

Physics 2: Electricity

Section 1: Circuit Symbols

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

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 = current ² 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 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. $R_{\text{total}} = R_1 + R_2$
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 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 5: IV Graphs

	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 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.