

Q1.

Question number	Answer	Additional guidance	Mark
	substitution (1) 0.15 x 40 evaluation (1) 6(.0) (V)	award full marks for correct answer without working	(2) A02

Q2.

	Answer	Acceptable answers	Mark
	substitution (1) 10/0.44 or 250/11 evaluation (1) 23 (ohms)	give full marks for correct answer, no working 22.7(ohms),22.73 (ohms), 22.72(ohms) Ignore excessive decimal places.	(2)

Q3.

Question number	Answer	Additional guidance	Mark
(i)	Substitution and evaluation (1) 15 (Ω)		(1) A02

Q4.

Question number	Answer	Additional guidance	Mark
	substitution (1) $1.56 = 0.45 \times R$ rearrangement and evaluation (1) $(R =) 3.5$ (ohms)	alternative method rearrangement (1) $(R =) \frac{V}{I}$ or $(R =) \frac{1.56}{0.45}$ (substitution and) evaluation (1) $(R =) 3.5$ (ohms) allow values that round to 3.5 e.g. 3.46(666) 3.47 etc award full marks for the correct answer without working	(2) AO2

Q5.

	Answer	Acceptable answers	Mark
(i)	 connected in parallel with lamp (1)	recognisable symbol such as a box with letter V inside or box with the word voltmeter inside it accept voltmeter across both lamp and ammeter	(1)
(ii)	Substitution $R = 6.0 / 0.26$ (1) Evaluation $= 23$ (1)	An answer which rounds to 23 Give full marks for correct answer no working	(2)

Q6.

Question Number	Answer	Acceptable answers	Mark
(a)(i)	C electrons (1)		(1)

Question Number	Answer	Acceptable answers	Mark
(a)(ii)	<p>current (1)</p> <p>potential difference/voltage (1)</p> <p>Note: award one mark if these answers are in the wrong order</p>	<p>amps / A /mA/ amperage/ampage accept rate of flow of charge but, charge flowing is insufficient ignore electricity ie rate of flow of electricity does not score</p> <p>pd / p.d./ volts / V/ mV / kV etc can accept e.m.f / emf just potential is insufficient</p> <p>accept numerical responses with correct unit</p> <p>award one mark for: meter 1 = ammeter NOT ammeter AND meter 2 = voltmeter NOT voltmeter</p>	(2)

Question Number	Answer	Acceptable answers	Mark
(c)	<p>p.d. for current of 0.3 A = 3.0 (V) (1)</p> <p>substitution $3.0 \div 0.3$ (1)</p> <p>evaluation 10 (Ω) (1)</p> <p>Ignore any unit given by the candidate</p>	<p>3 (V) seen in any calculation is enough for a mark check graph if no other mark</p> <p>$3 \div 0.3$ gains two marks</p> <p>$0.3 \div 3 (= 0.1)$ gains 1 mark (for 3 V) or bald 0.1 scores 1 mark (for 3V)</p> <p>Allow clear ecf from incorrect reading from graph for maximum 2 marks ie their reading $\div 0.3$ but $0.3 \div 0.3$ does NOT score unless 0.3 written on graph</p> <p>Give full marks for correct answer, no working DO NOT award any marks for POT error where there is no working.</p>	(3)

(Total for Question =8 marks)

Q7.

Question number	Answer	Additional guidance	Mark
(i)	<p>A description including</p> <p>as the potential difference (voltage) increases so does the current (1)</p> <p>idea of gradient of graph decreasing as V increases (1)</p>	<p>positive correlation</p> <p>at a decreasing rate</p> <p>non-linear</p> <p>not directly proportional</p>	(2) A03

Question number	Answer	Additional guidance	Mark									
(ii)	<p>Award one mark for each row of the table</p> <table border="1" style="margin-left: 20px;"> <thead> <tr> <th></th> <th>voltage V</th> <th>current in mA</th> </tr> </thead> <tbody> <tr> <td>point P</td> <td>1(.00)</td> <td>20</td> </tr> <tr> <td>point Q</td> <td>3.4 ±0.1</td> <td>43 ±1</td> </tr> </tbody> </table>		voltage V	current in mA	point P	1(.00)	20	point Q	3.4 ±0.1	43 ±1	<p>ignore any units added in the boxes</p>	(2) A02
	voltage V	current in mA										
point P	1(.00)	20										
point Q	3.4 ±0.1	43 ±1										

Question number	Answer	Additional guidance	Mark
(iii)	substitution (1) $(R=) \frac{4.5}{51(\times 10^{-3})}$ evaluation (1) 88.(2) (Ω)	0.088(2) or 8.8(2) or 0.88(2) or 0.09 seen scores 1 mark 0.088(2) k Ω or 0.09 k Ω scores 2 marks award full marks for correct answer without working	(2) AO2

Q8.

Question number	Answer	Additional guidance	Mark
(iii)	substitution into $V = IR$ (1) $4.2 = 0.19 \times R$ rearrangement (1) $\frac{4.2}{0.19}$ evaluation (1) $22 (\Omega)$	award full marks for correct answer without working $22.1(\Omega)$	(3)

Q9.

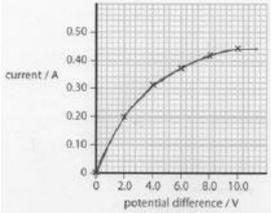
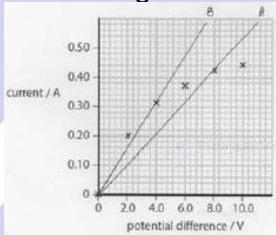
	Answer	Acceptable answers	Mark
(a)(i)	Correctly plotted point (1)	+/- ½ a small square	(1)
(a)(ii)	Smooth line through most (at least 5) crosses / points (1)	Do not accept clearly dot-to-dot or excessive tramlining Ignore any part of line after 45	(1)
(a) (iii)	Substitution: (1) $12 = 0.047 \times R$ Transposition: (1) $R = 12/0.047$ Evaluation: (1) $R = 260$	transposition and substitution in either order substitution mark can be scored when incorrectly transposed word/symbol equation is given 255.3, 255 give full marks for correct answer no working power of 10 errors with no working score max 1 mark	(3)

Q10.

Question Number	Answer	Acceptable answers	Mark
(i)	(correct) voltmeter symbol seen anywhere (1) voltmeter symbol connected in parallel / across heater (1)	accept symbols that are attempts at circles. accept line through symbol accept for second mark: any symbol or diagram of meter or box provided it is just from one side of the heater to the other	(2)

Question Number	Answer	Acceptable answers	Mark
(ii)	Substitution (into $V = I \times R$) $V = 0.56 \times 15$ (1) Evaluation = 8.4 (V) (1)	Allow full marks for correct answer with no working shown accept any power of 10 error for 1 mark e.g. 84 (V) or 0.84 (V) scores 1 mark accept rounding to 8 (V) for both marks	(2)

Q11.

	Answer	Acceptable answers	Mark
(b)(i)	both points correct (1)	allow + / - half square	(1)
(b)(ii)	curve of best fit judged by eye (1) 	Must pass through zero and two other points. 5 th point can be either (8.0,0.42) or (8.0, 0.44) straight line of best fit through origin tolerance between lines A and B shown on the diagram 	(1)
(c)	substitution (1) 10/0.44 or 250/11 evaluation (1) 23 (ohms)	give full marks for correct answer, no working 22.7(ohms),22.73(ohms), 22.72(ohms) Ignore excessive decimal places.	(2)
(d)(i)	an explanation linking two of the following points <ul style="list-style-type: none"> • electric(al)(energy) (1) • (is converted) to heat / thermal (energy) (1) • (is converted) to light (1) 	electricity	(2)

Total marks for question =10

Q12.

	Answer	Acceptable answers	Mark
(i)	Correctly plotted point (1)	+/- ½ a small square	(1)
(ii)	Smooth line through most (at least 5) crosses / points (1)	Do not accept clearly dot-to-dot or excessive tramlining Ignore any part of line after 45	(1)
(iii)	Substitution: (1) $12 = 0.047 \times R$ Transposition: (1) $R = 12/0.047$ Evaluation: (1) $R = 260$	transposition and substitution in either order substitution mark can be scored when incorrectly transposed word/symbol equation is given 255.3, 255 give full marks for correct answer no working power of 10 errors with no working score max 1 mark	(3)