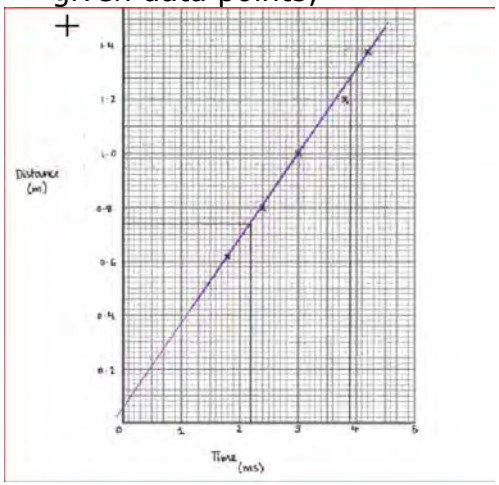
Question number	Answer	Notes	Marks
1 a	A (Joule);		1
b	The cell converts **Chemica**l energy into **Electrica**l energy;; The lamp converts this energy into **Light** and **Thermal** energy (BOTH needed);	 either order for the second sentence	2 1
c (i)	14(J);		1
(ii)	Efficiency = (<u>useful) energy output</u> ; (total) energy input	allow • x 100(%)	1
(iii)	Substitution; Evaluation; e.g. (efficiency =) $\frac{36}{50}$ (=) 0.72	do not allow • inverted substitution e.g. 50/36 =1.39 Allow • 72% • correct answer without working (bald answer) for both marks	2

(Total for Question 1 = 8 marks)

Question number	Answer	Notes	Marks
3 (a)	B;		1
(b) (i)	MP1. Axes labelled with units; MP2. Correct scales (to occupy at least ¼ of the area of the graph and in sensible intervals); MP3. Plotting; MP4. Plotting; MP5. straight line of best fit which extends beyond given data points;  Distance (m) Time (ms) **Distance in m / Time in ms** 0.62 / 1.8 0.80 / 2.4 1.00 / 3.0 1.20 / 3.8 1.38 / 4.2	• ignore orientation of graph • scale intervals on axes should be 2 or 5 or 10 • points should be less than 0.5 sq in diameter • -1 each incorrect plot to max of -2 • tolerance = +/- ½ square • if zero is not included, then line should go through all points except 3rd or 4th • if zero included, look for balance of points	5

(b)	any two from:- MP1 Steel is magnetically hard material/eq ; MP2 Steel **becomes** (permanently) magnetised; MP3 Steel **remains** magnetised (when current switched off) /paper clips **remain attracted** to steel;	NB do not credit repeat of stem (*remain attached* is in the stem)	2

(Total for Question 4= 6 marks)

Question number	Answer	Notes	Marks
5 (a) i	Step down (transformer);		1
ii	$(V_P/V_S) = (N_P/N_S)$; $\frac{\text{input (primary) voltage}}{\text{output (secondary) voltage}} = \frac{\text{primary turns}}{\text{secondary turns}}$ $\frac{V_P}{V_S} = \frac{n_P}{n_S}$	Allow • equation in words • standard abbreviations :- s, p, in, out, 1, 2 • N, n or T for number of turns • Rearrangements e.g. $(V_S/V_P) = (N_S/N_P)$ $V_S = (V_P)(N_S/N_P)$ $V_P = (V_S)(N_P/N_S)$	1
iii	Substitution; (rearrangement and) evaluation; e.g. $\frac{230}{25} = \frac{\text{primary turns}}{100}$ 920 (Turns)	Do not credit the equation in words or symbols bald answer gains full marks	2