

Question number	Answer	Notes	Marks
2 (a) (i)	C;  A is incorrect because it is a thermistor B is incorrect because it is a fixed resistor D is incorrect because it is a variable resistor		1
(ii)	B;  A is incorrect because it is a thermistor C is incorrect because it is a LDR D is incorrect because it is a variable resistor		1
(b) (i)	power = current $\times$ voltage;	allow rearrangements and standard symbols e.g. $P = I \times V$	1
(ii)	substitution OR rearrangement; evaluation to 2 or more s.f.;  e.g. $2200 = \text{current} \times 230$ OR $\text{current} = \text{power}/\text{voltage}$ (current =) 9.6 (A)	9.565... OR 9.57 condone rounding to 9.5 or 9.56	2
(iii)	D (13 A);  A is incorrect because this fuse would blow in normal operation B is incorrect because this fuse would blow in normal operation C is incorrect because this fuse would blow in normal operation		1
(iv)	any two from: fuse (wire) melts / eq.;  circuit is broken;  preventing heater from overheating;	condone 'fuse blows'  allow current is cut off / eq.	2

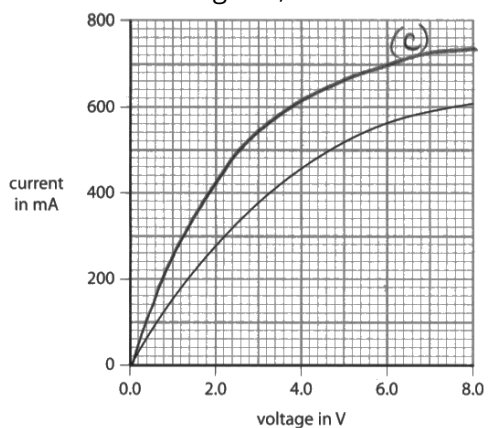
**Total for question 2 = 8 marks**

Question number	Answer	Notes	Marks
4 (a)	(i) pressure = force ÷ area;	allow rearrangements and standard symbols e.g. $p = F \div A$	1
	(ii) calculation of total weight; substitution and rearrangement; evaluation;  e.g. $0.432 (= 0.072 \times 6)$ (area =) $0.432 / 820$ (area =) $0.00053 \text{ (m}^2\text{)}$	          $(0.072 \times 6) / 820$ $0.00052683 \text{ (m}^2\text{)}$ $5.2683 \times 10^{-4} \text{ (m}^2\text{)}$ allow $0.0005 \text{ (m}^2\text{)}$ $0.0000878 \text{ (m}^2\text{)}$ gains 2 marks POT error loses a mark	3
(b)	(i) pressure decreases;  (because) area (in contact with table) increases / weight (over the same area) decreases;	accept quantitative method	2
	(ii) density remains constant; (because) mass of squares AND volume of squares is the same;	density not affected allow because the material is the same	2

**Total for question 4 = 8 marks**

Question number	Answer	Notes	Marks
8 (a)	(i) (unbalanced) force = mass $\times$ acceleration;	allow rearrangements and standard symbols e.g. $F = m \times a$	1
	(ii) substitution OR rearrangement; evaluation;  e.g. $49 = 45 \times a$ OR $a = F / m$ (a =) 1.1 (m/s <sup>2</sup> )	allow 1.088... (m/s <sup>2</sup> ) reject 1.08 (m/s <sup>2</sup> )	2
	(iii) any suitable suggestion; e.g. friction between snow / ground and sledge  ground is not level towing rope / direction at an angle to the ground / direction of movement	allow air resistance, drag	1
(b)	(i) acceleration = <u>change</u> in velocity $\div$ time (taken);	allow rearrangements and standard symbols e.g. $a = \Delta v \div t$ $a = v - u \div t$	1
	(ii) substitution AND rearrangement; evaluation to at least 2s.f.;  e.g. $v = 1.3 \times 2.4 (+ 0)$ (v =) 3.1 (m/s)	$v = a \times t$  allow 3.12 (m/s)	2
(c)	(i) <u>area</u> under the line / graph;		1
	(ii) any three from: MP1. (constant) acceleration between 0 and A; MP2. constant velocity between A and B; MP3. constant deceleration / negative acceleration between B and C; MP4. deceleration is less than acceleration;	allow no acceleration	3

Total for question 8 = 11 marks

Question number	Answer	Notes	Marks
12 (a)	<p>series circuit containing lamp and some form of power supply; ammeter in series with lamp;</p> <p>voltmeter in parallel with lamp;</p> <p>some method of varying the voltage across the lamp;</p>	<p>allow any recognisable symbol</p> <p>allow any recognisable symbol</p> <p>e.g. variable power supply, variable resistor in series, potentiometer circuit etc.</p>	4
(b) (i)	<p>one correctly read pair of values from the graph; one correct value for resistance calculated; second correct value for resistance calculated;</p> <p>resistance increases (as voltage increases);</p>	penalise failure to convert mA to A once only	4
(ii)	<p>increasing voltage increases the current; (causing) greater (rate of) electron collisions; (causing) increase in temperature;</p>		3
(c)	<p>similar shape curve drawn so that all parts are above the existing line;</p> 		1

Total for question 12 = 12 marks