Curriculum Map: Physics year 12 autumn

	Teacher 1	
Content Declarative knowledge 'I Know'	**2.1 – physical quantities and units** To state the prefix values pico, nano, micro, milli, kilo, mega, giga, tera To connect variables covered with standard units To state the base units **2.2 – making measurements and analysing data** Define random and systematic errors Give the difference between precision and accuracy Define absolute uncertainty Give the rules for combining uncertainties together **4.1 – charge and current** To recall the circuit symbols for all electrical components To define conventional current, electrolytes, charge, current and conductor To give the charge of an electron To know the structure of a metal To know the movement of electrons is random and to define drift velocity Know the difference between conductor, insulator and semiconductor **4.2 – energy, power and resistance** To define EMF, potential difference, work done and resistance To give units for the variables listed above Recall Ohm's law and state factors that may affect resistance of a wire To match the IV graphs with the circuit component (bulb, resistor and diode) To state the circuits needed to conduct the IV practical (PAG) Give the differences in properties and graphs between a thermistor and an LDR To define resistivity Define power, give the unit and recall the equation Give the components to the national grid Define the kilowatt hour and recall the method of calculating cost of electricity **4.3 – electrical circuits** To state kirchhoff's second law To give differences between a series and a parallel circuit To know the rules of series and parallel circuits To define a potential divider To give examples of potential divider circuits To define internal resistance and terminal potential difference To know the circuit used to calculate the internal resistance of a cell	**2.3 – scalars and vectors** Define a scalar and vector and provide examples of each Give the equation to calculate speed **3.1 – motion** Define key words such a displacement, distance, speed, velocity, acceleration To state key features of distance time graphs and velocity time graphs To give the equation for acceleration To know that the gradient of a velocity time graph is the acceleration and the area under is the distance To know that horizontal and vertical components act independently to each other To state when the acceleration of an object will change To list the equipment to be used in the determination of gravity To list different experiments that can be done to determine acceleration of free fall To define thinking, braking, stopping distance and to state factors that affect each **3.2 – forces in action** To know the 4 fundamental forces To give the difference between mass and weight To define normal contact force, upthrust and to label force diagrams To define equilibrium and to identify when it is reached To define a moment and the law of principle of moments To state the difference between a torque and a couple To define centre of mass and centre of gravity To recall the equation, letter and units for density Describe the different equipment needed to measure density of regular and irregular sized objects To state pressure and factors that affect it including the units
Skills Procedural Knowledge 'I know how to'	**2.1 – physical quantities and units** How to convert prefixes between each other How to make estimates of the quantities 2.2 – making measurements and analysing data	**2.3 – scalars and vectors** To know how to add scalar quantity and vector quantities together Combine vectors together to form vector triangles

	How to reduce errors in measurements Calculate the percentage uncertainty in a single value and for a set of repeated readings To know how to combine percentage uncertainties Calculate uncertainty of a line of best fit including gradients and y intercepts To be able to draw error bars on a line of best fit **4.1 – charge and current** To tell whether the charge carriers are ions or electrons To draw circuit diagrams using circuit symbols To apply kirchhoff's first law to circuit problems To use equation for charge and current To calculate and rearrange equation for drift velocity **4.2 – energy, power and resistance** To calculate energy and explaining the difference between EMF and P.d. Use Ohm's law to calculate resistance of a conductor To explain how area, length and temperature can affect resistance Explain the shape of the IV characteristics for a bulb, resistor and diode Describe the circuit diagrams and data collection needed to produce these graphs To explain the shape of the thermistor and LDR graphs. Provide proportional relationships between dimensions and resistivity. To describe an experiment to determine the resistivity of a metal wire To explain how the resistivity can be calculated from a graph of the results. To know the difference between negative and positive coefficient thermistor To calculate power To combine equations together to give 3 different equations for power To explain how electricity is carried through the national grid To describe the reasons behind using a step up transformer Calculate the cost of electricity **4.3 – electrical circuits** To apply knowledge of Kirchhoff's second law To connect Kirchoff's first and second law together to solve circuit problems with more than one source of EMF. To use the rules of series and parallel circuits to solve circuit problems. To calculate the total resistance of resistors in series and parallel circuits To calculate variables using the potential divider theory or equation Apply knowledge of potential divider theory to explain how a thermistor or an LDR can be used in these circuits. To explain how internal resistance happens and how the energy is distributed around the circuit To calculate the internal resistance of a cell and to rearrange the equation for this	To use Pythagoras, scaled drawings, parallelogram of forces to calculate resultant vectors To know how to resolve a vector quantity into its horizontal and vertical components **3.1 – motion** Rearrange and use the equation for acceleration Use the equations for average velocity Know how to interpret a distance and velocity time graph both qualitatively and quantitively To know how to calculate the distance, velocity and acceleration from graphs of motion To know how to use the kinematic equations To describe the change in motion for an object travelling vertically To use the kinematic equations to calculate problems involving projectile motion To use Force = mass x acceleration to describe objects in free fall Describe a method to determine a value of acceleration due to gravity using light gates (PAG) To carry out and analyse data from the practical to determine acceleration due to gravity To describe how the speed affects thinking and braking distances To explain the relationship between speed and braking distance **3.2 – forces in action** To calculate weight and normal contact force. To draw free body diagrams and calculate forces from them Describe the fall of something reaching terminal velocity Explain the forces a falling object experiences and the effect on the acceleration. To use triangle of forces to establish if equilibrium has been established To calculate forces using triangle of forces To use and apply the moment equation and the law of moments to solve for force or distance To experimentally measure the centre of mass of an object To explain how centre of mass is connected to stability and how you can predict if an object will topple. To calculate density To explain how you can measure the density of irregular and regular sized objects To use Archimedes principle to predict the volume of an object To calculate pressure of a solid and also pressure at a depth in a fluid To use Archimedes principle to measure the force on floating object

	To describe how to experimentally measure the internal resistance and how to get it from a graph of the results.	
Strategies Conditional Knowledge 'I know when to'	**2.1 – physical quantities and units** **2.2 – making measurements and analysing data** To know when to say results are precise of accurate To evaluate the accuracy of measurements, discussing the errors involved. To know when to use percentage uncertainty as opposed to absolute uncertainty To use the uncertainties to evaluate the errors involved in your measurement **4.1 – charge and current** To apply knowledge of Kirchhoff's law to unfamiliar situations To evaluate the equation for drift velocity to make proportional relationships between variables **4.2 – energy, power and resistance** To apply knowledge of energy to electrical circuit theory To evaluate the method for IV characteristic practical, explaining the reasons behind any errors. Interpret IV graphs and use these to make predictions about components. Evaluate the practical to determine the resistivity of a metal and the uncertainties associated with it. Interpret the results and errors to calculate the percentage uncertainty and percentage difference. Analyse the efficiency of the national grid and compare things that are done to reduce heat loss **4.3 – electrical circuits** To interpret and analyse circuit diagrams and to apply knowledge of rules of circuits to answer questions on this. To interpret and apply knowledge of circuit rules to answer questions on voltage distribution in circuits. To predict and then apply rules of circuits for resistance in series and parallel To interpret a graph of voltage against current to get the internal resistance and EMF of a circuit	**2.3 – scalars and vectors** To draw conclusions on diagrams after calculating the resultant vector Interpret vector diagrams based on data provided **3.1 – motion** To interpret graphical information on displacement, velocity and acceleration To analyse graphs of motion to draw conclusions To know when to use each kinematic equation based on the information given in the question To evaluate data provided to identify how to solve multiple step calculations To draw conclusions on objects falling under gravity based on the circumstances. To evaluate the accuracy of data collected from measuring acceleration due to gravity To critically analyse the method to compare the effectiveness of each mini experiment. **3.2 – forces in action** To analyse free body diagrams To evaluate experimental methods to calculate terminal velocity To apply knowledge of moments to unfamiliar situations and solve for different variables. To apply knowledge of Archimedes principle to predict different forces acting on a floating or sinking object
Key Questions	What are the rules of circuits? How does an electron behave?	How and why does an object move?
Assessment topics	Skills test at the end of module 2 End of term electricity test based on module 4	Skills test at the end of module 2
Cross curricular links/Character Education	Maths – graphical skills DT electronics – electrical circuits Chemistry – electron behaviour and resistivity	Maths – kinematic equations, projectile motion, trigonometric functions. Algebraic fractions. Biology – reaction times