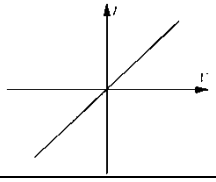
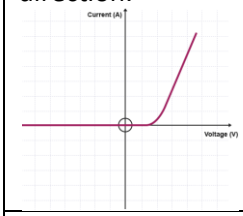
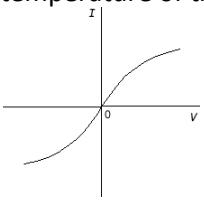
GCSE Physics Key Facts - Electricity

<table>
<tr><th colspan="2">Current, Potential Difference and Resistance</th></tr>
<tr><td>Draw and interpret circuit diagrams using circuit symbols for: Open switch, closed switch, lamp, fuse, cell, battery, diode, voltmeter, ammeter, resistor, thermistor, variable resistor, LDR and LED</td><td>For electrical charge to flow through a closed circuit the circuit must include a source of potential difference.</td></tr>
<tr><td>Electric current is a flow of electrical charge. The size of the electric current is the rate of flow of electrical charge.

Q = I x t

Q = Charge flow in Coulombs,
I = current in Amperes,
t = time in seconds</td><td>Ohm’s law equation

V = I x R

V = Potential difference (volts),
I = current (Amperes),
R = resistance (ohms)</td></tr>
<tr><td>A current has the same value at any point in a single closed loop. (e.g. current at all points in a series circuit is the same)</td><td>The greater the resistance of a component the smaller the current for a given potential difference (pd) across the component.</td></tr>
<tr><td>The resistance of components such as lamps, diodes, thermistors and LDRs is not constant; it changes with the current through the component.</td><td>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.
  </td></tr>
<tr><td>The current through a diode flows in one direction only. The diode has a very high resistance in the reverse direction.
  </td><td>The resistance of a filament lamp increases as the temperature of the filament increases.
  </td></tr>
<tr><td>The resistance of a thermistor decreases as the temperature increases. Thermistors are used in thermostats. The resistance of an LDR decreases as light intensity increases. Applications of LDRs include switching lights on when it gets dark.</td><td></td></tr>
<tr><th colspan="2">Series and parallel circuits</th></tr>
<tr><td>Series circuit have only one route for the current to take, parallel circuits have more than one route for the current to take.</td><td>Series Circuits: Same current through every component, potential difference of power supply is shared between the components</td></tr>
<tr><td>Parallel Circuits: Potential difference across each branch of the circuit is the same, current splits at a junction in the circuit</td><td>Resistors in series: Total resistance of two components in series is found by adding together the resistance of each component. (adding resistors in series increases resistance)</td></tr>
<tr><td>Resistors in parallel: Total resistance of two resistors is less than the resistance of the smallest resistor (adding resistors in parallel decreases resistance)</td><td></td></tr>
<tr><th colspan="2">Domestic uses and safety</th></tr>
<tr><td>UK mains supply has a frequency of 50Hz (it changes direction 50 times per second) and a potential difference of 230V</td><td>Batteries produce direct current (dc). This flows in only one direction. Mains electricity produces alternating current (a.c). This keeps changing direction.</td></tr>
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Most electrical appliances are connected to the mains using three-core cable. The colour of the insulation on each wire is: live wire (brown), neutral wire (blue), earth wire (green and yellow stripes)	The live wire carries the alternating potential difference from the supply. The neutral wire completes the circuit. The earth wire is a safety wire. It stops the appliance becoming live. It only carries a current if there is a fault
Potential difference between live wire and earth (OV) is 230V. The neutral wire is at, or close to, earth potential (OV).	The live wire may be dangerous even when a switch in the mains circuit is open
Energy Transfers and The National Grid	
Power equatios: **P = IV** and **P = I^2R** P = power (Watts) I = current (Amperes) V = Potential difference (Volts) R = resistance (ohms)	Electrical appliances transfer electrical energy into different types (e.g. an electric motor transfers electrical energy into kinetic energy)
Work is done when charge flows in a circuit	The amount of energy an appliance transfers depends on the power of the appliance and how long it is switched on for. Energy Equation: **E = P x t** E = energy transferred (Joules) P = Power (Watts) t = time (seconds)
Energy equation: **E = Q V** E = energy transferred (Joules) Q = charge (Coulombs) V = potential difference (Volts)	The National Grid is a system of cables and transformers linking power stations to consumers
Step-up transformers are used to increase the potential difference from the power station to cables. Step-down transformers are used to decrease the potential difference for domestic use.	Transmitting electricity at high potential differences increases efficiency as it reduces current and therefore reduces energy lost due to heating.