AQA (Trilogy) Combined Science GCSE **Student Progress Sheet**

Name: **Target:**

Unit 6.2 – Electricity

6.2.1. Current, Potential Difference and Resistance

6.2.1.1. Standard Circuit Diagram Symbols

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a	I can draw and interpret circuit diagrams, using the standard symbols for: cell, battery, lamp, voltmeter, ammeter, resistor, variable resistor, thermistor, LDR, LED, diode, fuse, switch (open and closed).			

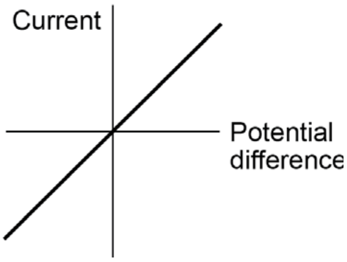
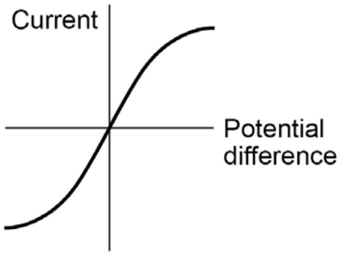
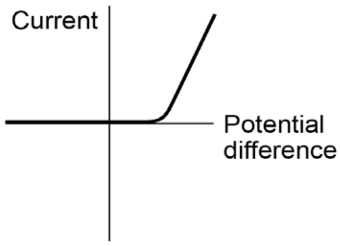
6.2.1.2. Electrical Charge and Current

a	I know that electric current is a flow of electrical charge.			
b	I know that a current has the same value at any point in a single closed loop.			
c	I know that the size of the electric current is the rate of flow of electrical charge.			
d	I can recall and apply the following equation: charge flow = current × time Q = I t charge flow, Q, in coulombs, C current, I, in amperes, A (amp is acceptable for ampere) time, t, in seconds,			
e	I know that for electrical charge to flow through a closed circuit the circuit must include a source of potential difference.			

6.2.1.3. Current, Resistance and Potential Difference

a	I know that the current (I) through a component depends on both the resistance (R) of the component and the potential difference (V) across the component.			
b	I know that the greater the resistance of the component, the smaller the current for a given potential difference (pd) across the component.			
c	I know that potential difference and voltage are different terms for the same quantity.			
d	I can recall and apply the following equation: potential difference = current × resistance V = I R potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω			

6.2.1.4. Resistors

a	I can explain that for some resistors, the value of R remains constant but that in others it can change as the current changes.			
b	I know that the current through an ohmic conductor (at a constant temperature) is directly proportional to the potential difference across the resistor. This means that the resistance remains constant as the current changes.  			
c	I know that the resistance of components such as lamps, diodes, thermistors and LDRs is not constant; it changes with the current through the component. The resistance of a filament lamp increases as the temperature of the filament increases.  			
d	The current through a diode flows in one direction only. The diode has a very high resistance in the reverse direction.  			
e	I know that the resistance of a thermistor decreases as the temperature increases.			
f	I can describe some applications of thermistors in circuits e.g. a thermostat.			
g	I know that the resistance of an LDR decreases as light intensity increases.			
h	I can describe some applications of LDRs in circuits, e.g. automatically switching lights on when it gets dark.			
i	I can explain the design and use of a circuit to measure the resistance of a component by measuring the current through, and potential difference across, the component.			
j	I can use graphs to explore whether circuit elements are linear or non-linear and relate the curves produced to their function and properties.			

6.2.2. Series and Parallel Circuits

a	I know that there are two ways of joining electrical components, in series and in parallel. Some circuits include both series and parallel parts.			
b	I can describe the difference between series and parallel circuits.			
c	I know that for components connected in series: • there is the same current through each component; • the total potential difference of the power supply is shared between the components; • the total resistance of two components is the sum of the resistance of each component. Rtotal = R1 + R2 resistance, R, in ohms, Ω			
d	I know that for components connected in parallel: • the potential difference across each component is the same; • the total current through the whole circuit is the sum of the currents through the separate components; • the total resistance of two resistors is less than the resistance of the smallest individual resistor.			
e	I can explain qualitatively why adding resistors in series increases the total resistance whilst adding resistors in parallel decreases the total resistance.			
f	I can explain the design and use of dc series circuits for measurement and testing purposes.			
g	I can calculate the currents, potential differences and resistances in dc series circuits.			
h	I can use circuit diagrams to construct and check series and parallel circuits that include a variety of common circuit components.			
i	I can solve problems for circuits which include resistors in series using the concept of equivalent resistance.			

6.2.3. Domestic Uses and Safety

6.2.3.1. Direct and Alternating Potential Difference

a	I know that mains electricity is an ac supply.			
b	I know that, in the United Kingdom, the domestic electricity supply has a frequency of 50 Hz and is about 230 V.			
c	I can explain the difference between direct and alternating potential difference.			

6.2.3.2 Mains Electricity

a	I know that most electrical appliances are connected to the mains using three core cable.			
b	I know that the insulation covering each wire is colour coded for easy identification: live wire – brown neutral wire – blue earth wire – green and yellow stripes.			
c	I know that the live wire carries the alternating potential difference from the supply, the neutral wire completes the circuit and the earth wire is a safety wire to stop the appliance becoming live.			
d	I know that the potential difference between the live wire and earth (0 V) is about 230 V and that the neutral wire is at, or close to, earth potential (0 V).			
e	I know that the earth wire is at 0 V, and that it only carries a current if there is a fault.			
f	I can explain why a live wire may be dangerous even when a switch in the mains circuit is open.			
g	I can explain the dangers of providing any connection between the live wire and earth.			

6.2.4. Energy Transfers

6.2.4.1. Power

a	I can explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time.			
b	I can recall and apply the following equation: power = potential difference × current P = V I power, P, in watts, W potential difference, V, in volts, V current, I, in amperes, A (amp is acceptable for ampere)			
c	I can recall and apply the following equation: power = current^2 × resistance $P=I^2 \times R$ power, P, in watts, W current, I, in amperes, A (amp is acceptable for ampere) resistance, R, in ohms, Ω			

6.2.4.2. Energy Transfers in Everyday Appliances

a	I know that everyday electrical appliances are designed to bring about energy transfers.			
b	I know that the amount of energy an appliance transfers depends on how long the appliance is switched on for and the power of the appliance.			
c	I can describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices.			
d	I know that work is done when charge flows in a circuit.			
e	I can recall and apply the following equations to calculate the amount of energy transferred by electrical work: energy transferred = power × time E = P t energy transferred = charge flow × potential difference E = Q V energy transferred, E, in joules, J power, P, in watts, W time, t, in seconds, s charge flow, Q, in coulombs, C potential difference, V, in volts, V			
f	I can explain how the power of a circuit device is related to: • the potential difference across it and the current through it • the energy transferred over a given time.			
g	I can describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.			

6.2.4.3. The National Grid

a	I know that the National Grid is a system of cables and transformers linking power stations to consumers and that electrical power is transferred from power stations to consumers using the National Grid.			
b	I know that step-up transformers are used to increase the potential difference from the power station to the transmission cables and then step-down transformers are used to decrease, to a much lower value, the potential difference for domestic use.			
c	I can explain why the National Grid system is an efficient way to transfer energy.			

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d	(HT only) I can select and use the equation: potential difference across primary coil × current in primary coil = potential difference across secondary coil × current in secondary coil as given on the equation sheet.			
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