3rd Year GCSE Physics Trinity Term

- HT5 - To finish Electricity topic ahead of summer exam;
- HT5 - To sit summer exam;
- HT6 - Then post-exam feedback and corrections. Complete compulsory electricity practicals if not yet done.
- If time permits in HT6 start the **Space** topic.
- Have included Electricity 1 and 2 checklists below - students can use to check and review understanding.
- *Use BBC Bitesize and Kerboodle.com access (online textbook) for independent consolidation.*

Full specification: https://filestore.aqa.org.uk/resources/physics/specifications/AQA-8463-SP-2016.PDF

Lesson	Aiming for 4		Aiming for 6		Aiming for 8	
P4.1 Electrical charges	I can label the constituents on an atom (proton, neutron, and electron) on a diagram.	☐	I can compare the electrical properties of protons, neutrons, electrons, and ions.	☐	I can describe the shape of the field and lines of force around a point charge or charged sphere.	☐
	I can describe the interactions between positively and negatively charged objects.		I can use the concept of electric fields to explain why charged objects interact.	☐	I can apply the concept of electric fields to explain in detail why the force between charged objects decreases with distance.	☐
	I can state that objects can become electrically charged by the action of frictional forces.		I can describe how objects become charged in terms of electron transfer.	☐	I can explain why sparks can be produced by charged materials in terms of charge build-up.	☐
P4.2 Electric circuits	I can identify circuit components from their symbols.	☐	I can describe the operation of a variable resistor and a diode and their effects on current.	☐	I can explain the nature of an electric current in wires in terms of electron behaviour.	☐
	I can draw and interpret simple circuit diagrams.		I can calculate the charge transferred by a steady current in a given time.		I can perform a range of calculations, including rearrangement of the equation $Q=It$.	
	I can construct a simple electrical circuit.		I can construct an electrical circuit and accurately measure the current.		I can measure the current in a circuit accurately and use it to calculate the rate of flow of electrons.	

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P4.3 Potential difference and resistance	I can state that resistance restricts the size of a current in a circuit.	☐	I can calculate the potential difference.	☐	I can describe potential difference in terms of work done per unit charge.	☐
	I can state Ohm's law and describe its conditions.		I can calculate the resistance of a component.	☐	I can rearrange equations for resistance and potential difference.	☐
	I can measure the current and potential difference in a circuit to determined the resistance.		I can measure the effect of changing the length of a wire on its resistance in a controlled experiment.	☐	I can investigate a variety of factors that may affect the resistance of a metal wire, such as the current through it, length, cross-sectional area, and metal used.	☐
P4.4 Component characteristics	I can identify the key characteristics of electrical devices.	☐	I can describe the resistance characteristics of a filament lamp.	☐	I can explain the resistance characteristics of a filament lamp in terms of electrons and ion collisions.	☐
	I can identify components from simple *I*–*V* graphs.	☐	I can describe the characteristics of diode and light-emitting diode.	☐	I can determine the resistance of a component based on information extracted from an *I*–*V* graph.	☐
	I can state the operation of a diode in simple terms.	☐	I can investigate the resistance characteristics of a thermistor and a LDR.	☐	I can compare the characteristics of a variety of electrical components, describing how the components can be used.	☐

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P4.5 Series circuits	I can state that the current in any part of a series circuit is the same.	☐	I can find the potential difference across a component in a circuit by using the p.d. rule.	☐	I can explain, in detail, why the current in a series circuit is the same at all points by using the concept of conservation of charge (electrons).	☐
	I can calculate the potential difference provided by cell combinations.	☐	I can calculate the current in a series circuit containing more than one resistor.	☐	I can analyse a variety of series circuit to determine the current through, p.d. across, and resistance of combinations of components.	☐
	I can calculate the total resistance of two resistors placed in series.	☐	I can investigate the resistance of series circuits with several components.	☐	I can evaluate in detail the investigation of series circuits and explain discrepancies.	☐
P4.6 Parallel circuits	I can identify parallel sections in circuit diagrams.	☐	I can measure the p.d. across parallel circuits and explain any discrepancies.	☐	I can analyse parallel circuits in terms of current loops.	☐
	I can state the effect of adding resistors in parallel on the size of the current in a circuit.		I can describe the effect on the resistance in a circuit of adding a resistor in parallel.		I can calculate the current at any point in a circuit.	
	I can state that the p.d. across parallel sections of a circuit is the same.		I can investigate the effect of adding resistors in parallel on the size of the current in a circuit.		I can evaluate in detail an investigation into the effect of adding resistors in parallel on a circuit.	

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P5.1 Alternating current	I can state that the UK mains supply is a high-voltage alternating current supply.	☐	I can describe the characteristics of the UK mains supply.	☐	I can explain the process of half-wave rectification of an a.c. source.	☐
	I can state simple differences between a.c. and d.c. sources.		I can compare a.c. traces in terms of period and amplitude (voltage).	☐	I can analyse a.c. traces with an oscilloscope to determine the voltage and frequency.	☐
	I can describe how the trace on an oscilloscope changes when the frequency or amplitude of the signal is changed.		I can operate a cathode ray oscilloscope to display an a.c. trace.	☐	I can compare and contrast the behaviour of electrons in a wire connected to d.c. and a.c. supplies.	☐
P5.2 Cables and plugs	I can identify the live, neutral, and earth wires in a three-pin plug.	☐	I can discuss the choices of materials used in cables and plugs in terms of their physical and electrical properties.	☐	I can explain why it is not necessary for some appliances to be earthed.	☐
	I can identify the key components of a typical three-pin plug and socket.		I can describe why a short circuit inside a device presents a hazard.		I can explain when there will be a current in the live, neutral, and earth wires of an appliance.	
	I can identify simple and obvious hazards in electrical wiring.		I can identify a variety of electrical hazards associated with plugs and sockets.		I can discuss in detail the hazards associated with poor electrical wiring.	
P5.3 Electrical power and potential difference	I can state that the power of a device is the amount of energy transferred by it each second.	☐	I can calculate the power of systems.	☐	I can measure and compare the power of electrical devices and explain variations in readings.	☐
	I can describe the factors that affect the rate of energy transfer by a current in a circuit.		I can calculate the power of electrical devices.	☐	I can calculate the electrical heating caused by resistance.	☐
	I can explain why different fuses are required electrical devices in simple terms.		I can select an appropriate fuse for a device.	☐	I can combine a variety of calculations to analyse electrical systems.	☐

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P5.4 Electrical currents and energy transfer	I can state that an electric current consists of a flow of charge (electrons in a wire).	☐	I can calculate the charge transferred by a current in a given time.	☐	I can perform calculations involving rearrangement of the equations $Q = It$ and $E = VQ$.	☐
	I can identify the factors that affect the energy transfers in a circuit.		I can calculate the energy transferred by a charge passing through a potential difference.		I can explain how energy is conserved in terms of current and p.d. during energy transfers by an electric current.	
	I can state that a battery or power supply provides energy to a current whereas a resistor causes a transfer of energy to the surroundings.		I can apply the law of conservation of energy in a circuit.		I can use algebra to combine the equations $Q = It$ and $E = VQ$ to form the relationships $E = VIt$ and $P = IV$.	
P5.5 Appliances and efficiency	I can describe the factors that affect the cost of using various electrical devices.	☐	I can calculate energy transfer in kilowatt-hours.	☐	I can convert between relevant units during calculations of energy transfer.	☐
	I can calculate energy transfer in joule.		I can convert between efficiencies stated in percentages and those stated in decimal forms.	☐	I can analyse the use of a variety of electrical devices to determine their costs of operation.	☐
	I can state that energy transfer can be measured in kilowatt-hours.		I can calculate the power rating of a device from the energy transferred and the time of operation.	☐	I can compare a range of electrical devices in terms of efficiency using calculations to support any conclusions.	☐