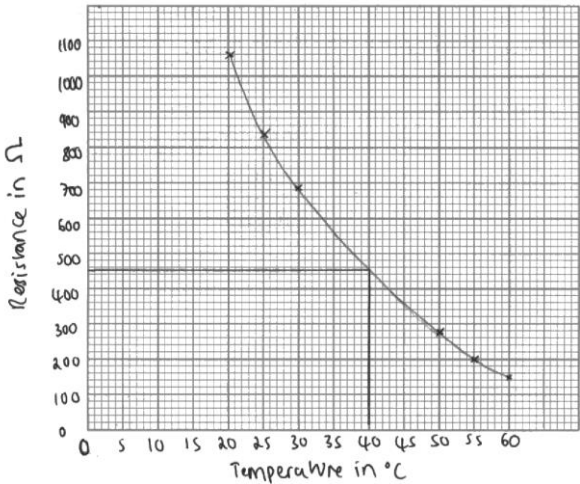


Question number	Answer	Notes	Marks
4	<p>MP1. find volume (of bolt);</p> <p>MP2. using displacement method;</p> <p>MP3. further detail of displacement method;</p> <p>MP4. correct use of density equation to find mass;</p> <p>MP5. further example of good practical technique;</p>	<p>MP2 MP3 MP5 can be awarded if seen on diagram</p> <p>e.g.</p> <ul style="list-style-type: none"> • ensure bolt is fully submerged • measure volume of water before and after then find difference • (if using Archimedes can) ensure all displaced water is collected <p>allow use of standard symbols</p> <p>e.g.</p> <ul style="list-style-type: none"> • take repeats and average • use of appropriately sized measuring cylinder • make sure no water splashes out • read volume of water from bottom of meniscus • read at eye level to reduce parallax error 	5

Total for question 4 = 5 marks

Question number	Answer	Notes	Marks														
14 a	C;		1														
b (i)	(independent) temperature; (dependent) resistance;	must be this way round	2														
(ii)	label on both axes with units; scale on both axes; plotting;; 	ignore orientation sensible linear scale using $\geq 50\%$ of the grid tolerance is ± 0.5 square -1 for each error <table data-bbox="1021 560 1300 792"><thead><tr><th>Temperature in °C</th><th>Resistance in Ω</th></tr></thead><tbody><tr><td>60</td><td>150</td></tr><tr><td>55</td><td>200</td></tr><tr><td>50</td><td>280</td></tr><tr><td>30</td><td>690</td></tr><tr><td>25</td><td>840</td></tr><tr><td>20</td><td>1060</td></tr></tbody></table>	Temperature in °C	Resistance in Ω	60	150	55	200	50	280	30	690	25	840	20	1060	4
Temperature in °C	Resistance in Ω																
60	150																
55	200																
50	280																
30	690																
25	840																
20	1060																
(iii)	suitable curve passing no more than 1 square from any point;		1														
(iv)	value in the range 420 - 480 (Ω)	allow ecf from line drawn in (iii) $\pm 1/2$ sq	1														
(v)	any three from: MP1. idea of thermometer reading being the actual temperature of the thermistor; MP2. measure a greater range of temperatures; MP3. take readings to fill in the gap in the temperature range; MP4. idea of measuring temperature/resistance to greater precision; MP5. take repeats AND average;	e.g. <ul style="list-style-type: none">position thermometer closer to the thermistorposition thermometer at the same height as the thermistorplacing thermistor at the bottom (of the beaker)stirring the water allow 'measure for higher temperatures' etc. allow 'measure more temperatures' in the absence of MP2 and MP3 allow use a temperature sensor and data logger more sensitive / digital thermometer	3														

c	(i)	voltage = current x resistance;	allow rearrangements and standard symbols e.g. $V = I \times R$ reject c/C for current allow ecf from (i)	1
	(ii)	substitution AND rearrangement; evaluation to 2 or more significant figures; e.g. (current =) $6.10 / 1060$ (current =) 0.00575 (A)	allow 5.75 mA 0.0058 (A)	2
	(iii)	resistance decreases; voltage stays the same; ($I=V/R$ therefore) current increases;		3

Total for question 14 = 18 marks