P4 Electricity in the home

| Lessons TBAT | Key Knowledge | Practical | Assessment |
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| Identify the similarities and differences between direct and alternating current<br><br>Explain how we access the amins supply safely<br><br>Calculate the amount of power transferred to a device. Part A | 6.2.3 Domestic uses and safety<br>6.2.3.1 Direct and alternating potential difference<br><br>Mains electricity is an ac supply. In the United Kingdom the domestic electricity supply has a frequency of 50 Hz and is about 230 V.<br><br>Students should be able to explain the difference between direct and alternating potential difference.<br><br>6.2.3.2 Mains electricity<br><br>Most electrical appliances are connected to the mains using three core cable.<br><br>The insulation covering each wire is colour coded for easy identification:<br>live wire – brown | Wiring a plug<br><br>Demo- national grid with transformers | End of topic test using past paper questions<br><br>Maths focus |

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| Calculate the amount of power transferred to a device. Part B<br><br>Describe how electricity it transferred from a power station to our homes | neutral wire – blue<br>earth wire – green and yellow stripes.<br><br>The live wire carries the alternating potential difference from the supply. The neutral wire completes the circuit. The earth wire is a safety wire to stop the appliance becoming live.<br><br>The potential difference between the live wire and earth (0 V) is about 230 V. The neutral wire is at, or close to, earth potential (0 V).<br><br>The earth wire is at 0 V, it only carries a current if there is a fault.<br>Students should be able to explain:<br>• that a live wire may be dangerous even when a switch in the mains circuit is open<br>• the dangers of providing any connection between the live wire and earth.<br><br>6.2.4 Energy transfers<br>6.2.4.1 Power<br><br>Students should be able to explain how the power transfer in any circuit device is related to the potential difference across it and the current through it, and to the energy changes over time:<br>power = potential difference × current<br>$P = V I$<br>power = current 2 × resistance<br>$P = I^2 R$<br>power, P, in watts, W<br>potential difference, V, in volts, V<br>current, I, in amperes, A (amp is acceptable for ampere) | Key stage 3 |

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| | resistance, R, in ohms, Ω<br><br>6.2.4.2 Energy transfers in everyday appliances<br><br>Everyday electrical appliances are designed to bring about energy Transfers.<br><br>The amount of energy an appliance transfers depends on how long the appliance is switched on for and the power of the appliance.<br><br>Students should be able to describe how different domestic appliances transfer energy from batteries or ac mains to the kinetic energy of electric motors or the energy of heating devices.<br><br>Work is done when charge flows in a circuit.<br><br>The amount of energy transferred by electrical work can be calculated using the equation:<br><br>energy transferred = power × time<br>E = P t<br>energy trans f erred = charge flow × potential difference<br>E = Q V<br>energy transferred, E, in joules, J<br>power, P, in watts, W<br>time, t, in seconds, s<br>charge flow, Q, in coulombs, C<br>potential difference, V, in volts, V<br><br>Students should be able to explain how the power of a circuit device is related to: | |

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| | • the potential difference across it and the current through it<br>• the energy transferred over a given time.<br>Students should be able to describe, with examples, the relationship between the power ratings for domestic electrical appliances and the changes in stored energy when they are in use.<br><br>6.2.4.3 The National Grid<br><br>The National Grid is a system of cables and transformers linking power stations to consumers.<br><br>Electrical power is transferred from power stations to consumers using the National Grid.<br><br>Step-up transformers are used to increase the potential difference from the power station to the transmission cables then step-down transformers are used to decrease, to a much lower value, the potential difference for domestic use.<br><br>Students should be able to explain why the National Grid system is an efficient way to transfer energy.<br><br>Higher tier only:<br>Students should be able to select and use the equation:<br>potential difference across primary coil x current in primary coil = potential difference across secondary coil x current in secondary Coil as given on the equation sheet. | |

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