WJEC Physics GCSE
Topic 1.4: Domestic electricity
Mark Schemes for Questions by topic

1.

Question				Marking details	Marks
3.	(a)			Units used = 1.5 ((1) for conversion) ×(8 × 14) **or** 112 (1) = [168] Cost = units used × cost per unit 2 520 = 168 **(ecf)** × cost per unit Cost per unit = $\frac{2520}{168}$ ((1) substitution and manipulation) = 15 [p] ((1) for answer) Answer of £15 p loses the answer mark N.B.1. Failure to convert 1 500 W to 1.5 kW loses conversion mark and gives an answer of 0.015 p – **Award 3 marks** N.B.2. Failure to convert £25.20 to 2 520 p gives an answer of 0.15 p - **Award 3 marks** N.B.3. Failure to include 8 or 14 loses 2nd mark only and gives an answer of 1.875 p (accept 1.88 or 1.9) and 1.071 p (accept 1.1) respectively. **Award up to the 3 other marks** N.B.4. Failure to include 1.5 gives an answer of 112 units and a cost of 22.5 p – **Award 3 marks** N.B.5. Failure to convert to 1.5 kW and failure to convert to 2 520 p gives an answer of 0.00015 p – **Award 2 marks**	4
	(b)			$E = P \times t$ = 1 500 × 14 × 8 **or** 168 000 (1) 60 × 60 **or** 3 600 (1) [= 604 800 000 J] N.B. Award **1 mark** only for: 28 800, 50 400, 403 200, 5.4×10^6, 43.2×10^6, 75.6×10^6, 5.4×10^3, 43.2×10^3, 75.6×10^3	2
				Question total	**[6]**

2.

Sub-section			Mark	Answer	Accept	Neutral answer	Do not accept
(a)			2	Time $= \frac{3\,900}{3}$ (1) $= 1\,300$ $\frac{1300}{52}$ **(ecf)** = 25 [hours](1) **Alternative solution:** Time = $= \frac{3\,900}{52}$ (1) $= 75$ $\frac{75}{3}$ **(ecf)** = 25 [hours](1)			
(b)	(i)		4	3 900 × 30 p (1) =117 000 p (1) conversion to [£]1170 (1) $\frac{7\,500}{1170}$ **(ecf)** = 6.41 [years] (1) Incorrect rounding loses answer mark. **Accept alternative routes**	If 16 p used, time = 12.02 [years] award 3 marks If 14 p used, time = 13.74 [years] award 3 marks		
	(ii)		2	Money saved <u>each year</u> would increase (1) reducing the pay-back time (1) **The 2nd mark can only be awarded if it is linked to the 1st mark.**			
(c)			2	Units saved = 3 900 × 25 = 97 500 (1) CO_2 saving = 97 500 **(ecf)** × 0.5 = 48 750 [kg] (1)			25 × 0.5
Total Mark			10				

3.

Question number	Answer	Notes	Marks
7 (a) (i)	can all be switched separately ; others stay alight when 1 bulb blows/eq;		2
(ii)	One of - to prevent overheating in the circuit / appliance/ wiring/ lamps; to switch off the circuit; to prevent current exceeding a certain value;	IGNORE live wire/plug	1
(iii)	(if or when) current exceeds stated value/current too high; the fuse (over heats and) melts; this breaks the circuit/stops the current/ turns the circuit off;	allow "fuse blows" ignore burns ignore 'stops the electricity'	3

Question number	Answer	Notes	Marks
7 (b) (i)	P= I x V ;	Allow • rearrangements • standard abbreviations • equation in words	1
(ii)	rearrangement; sub into equation; evaluation; e.g. I= P/V =250 /230 =1.1 (A)	rearrange and sub in either order allow a power of ten (POT) error for -1 1.09 (A)	3
(iii)	value 3 (A); fuse (value should only be) a little bigger than the current;	Allow ecf from bii	2
(iv)	In ANY order Any two from:- MP1. circuit breakers are resettable/eq; MP2. circuit breakers work instantly/ fuses do not work instantly; MP3. doesn't require earth wire; MP4. Circuit breakers are more sensitive;		2
(c)	D		1

3.

A
D
A
D
C