



Basics of Electricity

Checklist statement

✓

I can define electric current as the rate of flow of charge.

I can define potential difference as work done per unit charge.

I can apply $I = \frac{\Delta Q}{\Delta t}$, define all terms and know their standard units.

I can apply $V = \frac{W}{Q}$, define all terms and know their standard units.

I can define resistance.

I can apply $R = \frac{V}{I}$, define all terms and know their standard units.

Current–Voltage Characteristics

Checklist statement

✓

I can describe the current–voltage characteristics of an ohmic conductor.

I can describe the current–voltage characteristics of a semiconductor diode.

I can describe the current–voltage characteristics of a filament lamp.

I can explain Ohm's law as a special case where current is proportional to potential difference under constant physical conditions.

I can interpret current–voltage graphs where either current or potential difference is on the horizontal axis.

Resistivity

Checklist statement	✓
I can apply $\rho = \frac{RA}{L}$, define all terms and know their standard units.	<input type="checkbox"/>
I can describe qualitatively how temperature affects the resistance of a metal conductor.	<input type="checkbox"/>
I can describe qualitatively how temperature affects the resistance of a thermistor.	<input type="checkbox"/>
I know that only negative temperature coefficient (NTC) thermistors are considered.	<input type="checkbox"/>
I can describe applications of thermistors, including temperature sensors and resistance–temperature graphs.	<input type="checkbox"/>
I can explain superconductivity as a property of certain materials below a critical temperature.	<input type="checkbox"/>
I can describe applications of superconductors, including strong magnetic fields and reduced energy loss in power transmission.	<input type="checkbox"/>
I can describe a required practical to determine the resistivity of a wire.	<input type="checkbox"/>

Circuits

Checklist statement	✓
I can apply the rules for resistors in series.	<input type="checkbox"/>
I can apply the rules for resistors in parallel.	<input type="checkbox"/>
I can apply $E = IVt$, define all terms and know their standard units.	<input type="checkbox"/>
I can apply $P = IV$, define all terms and know their standard units.	<input type="checkbox"/>
I can apply $P = I^2R$, define all terms and know their standard units.	<input type="checkbox"/>
I can apply $P = \frac{V^2}{R}$, define all terms and know their standard units.	<input type="checkbox"/>
I can explain the relationships between currents, voltages and resistances in series and parallel circuits.	<input type="checkbox"/>
I can describe conservation of charge and conservation of energy in d.c. circuits.	<input type="checkbox"/>

Potential Divider

Checklist statement	✓
I can explain how a potential divider is used to supply a constant or variable potential difference.	<input type="checkbox"/>
I can describe the use of variable resistors, thermistors and light-dependent resistors (LDRs) in a potential divider.	<input type="checkbox"/>
I can analyse potential divider circuits to predict output potential differences.	<input type="checkbox"/>
I can design and construct potential divider circuits to achieve specific outcomes.	<input type="checkbox"/>

Electromotive Force and Internal Resistance

Checklist statement	✓
I can define electromotive force (emf).	<input type="checkbox"/>
I can define terminal potential difference.	<input type="checkbox"/>
I can apply $\varepsilon = \frac{E}{Q}$, define all terms and know their standard units.	<input type="checkbox"/>
I can apply $\varepsilon = I(R + r)$, define all terms and know their standard units.	<input type="checkbox"/>
I can perform calculations for circuits where internal resistance is not negligible.	<input type="checkbox"/>
I can describe a required practical to investigate the emf and internal resistance of a cell or battery.	<input type="checkbox"/>