

Unit P1 - Revision Lesson 5 Electricity				
Specification learning outcomes	HSW statements	Exemplar teaching activities	Main differentiation	Resource sheets
<p>5.1 Describe current as the rate of flow of charge and voltage as an electrical pressure giving a measure of the energy transferred.</p> <p>5.5 Discuss the advantages and disadvantages of methods of large-scale electricity production using a variety of renewable and non-renewable resources.</p> <p>5.7 Investigate factors affecting the generation of electric current by induction.</p> <p>5.6 Demonstrate an understanding of the factors that affect the size and direction of the induced current.</p> <p>5.8 Explain how to produce an electric current by the relative movement of a magnet and a coil of wire: a) on a small scale b) in the large-scale generation of electrical energy.</p> <p>5.9 Recall that generators supply current which alternates in direction.</p> <p>5.10 Explain the difference between direct and alternating current.</p> <p>5.11 Recall that a transformer can change the size of an alternating voltage.</p> <p>H 5.12 Use the turns ratio equation for transformers to predict either the missing voltage or the missing number of turns.</p> <p>5.13 Explain why electrical energy is transmitted at high voltages, as it improves the efficiency by reducing heat loss in transmission lines.</p> <p>5.14 Explain where and why step-up and step-down transformers are used in the transmission of electricity in the National Grid.</p>	<p>HSW 1, 5, 6, 7, 8, 9, 10, 12, 13</p>	<p><u>The theme for this lesson is electricity.</u></p> <p>Starter: <i>Which fuel would you use?</i> Tell students that a new power station is needed to make sure there is enough electricity for everyone in the country. Ask them which kind of power station they would choose to build and why. Follow this up by asking them to jot down a list of things they would need to find out before they could give a more considered answer.</p> <p>Main: <i>How much electricity do we get?</i> Worksheet P1.23c enables students to revise renewable resources. Question 2 on the worksheet could then be expanded to include non-renewable resources such as coal, oil, gas and nuclear. <i>Electricity from movement.</i> Worksheet P1.26b helps students to revise the generation of electricity on a small scale. Once the worksheet is completed students could be asked what would increase the size of the current produced in question 2. This could be linked to any practical work they have done in this area. Students could also be challenged to add direct current to the graph at the bottom of the worksheet and to explain how electricity generation works on a large scale. <i>Transmitting electricity.</i> Worksheet P1.27c enables students to revise transformers and the hazards of electricity. Once the worksheet is completed, students could be asked to look at question 2 again and suggest where in the National Grid these transformers might be situated. <i>Electricity and standby.</i> Worksheet P1.28d features a series of calculations that students should practice. This should be done as a class activity and it is sufficient to cover questions 1 to 3 only. Students should be reminded of the definition of power. <i>Investigating power consumption.</i> Students could be asked to plan a practical to investigate power consumption in a low voltage electrical item (or reminded of the practical investigation that they have already carried out.) Students should be encouraged to think about controlling variables or forming a hypothesis.</p> <p>Plenary: <i>Sentence starters.</i> Ask students to complete starter sentences using connecting words such as: 'and', 'because', 'but', 'however', 'so', 'such as', 'therefore', 'to', 'which'. They should be encouraged to complete each sentence in more than one way, using a different connecting word each time.</p> <p>Homework: Worksheet P1.30d provides questions about payback times.</p>	<p>Stretch: Students should revise the equations for transformers. This could be done using past paper question 6b from the Nov '11 Higher physics paper 5PH1H.</p> <p>More able students should be able to complete worksheet P1.28d by themselves and complete the extra challenge question.</p> <p>Support: Students may need to be reminded what a transformer does and that transformers can change the size of <i>alternating currents</i>.</p> <p>Worksheet P1.30b can be used instead of P1.30d for homework.</p>	<p>Worksheet P1.23c Worksheet P1.26b Worksheet P1.27c Worksheet P1.28d Worksheet P1.30b Worksheet P1.30d [Nov'11 Higher physics paper 5PH1H Question 6b]</p>

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5.15 Describe the hazards associated with electricity transmission.

5.2 Define power as the energy transferred per second and measured in watts.

5.3 Use the equation: electrical power (watt, W) = current (ampere, A) × potential difference (volt, V) $P = I \times V$.

5.16 Recall that energy from the mains supply is measured in kilowatt-hours.

5.17 Use the equation: cost = power (kilowatts, kW) × time (hour, h) × cost of 1 kilowatt-hour (p/kW h).

5.21 Use the equation: power (watt, W) = energy used (joule, J) / time taken (second, s) $P = E/t$.

5.4 *Investigate the power consumption of low-voltage electrical items.*

5.18 Demonstrate an understanding of the advantages of the use of low-energy appliances.

5.19 Use data to compare and contrast the advantages and disadvantages of energy-saving devices.

5.20 Use data to consider cost-efficiency by calculating payback times.