Mark scheme

Question			Answer/Indicative content	Marks	Guidance
1	a		For: Cheap(er) to run / saves energy / uses less power / more efficient / lasts longer / needs replacing less often ✓ Against: (More) expensive to buy / not dimmable / plastic is non-recyclable ✓	2 (2 × AO 3.2b)	**IGNORE** save money without qualification **IGNORE** colour (not in table) **IGNORE** expensive without qualification **IGNORE** environment without qualification **ALLOW** £5.00 as a reference to cost to buy **Examiner's Comments** Most candidates were able to gain at least 1 mark – often the 'for' mark. There were some vague answers: 'cheap' or 'expensive' without a reason did not score, whereas 'LEDs are cheap to run' (for example) did score. A number of candidates discussed the LEDs being bad for the environment – this was considered too vague. Higher-scoring candidates usually mentioned that the LEDs were bad for the environment because they were not recyclable.
	b	i	80 (days) ✓	1 (AO 3.1a)	**Examiner's Comments** Most candidates correctly read 80 days from the point where the two lines crossed.
		ii	**First check the answer on the answer line** **If answer = (£) 1 award 2 marks** Filament lamp cost = £7 **OR** LED cost = £6 ✓ (actual saving =) 7 - 6 = (£) 1(.00) ✓	2 (2 × AO 3.1a)	**Note** needs to be explicitly stated in text **ALLOW** 100 p **Examiner's Comments** The majority of candidates obtained a value of £1.00. High-scoring candidates tended to show their

					working, by writing down the total cost for the filament lamp and the total cost for the LED after 100 days from the graph before calculating the answer.
	c		13 ✓	1 (AO 2.2)	**Examiner's Comments** The majority of the candidates correctly determined 13 filament lamps. Lower-scoring candidates tended to find this question more challenging with various answers given. Little working was given.
			Total	**6**	
2			B	1 (AO 1.1)	**Examiner's Comments** A small majority of the candidates understood that the potential difference between the earth and the neutral wires is 0 V when the plug is operating normally. All the other responses were seen, with most incorrect answers being C. Many candidates perhaps understand that the potential of the earth is 0 V, but do not understand the potential difference between the wires.
			Total	**1**	
3			All three boxes ticked ✓	1 (AO1.2)	**Examiner's Comments** Only a significant minority suggested that all three wires should be connected to the electric plug.
			Total	**1**	
4			C ✓	1 (AO1.1)	**Examiner's Comments** There seemed to be some confusion between the frequency of mains ac and the potential difference of main ac.
			Total	**1**	
5			* **Level 3 (5–6 marks)** Detailed description of the changes using data for both coal and renewables **AND** a detailed explanation of why the changes occurred in terms of advantages of renewable resources and	6 (3 × AO3.1a) (3 × AO2.1)	**AO3.1a – Analyses information by interpreting the graph** • Use of coal has (generally) decreased. • Use of renewable has increased.

			disadvantages of coal. *There is a well-developed line of reasoning which is clear and logically structured. The information presented is relevant and substantiated*. **Level 2 (3–4 marks)** Description of the changes for both coal and renewables **AND** an explanation of the changes in terms of advantages of renewable resources and disadvantages of coal. **OR** Detailed description of the changes using data for both coal and renewables with basic explanation for coal and/or renewables. *There is a line of reasoning presented with some structure. The information presented is relevant and supported by some evidence*. **Level 1 (1–2 marks)** Simple relationship from the graph with basic explanation for coal and/or renewables. *There is an attempt at a logical structure with a line of reasoning. The information is in the most part relevant*. **0 marks** *No response or no response worthy of credit*.		• Coal decreased from 31% in 1990 to 5% in 2017. • Between 1999 and 2012 use of coal increased several times. • Renewables increased from 0.5% in 1990 to 11% in 2017. • Rate of increase of renewables is greater in more recent years. • Use of coal and renewables was the same in 2015–16 at 10%. **AO2.1a – Applies knowledge and understanding of renewable and non-renewable energy resources**. • Population has a greater awareness of environmental issues today. • UK government committed to 'greener' energy resources. • Coal is a non-renewable / finite energy resource. • Coal produces greenhouse gases / CO_2. • CO_2 contributes to global warming / climate change. • Coal produces other named pollutants e.g. SO_2 • Named renewable energy resources (solar / wind / biomass / tidal / wave) • More wind turbines / solar panels have been built • Cost of wind turbines / solar panels have reduced over time. • Renewable energy resources produce less greenhouse gases / less pollution / less CO_2. • Renewables energy resources are sustainable / have low fuel costs once set up. **<u>Examiner's Comments</u>** More successful responses quoted data from the graph and also

					suggested why coal had decreased and why renewable energy resources were increasing. Some candidates helpfully quoted different types of renewable energy resources. Less successful responses often just generalised the data on the graph such as coal has decreased without stating why. Exemplar 2  This candidate has carefully responded to the question set. Firstly, the candidate has described the changes in coal and renewable energy resources and importantly has quoted data read from the graph. The candidate has then attempted to suggest reasons for these changes in terms of carbon dioxide, global warming, air pollution which causes respiratory issues and sustainability. This means that the response is Level 3. On reading the response, the communication statement is met so 6 marks were given.
			Total	**6**	