Physics 2: Electricity

Section 1: Circuit Symbols

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

Section 4: V, I and R in Series and Parallel

Components connected in...	Current	Potential Difference	Resistance
27 Series	The current is the **same** at every point in the circuit and in every component.	The total potential difference of the power supply is **shared** between the components.	The **more resistors, the greater the resistance**. The total resistance of two components is the sum of the resistance of each component. $R_{total} = R_1 + R_2$
28 Parallel	The **total current** through the whole circuit is the **sum of the currents through the separate components.**	The potential difference across each component is the **same.**	Adding **more resistors in parallel decreases resistance**. The **total resistance** of two resistors is **less than the resistance of the smallest individual resistor**.

Section 6: The Three Core Cable

32 Live	**Brown** colour. **Current flows** to the appliance. Potential difference between this and other wires should be **230V**.
33 Neutral	**Blue** colour. Current taken away from appliance. Potential difference should be **0V**.
34 Earth	**Yellow** and **green** colour. Potential difference of **0V**. Carries charge to Earth if live wire touches the metal casing of an appliance.

Section 5: IV Graphs

Graph	Description
	29 Fixed Resistor (Ohmic Conductor) Current and potential difference are **directly proportional**. **Resistance is constant**.
	30 Filament Lamp Resistance of a filament lamp is **not constant**. As temperature increases, resistance increases. **Ions** within the lamp **vibrate more**, increasing **collisions** with **electrons**.
	31 Diode/ LED The **current** through a diode flows in **one direction only**. The diode has a **very high resistance in the reverse direction**.

Section 2: Equations to learn

	Equation	Symbol equation	Units
15	Charge flow = current x time	$Q = I \times t$	Charge flow - coulomb (C) Current – amperes (A) Time – seconds (s)
16	Potential difference = current x resistance	$V = I \times R$	Potential difference – volts (V) Current – amperes (A) Resistance – ohms (Ω)
17	Power = potential difference x current	$P = V \times I$	Power – watt (W) Potential difference – volts (V) Current – amperes (A)
18	Power = current² x resistance	$P = I^2 \times R$	Power – watt (W) Current – amperes (A) Resistance – ohms (Ω)
19	Energy transferred = power x time	$E = P \times t$	Energy = joules (J) Power – watt (W) Time – seconds (s)
20	Energy transferred = charge flow x potential difference	$E = Q \times V$	Energy = joules (J) Charge flow - coulomb (C) Potential difference – volts (V)

Section 3: Key Terms

21 Electric current	The **flow** of **electric charge**.
22 Potential difference	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 **causes charge to flow**
23 Resistance	Resistance is caused by anything that **opposes the flow of electric charge.**
24 Charge	Anything charged that is able to move within a circuit. **Electrons** or **ions**.
25 Series	A circuit with only **one route** for charge to take.
26 Parallel	A circuit with only **more than one route** for charge to take.

Section 7: Mains Electricity

35 Alternating Current	The **current** regularly **changes direction e.g. mains electricity**
36 Direct Current	The **current** flows in **one direction only e.g. batteries.**
37 Mains Electricity	UK mains is an **alternating current** of **230V** and at a frequency of **50Hz**.
38 National Grid	A series of **cables** and **transformers** linking power stations to consumers.
39 Step-up Transformer	**Increases the potential difference** for **transmission** across power cables. This **reduces the current** and **therefore less heat is lost** from the cables. This makes the National Grid **efficient**.
40 Step-down Transformer	**Reduces the potential difference** from the cables to **230V** for use by consumers.