<table>
<tr><th>Question number</th><th>Answer</th><th>Notes</th><th>Marks</th></tr>
<tr><td>2 (a)</td><td>
<table>
<tr><th>thermometer</th><th>part of spectrum</th></tr>
<tr><td>P</td><td>infrared;</td></tr>
<tr><td>Q</td><td>red</td></tr>
<tr><td>R</td><td>green / yellow;</td></tr>
<tr><td>S</td><td>violet</td></tr>
<tr><td>T</td><td>ultraviolet;</td></tr>
</table>
</td><td>allow all valid colours/ visible</td><td>3</td></tr>
<tr><td>(b)</td><td>any reference to absorption;

black is the better/best/good absorber;</td><td>allow reference to reflection
allow reference to ‘poor reflector’</td><td>2</td></tr>
<tr><td>(c)</td><td>infrared/IR;</td><td></td><td>1</td></tr>
</table>

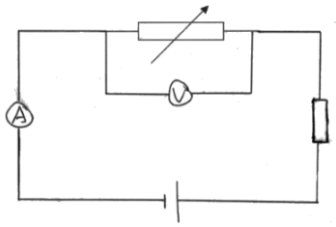
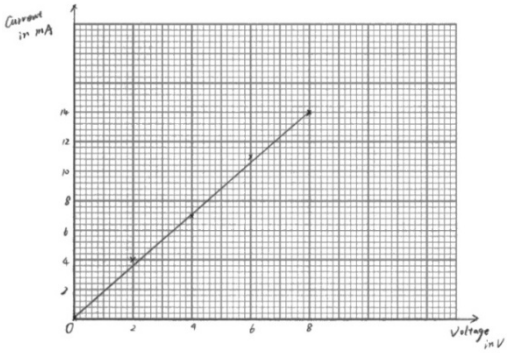
(Total for Question 2 = 6 marks)

Question number	Answer	Notes	Marks
5 (a)	any attempt at finding the area/ "area = distance" stated; area of triangle = ½ x 4.3 x 0.2 (= 0.43 m); area of rectangle = 4.3 x 0.2 (= 0.86 m); distance = 1.29 (m) ;	 accept area of trapezium = ½ x 4.3 x (0.2 + 0.4) for MP2 and MP3. count squares; area of 1 square = 0.001 (m); distance = 1.29 (m)	4

(b) (i)	idea that acceleration = gradient;
	gradient = (-)4.3 / 0.05;
	acceleration = (-) 86 (m/s^2);
		
		-1 for POT error
			3

(ii)	(resultant) force = mass x acceleration / F = ma		1
(iii)	substitution; evaluation; eg F = 0.13 x 86 F = 11 (N)	 allow ECF from (i) ignore sign 11.18, 11.2	2
(c)	increases time of collision; any reference to shallower gradient on graph; so acceleration will be smaller (in magnitude);		3

(Total for Question 5 = 13 marks)

Question number	Answer	Notes	Marks
12 (a) (i)	correct symbol for resistor; correct symbol for cell; correct symbol for ammeter; circuit is complete series circuit;  	reject extra components allow ECF for missing/incorrect symbols	4
(ii)	voltmeter symbol is correct and in parallel with any component; voltmeter is in parallel with variable resistor;		2
(b)	any FOUR from: stretchy resistor increases in resistance (when mass increased); total resistance increases; I = V/R; current in circuit less; voltage across fixed resistor decreases; so voltage across stretchy resistor increases; as total voltage is constant/voltage of cell constant;	reject V=IR or I=V/R with assumption of constant current	4
(c) (i)	voltage;	allow 'V'	1
(ii)	suitable linear scale chosen (>50% of grid used); axes labelled with quantities and unit; all plotting correct to nearest half square;  	ignore orientation	3
(iii)	correct best fit line judged by eye;		1

(Total for Question 12 = 15 marks)