Curriculum Map: Physics year 13 autumn term

	Teacher 1	Teacher 2
Content Declarative knowledge 'I Know'	**5.1 – thermal physics** To define temperature, absolute zero, thermal equilibrium, internal energy, Brownian motion, specific heat capacity, moles, an ideal gas, mean square speed, root mean square speed, the Boltmann constant To state properties of solids liquids and gases To know the difference in structure of states of matter To recall the changes of state To know the equipment to find the specific heat capacity of a metal To recall the difference between latent heat of fusion and vaporisation To know the shape of a cooling curve To know the relationship between moles and number of particles To know the assumptions of the kinetic model of a gas To recall Boyles law and Charles' law To define the equation of state for an ideal gas To give the relationships between pressure, temperature and volume for gases **5.2 – circular motion** To define the radian, angular velocity, period, centripetal acceleration, centripetal force To know the different between speed and velocity in context of circular motion To recall examples of centripetal force	**6.1 – capacitors** To define capacitance, charge, farad, capacitor, time constant, exponential decay, To know the base units of farads To state what makes up a capacitor To know the rules of capacitors in series and parallel To give uses of capacitors To know that the work done is the area under a charge, voltage graph To know the charge and discharge graphs for current, voltage and charge To know the circuit diagrams that allow the charging graphs To know the purpose of a resistor in a capacitor resistor circuit **6.2 – electric fields** Define electric field, electric field lines, electric field strength, coulombs low, permittivity of free space, electric potential, electric potential energy To know the field lines between charged objects and around a single charged object To know the rules of electric field lines To recall the difference between uniform and non uniform field To know that a capacitor uses electric field theory To give the graph of how potential energy varies with distance To know that the area under a force distance graph is equal to work done
Skills Procedural Knowledge 'I know how to'	**5.1 – thermal physics** To know how to convert between degrees and kelvin To describe heat transfer using knowledge of thermal equilibrium Use kinetic model of matter to explain properties of materials including state changes, physical properties and motion. To know how to use the equation for density To compare internal energies for solids and liquids To use knowledge of gas motion to explain how the internal energy is different for a gas Compare Brownian motion in liquids and gases To use the equation for specific heat capacity To describe the experiment to calculate the specific heat capacity of a metal block To use the equation for latent heat To describe and explain the cooling curve for a material To describe an experiment that can investigate latent heat To connect number of particles with the moles using avogadro's number Calculate the molar mass for monoatomic and diatomic gases To use the equation for pressure	**6.1 – capacitors** To describe how a capacitor charges and discharges in terms of the movement of electrons To use the equation for capacitance To describe an experiment to measure the capacitance of a capacitor To use the rules of circuits to derive the series and parallel rules for capacitors To solve problems involving series and parallel capacitors To conduct an experiment to investigate series and parallel combinations To use the energy equation for a capacitor To explain how the capacitor releases its stored energy To describe explain the charging and discharging curves To use the charging and discharging equations for charge, current and voltage To describe an experiment to measure the charging over time To rearrange the equation for discharging using the time constant To explain how the equation for discharging changes when using the time constant

	To calculate the root mean square speed To use Boyle's law and Charles' law to explain the relationship between pressure, volume and temperature To conduct an experiment that investigates Boyle's law To connect Boyle's law and Charles' law to derive ideal gas equation To describe the shapes of the graphs for pressure, temperature and volume To use the ideal gas equation To use the Boltzmann constant in the ideal gas equation To explain the relationship between absolute temperature and the kinetic energy of a gas molecule **5.2 – circular motion** To be able to convert between degrees and radians To derive equations for angular velocity using knowledge of circular motion To use the equations for angular velocity using time period and frequency To explain the changes in velocity when an object undergoes circular motion To use equation for centripetal acceleration and to derive it from normal acceleration To derive centripetal force equation from centripetal acceleration To describe an experiment to measure the speed of rotation with changing force	To know how to use natural logs to determine the initial charge or the time constant To know how to use spreadsheets to model capacitor discharge To use a graph of natural logs against time to determine values about capacitors **6.2 – electric fields** To know how to use the equation for force for a point sphere To use the rules of electric fields to draw field lines around charged objects To use the definition and equation of coloumbs law To calculate the resultant force acting on 2 charged objects To use the equations for electric fields strength for a point charge and for parallel plates To know how to compare electric fields and gravitational fields To be able to calculate the resultant field To derive the units of electric field strength To describe the motion of a charged particle in a uniform electric field To use the equation for a parallel plate capacitor To use equations for electric potential and electric potential energy To use knowledge of electric potential to explain the graph for how it varies with distance To know how to compare negative and positive charges in terms of the variation in potential To use the equation for capacitance of an isolated sphere
Strategies Conditional Knowledge 'I know when to'	**5.1 – Thermal Physics** To apply knowledge of density to explain the atomic or molecular spacing To know when to change the variables during the investigation for specific heat capacity To evaluate the results and make changes to improve accuracy of the SHC experiment. To know when to use latent heat of fusion and latent heat of vaporisation To interpret data from the experiments for latent heat To use the kinetic theory to obtain the equation for pressure To evaluate the experiment for Boyles law and to draw conclusions based on this. To apply proportionate relationships of pressure, volume and temperature to draw conclusions **5.2 – circular motion** To apply knowledge of circular motion and centripetal force to situations such as conical pendulum and a whirling bung To evaluate the method of a whirling bung to look at improvements to accuracy of readings.	**6.1 – capacitors** To apply knowledge of electricity theory to solve circuit problems involving capacitors To evaluate and draw conclusions based on both capacitors in series and parallel circuits To interpret charging and discharging graphs for capacitors To analyse capacitor graphs and use them to calculate initial values or the resistance of the circuit To interpret spreadsheet data to draw conclusions about capacitors **6.2 – electric fields** To interpret unfamiliar situations and draw electric field diagrams from them To apply knowledge of mechanics and electricity to solve free body force diagrams for examples pendulums To evaluate facts and rationalise them into gravitational and electric fields To apply knowledge of electricity to answer questions about a cathode ray tube

			To interpret and draw conclusions on the graph showing the variation of potential with distance	
Key Questions	What is kinetic theory? What are the differences between states of matter? What happens to a gas when variables change? How and why do satellites move around the earth?		What are the rules of circuits for capacitors? How does a capacitor work? How do charged particles move and work in electric fields?	
Assessment topics	End of thermal physics topic exam in November. Circular motion topic assessed in spring term.		End of capacitor exam in November. Electric field topic assessed in spring term	
Cross curricular links/Character Education	Maths – equations and graphs Chemistry – moles and pressure, temp and volume relationship Geography – satellites		Maths – graphical analysis of both capacitor and electric fields graphs, rearranging of equations, resultant vectors DT electronics – circuit analysis	