. Explain, with examples, motion in a circle including changes in velocity but not speed. Use Distance time graphs, calculate speed and distance travelled. Give everyday accelerations and understand negative accelerations mean slowing down. Calculate the average acceleration of an object recalling and use: [a = Δv/t]. Use velocity time graphs to find acceleration (from Grad) and distance travelled (from Area). **Use methods to determine/estimate area under a velocity time graph. Apply [v2=u2+2as] (GIVEN). Use Newton's first law (for stationary and moving objects). Use Newton's second Law to define acceleration recall and apply: [F = ma]. Use Newton's 3rd law on equilibrium situations. **Describe inertia and give its definition PRAC Investigate effect of varying mass and force on acceleration Estimate speed acceleration and force on typical road transport Explain methods of measuring reaction time and estimate an average person's reaction time

		Discuss stopping, braking and thinking time and distance including factors affecting. Explain that a greater braking force causes a larger deceleration and explain dangerous to drivers **Estimate the forces involved in the deceleration of road vehicles **Calculate momentum by recalling and applying the equation: [p = mv] **Explain and apply conservation of momentum for a closed system **Describe examples of momentum in a collision

Year 11 Separate PHYSICS Curriculum Map

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		Solve problems for circuits finding voltage, current and resistance. Explain the difference between DC and AC, stating UK mains voltage and current. Describe the function of each wire in a three-core cable connected to the mains. State that the voltage between the live wire and earth is about 230 V and that neutral wire and our bodies are close to 0 V. Explain why a live UK mains wire is dangerous. Due to providing a connection to earth. Explain how the power transfer is related to the voltage and current. Recall, rearrange and calculate power by applying the equations: P = VI and P = I2 R Explain how power is transferred from power stations to people's homes and why voltage is changed.
Autumn 2	Atomic Structure Revision and PPEs	
Spring 1	AQA Paper 2 Waves	Identify and describe scalar quantities and vector quantities. Identify and give examples of forces as contact or non-contact forces. Describe the interaction between two objects and the force produced. Describe weight and explain that how it varies depends on the gravitational field strength Recall and calculate weight using the equation: [W = mg]. Identify an objects centre of mass. Calculate the result of two forces. **Use Free body diagrams to calculate the resultant of multiple forces & equilibrium conditions. Describe energy transfers when work is done and recall + calculate using [W = Fs].

		Describe what a Joule is & convert between Nm and J. Explain that work done against friction causes the temperature of an object to rise. Describe examples of the forces involved in stretching, bending or compressing an object. Describe the difference between elastic and inelastic deformation. Describe the extension of an elastic object and calculate it by recalling & using: [F = ke]. Calculate energy stored in a spring using [E=12ke2] (GIVEN). PRAC: Investigate stretching springs. Describe forces that cause objects to rotate and identify them as moments. Recall and apply [M=Fd] the moment equation. Explain and apply the moment equation to balanced moments. Explain that levers and gears can be used to transmit rotational forces Define a fluid and how they cause pressure. Recall and apply [P=F/A] the Pressure equation. **Explain the pressure in a column of liquid and apply [p=hg] (GIVEN) **Calculate pressure at different depths and on different objects. Describe structure of the atmosphere explain why pressure varies with height Define & explain distance and displacement, speed and velocity as scalar or vector quantities. Recall typical speeds of walking, running, cycling and factors that affect it. Calculate average speed for non constant speed. Explain, with examples, motion in a circle including changes in velocity but not speed. Use Distance time graphs, calculate speed and distance travelled.

		Give everyday accelerations and understand negative accelerations mean slowing down. Calculate the average acceleration of an object recalling and use: [a = Δv/t]. Use velocity time graphs to find acceleration (from Grad) and distance travelled (from Area). **Use methods to determine/estimate area under a velocity time graph. Apply [v2=u2+2as] (GIVEN). Use Newton's first law (for stationary and moving objects). Use Newton's second Law to define acceleration recall and apply: [F = ma]. Use Newton's 3rd law on equilibrium situations. **Describe inertia and give its definition PRAC Investigate effect of varying mass and force on acceleration Estimate speed acceleration and force on typical road transport Explain methods of measuring reaction time and estimate an average person's reaction time Discuss stopping, braking and thinking time and distance including factors affecting. Explain that a greater braking force causes a larger deceleration and explain dangerous to drivers **Estimate the forces involved in the deceleration of road vehicles **Calculate momentum by recalling and applying the equation: [p = mv] **Explain and apply conservation of momentum for a closed system **Describe examples of momentum in a collision
Spring 2	AQA Paper 2 Magnets / Space	**MAGNETS** Describe the attraction and repulsion between unlike and like poles of magnets. Draw the magnetic field pattern of a bar magnet, showing the field strength and direction.

		Explain how a magnetic compass is related to evidence that the core of the Earth must be magnetic. Describe how to plot the magnetic field pattern of a magnet using a compass. Give examples of how the magnetic effect of a current. Explain how a solenoid arrangement can increase the magnetic effect of the current. **State and use Fleming's left-hand rule and explain what the size of the induced force depends on **Calculate the force on a conductor by applying: [F = BIL] (GIVEN) **Explain how rotation is caused in an electric motor **Explain how loudspeakers and headphones use the motor effect to convert electricity into sound. **Explain what happens when a conductor passes through a magnetic field. **Recall factors which affect EM induction **Describe Lenz's Law ** Explain how EM induction is used to create AC and DC **Explain how a microphone works ** Describe the structure of a transformer ** Use the transformer equation [VpVs=npns] (GIVEN) **Describe the transformer affect as ratio of coils ** Apply the power equation to transformer [VsIs=VpIp] (GIVEN) ** Explain how a transformer works and why it would not with DC **SPACE**

		Describe the structure of our solar system. Describe how the solar system was formed. Describe the scale of our solar system relative to the milky way. State the life cycle of massive stars and small stars, and identify our star as a small star Describe the production of new elements and heavy elements. Describe the force structure in a nebula and a main sequence star. Describe the production of nebula. Explain orbital motion with forces. Describe the difference between natural satellites and artificial satellites giving examples. ** Explain satellites motion as circular using terms of velocity and speed correctly. **Explain speed and radius of an orbit as being dependent on one another. Describe redshift Explain how redshift supports the big bang theory. Explain how changes of speed of galaxies provide evidence of the expanding universe. Explain how theories are arrived at and changed. Understand there is still a great deal not known about the universe (e.g. dark mass and energy).
Summer 1	Revision	
Summer 2	Exams	