

**4.2 Triple/6.2 Combined Science- Electricity**

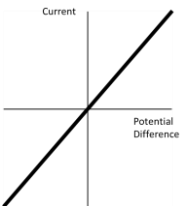
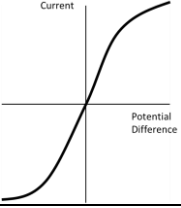
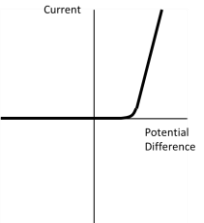
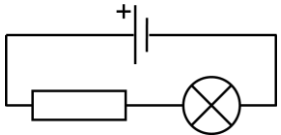
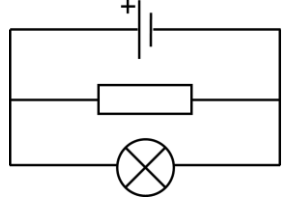
<b>1.0 Static Charge-Triple only</b>			
Electric Field	Electric fields are found around charges, a charged object in an electric field will experience a force. The field lines are perpendicular to the charge	Friction	The force experienced when two objects come into contact with each other
Attract	When two oppositely charged objects are drawn to each other	Transferring electrons	When two insulating materials rub against each other they experience friction. The friction causes electrons to transfer from one object to the other.
Repel	When two like charged objects push away from each other	Negative charge	When an object gains electrons.
Electric Charge	There are two types of electric charge, positive and negative	Positive charge	When an object loses electrons.
Electron	Negative charged particle that can move in order to give an object a charge		

<b>2.0 Electric Current</b>	
Current	The flow of electric charge, has the same value at any point in a single closed loop
Ammeter	Component used to measure current, must be connected in series, units are Amps (A)
$Q=It$	<b>Q</b> is the charge flow in coulombs, C <b>I</b> is the current in amps, A <b>t</b> is the time in seconds, s

**3.0 Circuit Symbols**

Cell		Open Switch		Diode	
Battery		Closed Switch		LED	
Resistor		Ammeter		Lamp	
Variable Resistor		Voltmeter		Fuse	
LDR			Thermistor		
As the light level increases the resistance decreases.			As the temperature increases the resistance decreases.		

<b>4.0 Potential difference (voltage)</b>	
Potential difference	Also called voltage, the potential difference between two points in an electric circuit is the work done when a coulomb of charge passes between the points. Potential difference cause charge to flow
Voltmeter	Component used to measure potential difference, must be connected in parallel, units are Volts (V)
Work	Voltage is the work done per unit of charge $E=VQ$ <b>E</b> is the energy in joules, J <b>V</b> is the voltage in volts, V <b>Q</b> is the charge flow in coulombs, C

5.0 Resistance		6.0 Current-voltage graphs	
Resistance	Measures how hard it is for electrical current to pass through a component	Ohmic Conductor	Current and potential difference are directly proportional. Resistance is constant.
Ohm's Law	$V=IR$ <b>V</b> is the voltage in volts, <b>V</b> <b>R</b> is the resistance in Ohms, $\Omega$ <b>I</b> is the current in amps, <b>A</b>		
Factors affecting resistance	<ul style="list-style-type: none"> <li>As the cross sectional area increases, resistance decreases.</li> <li>As the length increases the resistance increases.</li> <li>As the temperature increases the resistance increases.</li> </ul> The material of the component effects the resistance.	Filament Lamp 	Resistance of a filament lamp is not constant. As temperature increases resistance increases
		Diode 	The current in a diode flows in one direction only. The diode has very high resistance in the reverse direction.
7.0 Series and Parallel Circuits			
Series-Connected along a single loop		Parallel-connected along multiple branches	
			
Current	Is the same at all points	Current	The total current is the sum of the current across all components
Voltage	The total potential difference of the power supply is shared across all components	Voltage	The voltage is the same at all points
Resistance	$R_{total}=R_1+R_2$	Resistance	The total resistance of two resistors is less than the resistance of the smallest individual resistor.

8.0 Electrical Supply		9.0 Electrical Wiring	
Direct Current	DC= Direct current. The current always flows in the same direction, batterie produce DC voltage	3 core cable	3 copper wires coated in insulating plastic
Alternating Current	AC= alternating current. The current constantly changes direction, produced by an alternating potential difference, where positive and negative ends continually swap	Live Wire	Live wire is brown, carries alternating potential difference of 230V
UK mains	UK mains supply is AC at 230V, it has a frequency of 50Hz	Neutral Wire	Neutral wire is blue, completes the circuit, carrying current out of the appliance at 0V
		Earth Wire	Earth wire is green and yellow, it is a safety feature. Current is at 0V Prevents the appliance becoming live if there is a fault. It only carries current if there is a fault.
10.0 Power		11.0 Energy Transferred	
Power	The power of a device is related to <ul style="list-style-type: none"> <li>potential difference and current</li> <li>Energy transferred over time</li> </ul>	$E=Pt$	Energy- J Power-W Time-s
$P=VI$	Power-W Voltage-V Current-A	$E=QV$	Energy- J Charge Q- C Voltage-V
$P=I^2R$	Power=W Current=A Resistance= $\Omega$		
12.0 National Grid			
National Grid	A network of cables that connect power stations with consumers	Meeting Demand	Demand for electricity varies throughout the week and seasonally. Spare capacity for generating extra electricity is kept on standby for major events
Step up transformer	Used to increase the potential difference from the power station to the transmission cables	National grid efficiency	Electricity carried with high potential difference and low current, this reduces heat loss in the transmission cables.
Step down transformer	Used to step down the potential difference from the transmission cables for domestic use		