



Physics Scheme of Learning

P5: Electricity in the Home

Intent – Rationale

This is the second topic in the sequence “Particles at Work”. In this chapter students study more familiar, domestic uses of electricity. Covered concepts include alternating current (AC), charge flow in circuits, use of plugs and fuses in domestic circuits, power ratings for appliances, and electrical efficiency.

Sequencing – what prior learning does this topic build upon?	Sequencing – what subsequent learning does this topic feed into?
<ul style="list-style-type: none"> • KS3 Topic 1 – Energy • KS3 Topic 3 – Electric Circuits • GCSE Chapter P1 – Conservation and dissipation of Energy • GCSE Chapter P3 – Energy Resources • GCSE Chapter P4 – Electric Circuits 	<ul style="list-style-type: none"> • The remaining content in “Particles at Work”: GCSE P6 Molecules and matter GCSE P7 Radioactivity • GCSE P15 Electromagnetism
What are the links with other subjects in the curriculum?	What are the links to SMSC, British Values and Careers?
<ul style="list-style-type: none"> • Technology - electronics 	<ul style="list-style-type: none"> • Electrical engineering/the National Grid
What are the opportunities for developing literacy skills and developing learner confidence and enjoyment in reading?	What are the opportunities for developing mathematical skills?
<p>FROM THE LIBRARY <i>Energy Crisis</i>; Lisa firth-333.8 <i>Energy Alternatives</i>; Robert Sneddon-620 <i>Energy</i>; Chris Oxlade-531 <i>Energy</i>; J Challoner-DK eyewitness-531</p>	<ul style="list-style-type: none"> • Calculations of electrical power using energy and time or potential difference and current • Calculations using Ohm’s law • Calculations of charge flow • Calculations of electrical efficiency • Calculations of energy usage in kWh • Rearranging equations • Unit prefixes and conversions



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Intent – Concepts

What knowledge will students gain and what skills will they develop as a consequence of this topic?	
<u>Know</u>	
<ul style="list-style-type: none"> Describe the characteristics of direct current (DC) and alternating current (AC). State the colour and function of the live, neutral and earth wires in a plug. State which materials are used for plug casings. State the equation linking power, energy and time. Describe the energy transfers taking place as electrical current flows through a resistor. Describe how energy is transferred in a resistor. Describe the National Grid. 	
<u>Apply</u>	
<ul style="list-style-type: none"> Use an oscilloscope to measure the frequency and peak potential difference of an alternating current. State the reason for the earth pin in a three-pin plug. Explain why plug casings are made of plastic. Calculate electrical power supplied to an appliance using current and potential difference. Calculate energy transferred in a given length of time. Use calculations to decide on suitable fuse for an appliance. Calculate electrical efficiency of appliances. 	
<u>Extend</u>	
<ul style="list-style-type: none"> Compare efficiencies of appliances that do the same job. Describe heat transfers in multiple circuit components, including bulbs and resistors. Calculate energy flow using charge flow and potential difference. Use electrical efficiency to calculate useful power output of an appliance. 	
What subject specific language will be used and developed in this topic?	What opportunities are available for assessing the progress of students?
<p>Alternating current Electric current in a circuit that repeatedly reverses its direction.</p> <p>Alternator An alternating current generator.</p> <p>Direct current Electric current in a circuit that is in one direction only.</p> <p>Earth wire The wire in a mains cable used to connect the metal case of an appliance to earth.</p> <p>Efficiency Useful energy transferred by a device -o- total energy supplied to the device.</p> <p>Electrons Tiny, negatively charged particles that move around the nucleus of an atom.</p>	<ul style="list-style-type: none"> Isaac Physics P5 board P5 summative test



Fuse A fuse contains a thin wire that melts and cuts the current off if too much current passes through it.

Live wire The mains wire that has a voltage that alternates in voltage (between +325V and 325V in Europe).

National Grid The network of cables and transformers used to transfer electricity from power stations to consumers (i.e., homes, shops, offices, factories, etc.).

Neutral wire The wire of a mains circuit that is earthed at the local substation so its potential is close to zero.

Plug A plug has an insulated case and is used to connect the cable from an appliance to a socket.

Potential difference A measure of the work done or energy transferred to the lamp by each coulomb of charge that passes through it. The unit of potential difference is the volt (V).

Power The energy transformed or transferred per second. The unit of power is the watt (W).

Resistance Resistance (in ohms, Ω) = potential difference (in volts, V) / current (in amperes, A).

Step-down transformer An electrical device used to step down the size of an alternating potential difference.

Step-up transformer An electrical device used to step up the size of an alternating potential difference.

Three-pin plug A three-pin plug has a live pin, a neutral pin, and an earth pin.

Transformer An electrical device used to change an (alternating) voltage. See also Step-up transformer and Step-down transformer.

Useful energy Energy transferred to where it is wanted in the way that is wanted.

Wasted energy Energy that is not usefully transferred.

Work The energy transferred by a force.

Work done (joules, J) = force (newtons, N) x distance moved in the direction of the force (metres, m).



Intent – Concepts

Lesson title	Learning challenge	Higher level challenge	Suggested activities and resources
P5.1 Electrical Power	Can I calculate electrical power?	Can I explain why electricity is transferred at high voltage in the National Grid?	
P5.2 Mains Electricity	Can I state the differences between AC and DC electricity?	Can I explain the function of the earth wire in an electrical appliance?	
P5.3 Fuses	Can I recognise the function of the earth wire?	Can I explain the function of a fuse?	
P5.4 Electrical current and energy transfer	Can I understand the meaning of kWh?	Can I calculate kWh?	
Revision			
Summative test			