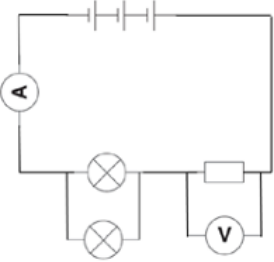
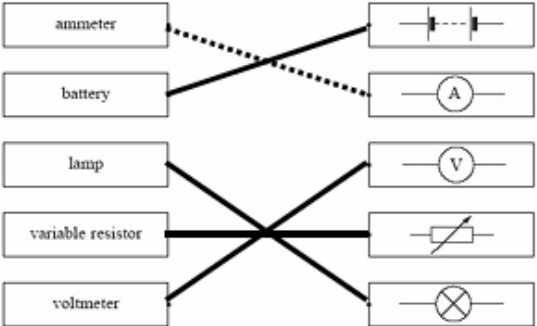


Marking Scheme

1	(i)	<table border="1"> <tr> <td>S₁ position</td> <td>S₂ position</td> <td>lamp is lit</td> </tr> <tr> <td>W</td> <td>X</td> <td>(yes)✓</td> </tr> <tr> <td>W</td> <td>Y</td> <td>(no) x</td> </tr> <tr> <td>Z</td> <td>X</td> <td>(no) x</td> </tr> <tr> <td>Z</td> <td>Y</td> <td>(yes)✓</td> </tr> </table> <p>any three correct; all 4 correct;;</p>	S ₁ position	S ₂ position	lamp is lit	W	X	(yes)✓	W	Y	(no) x	Z	X	(no) x	Z	Y	(yes)✓	<p>allow 1 mark when middle two rows blank, but otherwise correct</p> <p>allow 1 mark when top and bottom rows blank but otherwise correct</p>	2
	S ₁ position	S ₂ position	lamp is lit																
W	X	(yes)✓																	
W	Y	(no) x																	
Z	X	(no) x																	
Z	Y	(yes)✓																	
	(ii)	<p>any sensible suggestion of 2 way switching; e.g. on a corridor on stairs basement/cellar bedroom/kitchen light room with 2 doorways</p>	<p>allow clear description of 2 switches controlling the same light</p>	1															

Question number	Answer	Notes	Marks
2 (a)	<p>mark each of these independently:</p> <p>MP1. a resistor in series with the lamp only;</p> <p>MP2. a second lamp in parallel with the first lamp;</p> <p>MP3. a voltmeter that measures the voltage across the resistor;</p> <p>MP4. an ammeter that measures the total current in the circuit;</p>	<p>circuit symbols used must be correct (no square voltmeter/ammeter etc.)</p> 	4
(b) (i)	<p>labels on axes including units;</p> <p>scales on axes;</p> <p>plotting;;</p>	<p>axes can be either way round</p> <p>must occupy >50% in each direction</p> <p>-1 for each error</p>	4
(ii)	<p>I = 0.4, V = 4.5 clearly indicated;</p>		1

(iii)	<p>Suitable line of best fit;</p> <p>Current (A)</p> <p>Voltage (V)</p>	<table border="1"> <thead> <tr> <th>Voltage in V</th> <th>Current in A</th> </tr> </thead> <tbody> <tr> <td>1.0</td> <td>0.10</td> </tr> <tr> <td>2.5</td> <td>0.25</td> </tr> <tr> <td>3.0</td> <td>0.30</td> </tr> <tr> <td>4.5</td> <td>0.40</td> </tr> <tr> <td>5.0</td> <td>0.50</td> </tr> <tr> <td>6.0</td> <td>0.60</td> </tr> </tbody> </table>	Voltage in V	Current in A	1.0	0.10	2.5	0.25	3.0	0.30	4.5	0.40	5.0	0.50	6.0	0.60	1
Voltage in V	Current in A																
1.0	0.10																
2.5	0.25																
3.0	0.30																
4.5	0.40																
5.0	0.50																
6.0	0.60																
(iv)	voltage = current x resistance;	in words or standard symbols	1														
(v)	substitution into correct equation using any suitable pair of values taken from the graph line or table; evaluation of $R = 10 \text{ } (\Omega)$;	allow (0.1,1), (0.6,6) etc	2														

Question number	Answer	Notes	Marks
3 (a)	 <p data-bbox="431 680 639 743">all 4 lines;;; 2 any 2 lines;;; 1</p>	(dotted line is given)	2
(b) (i)	light dependent resistor / LDR;	allow <ul style="list-style-type: none"> • photo sensitive resistor • light sensitive resistor allow recognisable spellings	1
(ii)	thermistor;	allow recognisable spellings total marks = 5	1