Beckfoot

Subject: Science (Physics)	Topic: Electricity - circuits	Year Group: 10

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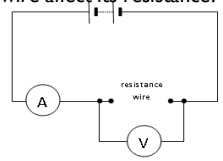
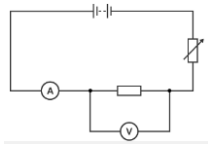
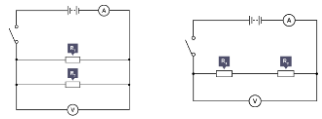
Circuit symbols

1	cell	8	switch (open)
2	battery	9	switch (closed)
3	lamp	10	resistor
4	fuse	11	variable resistor
5	diode	12	thermistor
6	LED	13	voltmeter
7	LDR	14	ammeter

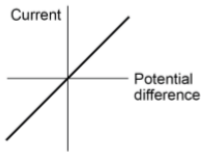
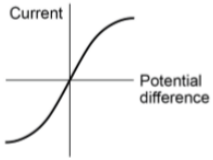
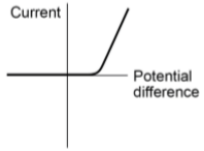
Required practicals

1	Independent: length of wire Dependent: resistance (determined by measuring I and V and then R=V/I) Control: temperature, wire thickness	How does the length of a wire affect its resistance? 
2	This set-up is used to collect data to plot an I-V graph for a resistor. Ammeters are always connected in series and voltmeters in parallel. The variable resistor alters the pd.	
3		What happens to resistance in series and parallel? Use R=V/I to determine total R.

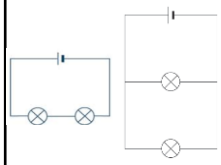
Key equations

1	Charge (C) = current (A) x time (s)	Q = I x t
2	Potential difference (V) = current (A) x resistance (Ω)	V = I x R
3	Power (W) = current (A) x voltage (V)	P = I x V
4	Power (W) = current (A) ^{2} x resistance (Ω)	P = I^2 x R
5	Energy transferred (J) = power (W) x time (s)	E = P x t
6	Energy transferred (J)= charge x potential difference (V)	E = Q x V

Current-Voltage graphs

1		**Resistor I-V graph** Current and voltage are directly proportional. Resistance is constant.
2		**Filament lamp I-V graph** The resistance increases as the temperature of the filament increases.
3		**Diode I-V graph** Current only flows in one direction.

Series and parallel circuits

1		Series circuits have one loop. Parallel circuits have two or more loops.
2	Current	Series: is the same everywhere. Parallel: is split between loops
3	Potential difference	Series: pd of power supply is shared between components. Parallel: is same across each loop
4	Resistance	Series: total R = sum of resistances of all components Parallel: total R is reduced as current can follow more paths

Key Vocabulary

1	**Current**	The rate of flow of electrical charge.
2	**Potential difference (voltage)**	A measure of how much energy is transferred between two points in a circuit.
3	**Resistance**	A measure of how difficult it is for current to flow through a component.
4	**Thermistor**	A component whose resistance decreases as temperature increases.
5	**LDR**	A component whose resistance decreases as light intensity increases.

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Subject: Science (Physics)	Topic: Electricity – mains & static	Year Group: 10

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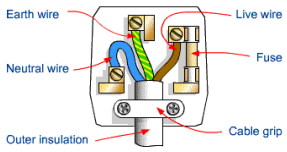
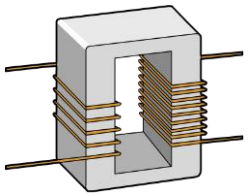
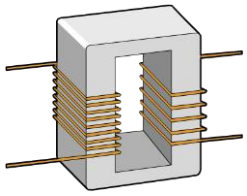
Mains electricity

1	In the UK domestic mains electricity is an ac supply.
2	It has a frequency of 50 Hz and is 230 V.
3	 **Live** – carries alternating pd from the supply. **Neutral** – completes the circuit. **Earth** – stops appliance becoming live.

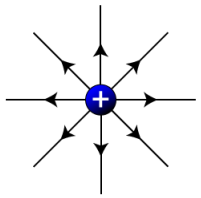
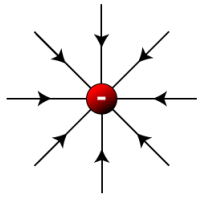
National grid

1	Electrical power is transferred from power stations to consumers using the national grid.
2	 Step-up transformers increase the potential difference from the power station to the transmission cables, reducing the current in the cables. This means less energy is wasted as heat in the wires.
3	 Step-down transformers are used to decrease the potential difference to a safer level for domestic use.

Energy transfers

1	All electrical appliances transfer energy from on store to another. E.g. motors transfer energy from the mains to the kinetic energy of the motor.
2	The amount of energy transferred depends on the power of the appliance and how long it is on for (E=Pt).

Electric fields (Physics only)

1	All charged objects have an electric field around them. This is a region where charges experience a force.	
2	Electric field around positively charged sphere. 	Electric field around a negatively charged sphere 
3	Field lines point away from positive charges and towards negative charges as they show the direction a positive charge would move.	
4	The closer together the arrows are, the stronger the field, meaning that the field is stronger closer to the charge.	
5	If another charged object is placed in the electric field it experiences a force. The force gets stronger as the distance between the objects decreases.	

Key Vocabulary

1	**Alternating current**	A current that regularly changes direction.
2	**Direct current**	A current that flows in one direction only.
3	**Conductor**	Materials through which electrical charge flow easily. Materials with low resistances.
4	**Insulator**	Materials through which electrical charges do not flow easily. Have high resistances.
5	**Power**	Energy transferred each second.

Static electricity (Physics only)

1	When insulators are rubbed against each other electrons are rubbed off one material and on to the other.
2	The material that gains electrons becomes negatively charged. The material that loses electrons is left with a positive charge.
3	Objects with the same charge repel. Objects with opposite charges attract.
4	Attraction and repulsion between two charged objects are examples of non-contact force.