Combined Science - Physics – Paper 1 – Foundation Tier
Personal Learning Checklist (PLC)

		Dates		
	Confidence			
1.	**Energy**			
	Conservation and Dissipation of Energy (Kerboodle Chapter 1)			
1.1	Describe the ways in which energy can be stored.			
1.2	Describe how energy can be transferred for example: ○ when an object falls; ○ when an object hits an obstacle and stops moving; ○ in bringing water to the boil in a kettle; ○ on a trampoline; ○ on a rollercoaster.			
1.3	Explain what is meant by "conservation of energy"			
1.4	Explain what is meant by a "closed system"			
1.5	Calculate the following: ○ the work done by a force; ○ the change in gravitational potential energy when an object is moved up or down; ○ the kinetic energy of an object; ○ the amount of energy in an elastic potential energy store.			
1.6	Explain why it is easier to lift an object on the moon than on the earth.			
1.7	Describe what happens to work that is done to overcome friction.			
1.8	Describe what is meant by useful and wasted energy.			
1.9	Describe what happens to "wasted" energy in a system.			
1.10	Describe what is meant by efficiency.			
1.11	Calculate the efficiency of an energy transfer in terms of energy or of power.			
1.12	Explain what is meant by power and how to calculate the power of an appliance.			
	Energy Transfer by Heating (Kerboodle Chapter 2)			
1.13	Write down which materials make the best conductors.			
1.14	Write down which materials make the best insulators.			
1.15	Describe how the thermal conductivity of a material affects the rate of energy transfer through it by conduction.			
1.16	Describe how the thickness of a layer of material affects the rate of energy transfer through it by conduction.			
1.17	Describe what the specific heat capacity of a substance means.			
1.18	Calculate the energy needed to change the temperature of an object.			
1.19	Describe how the mass of a substance affects how quickly its temperature changes when you heat it.			
1.20	*Core practical: describe how to measure the specific heat capacity of a substance.*			
1.21	Describe how homes are heated.			
1.22	Describe how you can reduce the rate of energy transfer from your home.			
1.23	Describe what cavity wall insulation is.			

	Energy Resources (Kerboodle Chapter 3)			
1.24	Describe how most energy demands are met today.			
1.25	Name the energy resources that are used.			
1.26	Describe how nuclear fuels are used in power stations.			
1.27	Name the other fuels that are used in power stations.			
1.28	Name the other fuels that are used to generate electricity.			
1.29	Describe what a wind turbine is made up of.			
1.30	Describe how waves can be used to generate electricity.			
1.31	Name the type of power station that uses water running downhill to generate electricity.			
1.32	Describe how the tides can be used to generate electricity.			
1.33	Describe what solar cells are and how they are used.			
1.34	Describe the difference between a panel of solar cells and a solar heating panel.			
1.35	Describe what geothermal energy is.			
1.36	Describe how geothermal energy can be used to generate electricity.			
1.37	Describe what fossil fuels do to the environment.			
1.38	Explain why people are concerned about nuclear power.			
1.39	Describe the advantages and disadvantages of renewable energy resources.			
1.40	Evaluate the use of different energy resources.			
1.41	Describe how best to use electricity supplies to meet variations in demand.			
1.42	Compare the economic costs of different energy resources.			
1.43	Name energy resources that need to be developed to meet people's energy needs in the future.			

2.	**Electricity**			
	Electric Circuits (Kerboodle Chapter 4)			
2.1	Describe how electric circuits are shown as diagrams.			
2.2	Write down the difference between a battery and a cell.			
2.3	Describe what determines the size of an electric current.			
2.4	Calculate the size of an electric current from the charge flow and the time taken.			
2.5	Write down what is meant by potential difference.			
2.6	Write down what resistance is and what its unit is.			
2.7	Write down Ohm's law.			
2.8	Describe what happens when you reverse the potential difference across a resistor.			
2.9	Describe what happens to the resistance of a filament lamp as its temperature increases.			
2.10	Describe how the current through a diode depends on the potential difference across it.			
2.11	*Core practical: investigating I-V characteristics of a resistor, bulb and diode.*			
2.12	Describe what happens to the resistance of a temperature-dependent resistor as its temperature increases.			
2.13	Describe what happens to the resistance of a light-dependent resistor as the light level increases.			

2.14	Describe the current, potential difference, and resistance for each component in a series circuit.			
2.15	Describe the potential difference of several cells in series.			
2.16	Calculate the total resistance of two resistors in series.			
2.17	Explain why adding resistors in series increase the total resistance.			
2.18	Describe the currents and potential differences for components in a parallel circuit.			
2.19	Calculate the current through a resistor in a parallel circuit.			
2.20	Explain why the total resistance of two resistors in parallel is less than the resistance of the smaller individual resistor.			
2.21	Explain why adding resistors in parallel decrease the total resistance.			
	Electricity in the Home (Kerboodle Chapter 5)			
2.22	Write down what direct current is and what alternating current is.			
2.23	Describe what is meant by the live wire and the neutral wire of a mains circuit.			
2.24	Describe the National Grid.			
2.25	Describe how to use an oscilloscope to measure the frequency and peak potential difference of an alternating current.			
2.26	Describe what the casing of a mains plug or socket is made of and explain why.			
2.27	Write down what is in a mains cable.			
2.28	Write down the colours of the live, neutral, and earth wires.			
2.29	Explain why a three-pin plug includes an earth pin.			
2.30	Describe how power and energy are related.			
2.31	Use the power rating of an appliance to calculate the energy transferred in a given time.			
2.32	Calculate the electrical power supplied to a device from its current and potential difference.			
2.33	Work out the correct fuse to use in an appliance.			
2.34	Calculate the flow of electric charge given the current and time.			
2.35	Write down the energy transfers when electric charge flows through a resistor.			
2.36	Describe how the energy transferred by a flow of electric charge is related to potential difference.			
2.37	Link the electrical energy supplied by the battery in a circuit to the energy transferred to the electrical components.			
2.38	Calculate the energy supplied to an electrical appliance from its current, its potential difference, and how long it is used for.			
2.39	Work out the useful energy output of an electrical appliance.			
2.40	Work out the output power of an electrical appliance.			
2.41	Compare different appliances that do the same job.			

3.	**Particle Model of Matter**			
	Molecules and matter (Kerboodle Chapter 6)			
3.1	Define density and write down its unit.			

3.2	*Core practical: describe how to measure the density of a solid object or a liquid.*			
3.3	Use the density equation to calculate the mass or the volume of an object or a sample.			
3.4	Describe how to tell from its density if an object will float in water.			
3.5	Describe the different properties of solids, liquids, and gases.			
3.6	Describe the arrangement of particles in a solid, a liquid, and a gas.			
3.7	Explain *why* gases are less dense than solids and liquids.			
3.8	Explain why the mass of a substance that changes state stays the same.			
3.9	Write down what the melting point of and the boiling point of a substance mean.			
3.10	Describe what you need to do to melt a solid or to boil a liquid.			
3.11	Explain the difference between boiling and evaporation.			
3.12	Use a temperature-time graph to find the melting point or the boiling point of a substance.			
3.13	Describe how increasing the temperate of a substance affects its internal energy.			
3.14	Explain the different properties of a solid, a liquid, and a gas.			
3.15	Describe how the energy of the particles of a substance changes when it is heated.			
3.16	Explain in terms of particles why a gas exerts pressure.			
3.17	Write down what latent heat means as a substance changes its state.			
3.18	Write down what specific latent heat of fusion and of vaporisation mean.			
3.19	Use specific latent heat in calculations.			
3.20	Describe how to measure the specific heat latent heat of ice and of water.			
3.21	Describe how a gas exerts pressure on a surface.			
3.22	Describe how changing the temperature of a gas in a sealed container affects the pressure of the gas.			
3.23	Explain why raising the temperature of a gas in a sealed container affects the pressure of the gas.			
3.24	Describe how to see evidence of gas molecules moving around at random.			

4.	**Atomic Structure**			
	Radioactivity (Kerboodle Chapter 7)			
4.1	Write down what a radioactive substance is.			
4.2	Write down the types of radiation given out from a radioactive substance.			
4.3	Write down what happens when a radioactive source emits radiation (radioactive decay).			
4.4	Write down the different types of radiation emitted by radioactive sources.			
4.5	Describe how the nuclear model of the atom was established, (including Bohr's and Chadwick's contributions).			
4.6	Explain why the 'plum pudding' model of the atom was rejected.			
4.7	Describe what conclusions were made about the atom from experimental evidence.			
4.8	Explain why the nuclear model was accepted.			
4.9	Write down what an isotope is.			

4.10	Describe how the nucleus of an atom changes when it emits an alpha particle or a beta particle.			
4.11	Represent the emission of an alpha particle from the nucleus.			
4.12	Represent the emission of a beta particle from the nucleus.			
4.13	Write down how far each type of radiation can travel in air.			
4.14	Describe how different materials absorb alpha, beta, and gamma radiation.			
4.15	Describe the ionising power of alpha, beta and gamma radiation.			
4.16	Explain why alpha, beta, and gamma radiation are dangerous.			
4.17	Write down what the half-life of a radioactive source means.			
4.18	Write down what the count rate from a radioactive source means.			
4.19	Describe how to choose a radioactive isotope for a particular job.			

	Equations that I need to know:			
I.	$\textbf{work done} = \textbf{force} \times \textbf{distance}$ (J) (N) (m)			
II.	$\textbf{kinetic energy} = {}^{1}/_{2} \times \textbf{mass} \times \textbf{speed}^2$ (J) (kg) (m/s)			
III.	$\textbf{weight} = \textbf{mass} \times \textbf{gravitational field strength}$ (N) (kg) (N/kg)			
IV.	$\textbf{gravitational potential energy} = \textbf{mass} \times \textbf{gravitational field strength} \times \textbf{change in height}$ (J) (kg) (N/kg) (m)			
V.	$\textbf{energy transferred} = \textbf{power} \times \textbf{time}$ (J) (W) (s)			
VI.	$\textbf{efficiency} = \frac{\textbf{useful output energy transfer}}{\textbf{total input energy transfer}}$			
VII.	**charge flow (*Q*) = current (*I*) x time taken (*t*)** (coulombs, C) (amperes, A) (seconds, s)			
VIII.	**potential difference across a component (*V*) = energy transferred *(E)*** (joules, J) **charge (*Q*)** (coulombs, C)			
IX.	**resistance (*R*) = potential difference (*V*)** (volts, V) (ohms, Ω) **current (*I*)** (coulombs, C)			
X.	**power supplied (*P*) = current (*I*) x potential difference (*V*)** (watts, W) (amperes, A) (volts, V)			
XI.	**Power (*P*)** (watts, W) **= energy transferred *(E)*** (joules, J) **time (*t*)** (seconds, s)			
XII.	**power (*P*) = current^2 (I^2) x resistance (*R*)** (watts, W) (amperes, A) (ohms, Ω)			
XIII.	**charge flow (*Q*) = current (*I*) x time taken (*t*)** (coulombs, C) (amperes, A) (seconds, s)			
XIV.	**Density (ρ)= mass (m)** (kg) (kg/m^3) **volume (V)** (m^3)			