



Scheme of work: Electricity, magnetism and waves

Entry Level Certificate Physics – Component 6

This resource provides guidance for teaching component 6: Electricity, magnetism and waves from our new Entry Level Certificate Science. It is based on the specification (5960).

The scheme of work is designed to be a flexible medium term plan for teaching content and development of the skills that will be assessed.

We have provided it in Word format to help you create your own teaching plan – you can edit and customise it according to your needs. This scheme of work is not exhaustive; it only suggests activities and resources you could find useful in your teaching.

3.6 Component 6 – Physics: Electricity, magnetism and waves

Spec ref.	Summary of the specification content	Learning outcomes <i>What most students should be able to do</i>	Suggested timing (hours)	Opportunities to develop Scientific Communication skills	Opportunities to develop and apply practical and enquiry skills	Resources
3.6.1 O1	Current in a circuit	<p>Describe a current as a flow of electrical charge.</p> <p>Construct a simple series circuit.</p> <p>Measure current using an ammeter in series.</p> <p>Measure voltage using a voltmeter in parallel across a component.</p> <p>Recognise that current in a component depends on the resistance in the circuit.</p>	1	<p>Use scientific vocabulary correctly to describe or build a simple circuit.</p> <p>Flip cards for units</p> <p>Use AQA Teachit KS3 Electricity – what's that word? To consolidate vocabulary for electricity and magnetism.</p>	<p>Build series circuits to measure current through a variety of components.</p> <p>TDA (Teacher-devised assignment) opportunity: Investigate which materials are the best electrical conductors.</p>	<p>BBC Bitesize - Electric current and potential difference</p> <p>Teachit Science - Electricity - what's that word?</p>
O2	d.c. and a.c. current	<p>Recall that direct current is supplied by cells and batteries.</p> <p>Recall that mains electricity is alternating current.</p>	½	Use scientific vocabulary correctly, including the units for frequency and voltage.	Compare the pattern shown on an oscilloscope for d.c. and a.c. supply.	BBC Bitesize - Electrical circuits

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		Recall that UK mains electricity has a frequency of 50Hz and is 230V.				
3.6.2 O3	Wiring a plug	<p>Recall the colour-coding for three-core flex and the appropriate terminal for each wire.</p> <p>Explain how the earth wire protects the user and how the fuse protects the appliance.</p> <p>Recall that double-insulated appliances do not need an earth wire.</p>	1	<p>Use scientific vocabulary correctly.</p> <p>Interpret information about current ratings to choose the correct fuse for an appliance.</p>	<p>Wire a standard 3 pin plug correctly.</p> <p>Investigate how fuse wire melts when the identified current is exceeded.</p>	BBC Bitesize - Electrical safety activity
O4	Energy transfer in electrical appliances	<p>Read a domestic electricity meter to measure the amount of energy used.</p> <p>Recall the unit for power (W).</p> <p>Recognise that heating devices have the highest power ratings.</p>	1	Discuss relative energy usage of different everyday appliances.	<p>Reading of meters to produce meaningful and valid observations.</p> <p>Comparison of the energy usage of small household electrical appliances using a joulemeter.</p>	Power ratings for common appliances

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		<p>Name the units used in a domestic electricity meter to measure energy (kWh).</p> <p>Decide which of a selection of appliances has transferred the most energy for a known period of time.</p>		<p>Use Teachit KS3 Domestic electricity bills to calculate usage.</p> <p>Use Teachit KS3 Power ratings and calculations in conjunction with practical exploration of the demand of different appliances.</p>		<p>Teachit Science - Domestic electricity bills</p> <p>Teachit Science - Power ratings and calculations</p>
3.6.3 O5	Magnets	<p>Recall that the poles of a magnet are where the magnetic forces are strongest.</p> <p>Recall that like poles attract and unlike poles repel and recognise these as non-contact forces.</p> <p>Describe the pattern of magnetic fields between two magnets.</p>	1	<p>Use scientific vocabulary correctly.</p> <p>Use Teachit KS3 Magnets- True or false? to establish prior knowledge.</p>	<p>Identify the N and S poles of bar magnets using a suspended magnet to show attraction and repulsion.</p> <p>Use a compass to identify the field pattern around a single and then paired bar magnets.</p> <p>Construct a 'magnetic toy' of floating magnets using circular 'holed'</p>	<p>Bar magnets</p> <p>Plotting compasses</p> <p>Teachit Science - Magnets - true or false?</p> <p>PhET interactive simulations - Electricity, magnets and circuits</p> <p>BBC Bitesize - Magnetic fields</p>

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					magnets and wooden base and rod.	
O6	Electromagnets and solenoids	<p>Recall that a current in a wire produces a magnetic field around the wire.</p> <p>Recall that increasing the current increases the strength of a magnetic field.</p> <p>Construct a simple electromagnet from a solenoid and an iron core.</p> <p>Recall uses of electromagnets in relays and scrapyards.</p>	1	Use scientific vocabulary correctly.	<p>Use a plotting compass to identify the magnetic field round a current-carrying wire.</p> <p>Investigate how the strength of an electromagnet changes.</p> <p>Research uses of electromagnets.</p> <p>TDA opportunity: Investigate factors that affect the strength of an electromagnet.</p>	<p>BBC Bitesize - Electromagnetism and magnetism</p> <p>Magnet Academy - Electromagnetic induction</p> <p>Teachit Science - Investigating an electromagnet</p>
3.6.4 O7	Longitudinal and transverse waves	Recognise that waves transfer energy not physical materials.	1	Use scientific vocabulary correctly to explain the differences between wave types.	Class 'Mexican wave' demonstration.	BBC Bitesize - Types of waves

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		<p>Distinguish between transverse and longitudinal waves.</p> <p>Know that sound waves need a medium (material) to travel through.</p>			<p>Practical demonstrations:</p> <p>Slinky (longitudinal) Rope (transverse) Bell in (evacuated) jar</p>	<p>Youtube - Biggest wave</p> <p>Teachit Science - Sound introduction (powerpoint)</p> <p>BBC Bitesize - Sound waves</p>
O8	Wave properties	<p>Identify wavelength and amplitude on a diagram of a transverse wave.</p> <p>Use the wave equation and recall the correct units for wave speed, frequency and wavelength</p>	1	<p>Use scientific vocabulary correctly.</p> <p>Use Teachit KS3 Do I understand sound? As a revision activity and to consolidate correct use of vocabulary.</p>	<p>Demonstrate wave shapes using oscilloscope.</p> <p>Use oscilloscope, frequency generator, loudspeaker to relate frequency to changes in pitch and to relate amplitude to changes in volume.</p>	<p>BBC Bitesize - Waves</p> <p>Teachit Science - Do I understand sound?</p> <p>Youtube - Understanding waves lesson</p>
3.6.5 O9	The electromagnetic spectrum	Recall the order of the spectrum (but not the values of wavelength or frequency).	2	Use scientific vocabulary correctly.	Use IT to research information.	NASA - Electromagnetic spectrum

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		Identify the risks associated with ultraviolet waves, X-rays and gamma rays.		<p>Use a mnemonic to remember the order eg Grandma X's Umbrella Vanishes In Mild Rain (gamma -> radio waves) OR Remember My Instructions, Visible Using X-ray Glasses (radio waves -> gamma).</p> <p>Small groups/individuals use IT to research facts about one component of the spectrum and then co-operate as a group to produce the spectrum.</p> <p>Design a poster to explain the risks of unprotected sun exposure/tanning beds.</p>	<p>Investigate the effectiveness of sunscreens in absorbing u.v radiation using u-v sensitive beads or microscope slides and sunscreens.</p> <p>TDA opportunity: Testing visual acuity in different colours of light.</p>	<p>BBC Bitesize - The electromagnetic spectrum</p> <p>BBC Bitesize - Medical use of X-rays</p>
O10	Uses of the electromagnetic spectrum	<p>Recall the seven components of the e-m spectrum.</p> <p>Explain why each type of radiation is suitable for its use.</p>	2	<p>Use scientific vocabulary correctly.</p> <p>Use optical fibre to send a message using Morse code.</p>	Circus of exemplars of e-m radiation eg radio; microwave oven; infra-red heater eg toaster; light source and prism; UV light and tonic water;	BBC Bitesize - Uses of electromagnetic waves

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					<p>UV-visible pens; sample X-ray.</p> <p>Investigate microwaves to find which materials block them (eg apple).</p> <p>Investigate light travelling down an optical fibre over a distance (fishing line is a suitable but unshielded alternative).</p> <p>TDA opportunity:</p> <p>Investigate the shielding of a mobile phone or remote control device.</p> <p>TDA opportunity:</p> <p>Investigate the range over which a Bluetooth device is effective.</p>	