

Electricity and Electromagnetism

Checklist

Tick off the concepts you're confident with to plan your study and find areas of improvement!

Static Electricity

- I can define the term **charge** and provide its' units
- I understand that electrons have a negative charge of -1.6×10^{-19} Coulombs
- I understand that protons have a positive charge of 1.6×10^{-19} Coulombs
- I can state the units and symbols for:
 - Electric field strength
 - Voltage
 - Distance
 - Charge
 - Electric potential energy
 - Force
- I can describe how an electric field is formed
- I can draw and label a diagram of a uniform electric field, correcting using labels and lines
- I can calculate the electric field strength, voltage, or distance between two plates using the equation $E = \frac{V}{d}$
- I can calculate the force on a charge, electric field strength, or charge using the equation $F = Eq$
- I can calculate the electric potential energy, the electric field strength, the charge, or the distance between the two plates using the equation: $\Delta E_p = Eqd$.
- I can calculate kinetic energy, mass, or velocity using the equation $E_k = \frac{1}{2}mv^2$
- I can explain how charged particles (positive and negative) move through an electric field.
- I can calculate the maximum velocity of a charged particle in an electric field

DC Electricity

- I know the electrical symbols for the following electrical components:
 - Ammeter
 - Lamp
 - Battery
 - Resistor
 - Switch
 - Voltmeter
 - Cell
 - Variable resistor
- I can draw a series circuit and a parallel circuit, with components
- I can explain the difference between the two types of circuits
- I can define **voltage**
- I can define **current**
- I can define **resistance**
- I can state the symbol and units for:
 - Voltage
 - Current
 - Resistance
- I can describe what happens to a current and voltage in a series circuit
- I can describe what happens to the current and voltage in a parallel circuit
- I can calculate the voltage, current, or resistance using the equation $V = \frac{I}{R}$
- I can calculate voltage, given energy and charge
- I can calculate the current using the charge and time
- I can calculate the resistance in a series or parallel circuit
- I can explain why current remains the same across all components in a series but is shared between the branches in a parallel circuit
- I can explain why the voltage is shared across all components in series but remains the same in each parallel branch.

Power

- I can calculate the power in a circuit
- I can explain why ammeters have to be in series to the component
- I can discuss the brightness of bulbs in a circuit and how it changes in series versus parallel, and when bulbs are added or removed
- I can link the brightness of bulbs to power

Electromagnetism

- I can state the symbols and units for:
 - Force
 - Magnetic field strength
 - Voltage
 - Current
 - Length
 - Charge
 - Velocity.
- I can explain how magnetic fields are generated
- I can draw magnetic field lines going into and coming out of a page
- I can draw and label a diagram of a magnet and its' field, using the north and south poles and the direction of the magnetic field lines
- I can calculate the force, magnetic field strength, current, or length using the equation:
 $F = BIL$
- I can calculate force, magnetic field strength, charge, or velocity using the equation: $F = Bqv$
- I can calculate the voltage, magnetic field strength, velocity, or length using the equation:
 $V = BvL$
- I can show the direction of motion, magnetic field, and current using the **Left-Hand Rule**.
- I can discuss electromagnetic induction, referring to the movement of charges in a magnet.
- I can discuss the motor effect and can explain how motors work
- I can discuss how a current and voltage is generated by moving a conductor through a magnetic field, using real examples