Curriculum for Excellence
Higher Physics

Success Guide

Electricity

Key Area – Monitoring and Measuring A.C.

Monitoring alternating current signals with an oscilloscope

Candidates should use their understanding of Physics to:

Use a multimeter to correctly measure current, voltage and resistance.			
Describe A.C. in terms of direction of current.			
Use an oscilloscope to measure the peak voltage of an A.C. supply and describe the waveform produced.			
Determine the frequency of an A.C. supply from an oscilloscope reading or a graph.			
Identify the peak voltage on an oscilloscope trace.			
Describe and determine the root mean square voltage and current of a supply.			

Key Area – Current, Potential Difference, Power and Resistance

Candidates should use their understanding of Physics to:

Use a wide variety of relationships involving potential difference, current, resistance and power to analyse circuits.			
Apply above relationships in complex calculations that require multiple steps to complete.			
Investigate circuits involving potential dividers that can be used for taking measurements and to set and control voltages.			
Perform calculations such as the output of a potential divider when a load is connect across the output.			
Apply their understanding of potential divider circuits to calculations that determine the potential difference and resistance across different components.			

Key Area – Electrical Sources and Internal Resistance

Candidates should use their understanding of Physics to:

Define the terms electromotive force (EMF), internal resistance and terminal potential difference.			
Analyse a circuit to determine the point at which the maximum power is transferred.			
Explain the phenomenon of internal resistance with reference to 'ideal supplies', 'short circuits', and 'open circuits'.			
Determine internal resistance and electromotive force using graphical analysis.			

Key Area – Capacitors

Candidates should use their understanding of Physics to:

Describe the principles of a method to show the relationship between the charge on a capacitor and the potential difference across the capacitor.			
Explain the term 'capacitance' in terms of charge on the capacitor and the potential difference across it (this can be used to define the Farad).			
Apply the information gathered from a charge vs. potential difference graph to determine the total energy stored by a charged capacitor.			
Use the relationships between energy, charge, capacitance and potential difference (not to be confused with the work done by a charge moving in a field, W=QV).			
Analyse data gathered from investigations into capacitor charging and discharging to show the variation of current and potential difference against time.			
Describe the effect of resistance and capacitance on charging and discharging curves.			

Key Area – Conductors, Semiconductors and insulators

Candidates should use their understanding of Physics to:

Categorise solids into conductors, semiconductors or insulators by their ability to conduct electricity.			
Describe the conduction and valence bands in conductors, semiconductors and insulators.			
Describe the movement of charge carriers in conductors and semiconductors with reference to energy bands.			
Explain why there is no movement of charge carriers in insulators at room temperature with reference to energy bands.			
Explain the movement of charge carriers in a semiconductor with reference the energy of the electrons, including thermal energy.			

Key Area – p-n junctions

Candidates should use their understanding of Physics to:

Describe the process of manufacturing p-type and n-type semiconductors with reference to doping.			
Describe the electrical properties of a p-n junction with reference to majority charge carriers (potential barrier and depletion layer could be used at this level).			
Explain the production of an EMF when photons are incident on a suitable semiconductor junction (photovoltaic effect).			
Explain the production of photons when current is passed through a suitable p-n junction (LEDs).			