

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(i)</b>	solid  liquid	in either order  plasma as an alternative to either.	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(a)(ii)</b>	<b>C</b> temperature of the gas measured in Kelvin		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(i)</b>	an explanation <b>linking</b> two of the following three points:-  particles move (1)  bombarding/colliding (1)  with wall/side (1) (only give if one of the previous marks is there) (of container)	molecules/they move  hit ignore 'pushing'  e.g. molecules push on walls = 0 bounce off inside of container =2	<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>1(b)(ii)</b>	substitution $P_2 = \frac{101\,000 \times 340}{2.5}$ (1) Evaluation 13.7 to any power of 10 (1) 13 700 000(Pa), 13 700kPa (1)	1.37(36) X 10 <sup>7</sup> / 13736000 14 to any power of 10 14 000 000 (Pa), 14 000 (kPa)  Full marks are awarded for the correct answer with no working	<b>(3)</b>

Total for Question 2 = 8 marks

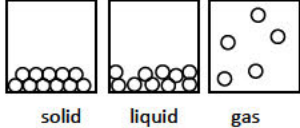
Question Number	Answer	Acceptable answers	Mark
<b>2 (a)(i)</b>	volume in range 9.0 – 10.5 (cm <sup>3</sup> ) (1) pressure in range 1.5 – 1.7 (kPa) (1)		<b>(2)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2 (a)(ii)</b>	<input checked="" type="checkbox"/> <b>D</b> 296 K		<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2 (a)(iii)</b>	Volume in range 4 – 8 (cm <sup>3</sup> )	Any value between 4 (cm <sup>3</sup> ) and 8 (cm <sup>3</sup> )	<b>(1)</b>

Question Number	Answer	Acceptable answers	Mark
<b>2 (a)(iv)</b>	Substitution (1) 2.2 x 10.8 ÷ 0.2  Evaluation (1) 119 (cm <sup>3</sup> )	118.8 (cm <sup>3</sup> )  give full marks for the correct answer, no working	<b>(2)</b>

Question Number	Indicative Content	Mark
<b>QWC</b>	<p data-bbox="253 298 396 339">* )</p> <p data-bbox="412 298 1370 339">An explanation including some of the following points:</p> <p data-bbox="412 380 639 410">particles in gas</p> <ul data-bbox="461 416 992 588" style="list-style-type: none"> <li>• move rapidly</li> <li>• throughout container</li> <li>• collide with each other</li> <li>• collide with walls/lid of container</li> <li>• exerting a force</li> </ul> <p data-bbox="412 629 651 660">particles in solid</p> <ul data-bbox="461 666 760 768" style="list-style-type: none"> <li>• in fixed positions</li> <li>• vibrate</li> <li>• do not reach lid</li> </ul>	<b>(6)</b>
<b>Level 1</b>	<b>0</b>	No rewardable content
<b>1</b>	<b>1 - 2</b>	<ul data-bbox="461 885 1482 1091" style="list-style-type: none"> <li>• a limited explanation e.g. particles in the copper do not touch the lid / particles in the oxygen do touch the lid</li> <li>• the answer communicates ideas using simple language and uses limited scientific terminology</li> <li>• spelling, punctuation and grammar are used with limited accuracy</li> </ul>
<b>2</b>	<b>3 - 4</b>	<ul data-bbox="461 1101 1482 1275" style="list-style-type: none"> <li>• a simple explanation e.g. particles in a gas can move freely and collide with the lid</li> <li>• the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately</li> <li>• spelling, punctuation and grammar are used with some accuracy</li> </ul>
<b>3</b>	<b>5 - 6</b>	<ul data-bbox="461 1285 1482 1485" style="list-style-type: none"> <li>• a detailed explanation e.g. particles in a gas can move freely and collide with the lid but particles in a solid vibrate about fixed positions so cannot reach the lid</li> <li>• the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately</li> <li>• spelling, punctuation and grammar are used with few errors</li> </ul>

Question number	Answer	Additional guidance	Mark
3(a)(i)	<p>In the solid box: regular arrangement and particles touching (1)</p> <p>In the liquid box: irregular arrangement and most particles touching (1)</p> <p>In the gas box: random and spaced (compared to liquid) (1)</p>	<p>ignore variation in particle size</p> <p>ignore arrows/lines indicating movement</p> <p>allow solid and liquid arrangements that do not fill the box</p>  <p style="text-align: center;">solid      liquid      gas</p>	<b>(3)</b>

Question number	Answer	Mark
3(a)(ii)	C	<b>(1)</b>

Question number	Answer	Additional guidance	Mark
3(b)(i)	<p>substitution (1) <math>100 \div 13</math></p> <p>answer (1) <math>7.7 \text{ (g/cm}^3\text{)}</math></p>	<p>award full marks for correct numerical answer without working</p> <p>allow <math>7.692 \text{ (g/cm}^3\text{)}</math></p>	<b>(2)</b>

Question number	Answer	Additional guidance	Mark
3(b)(ii)	<p>An answer that provides a description by making reference to:</p> <ul style="list-style-type: none"> <li>• part fill a measuring cylinder with water and record the starting volume (1)</li> <li>• completely immerse the stone in the water and record the final volume of water and stone (1)</li> <li>• volume of stone = final volume – initial volume (1)</li> </ul>	<p>accept valid alternative methods, e.g.</p> <p>fill a displacement can until some water overflows/flows out of spout</p> <p>completely immerse the stone in the displacement can and collect the displaced water in a measuring cylinder</p> <p>volume of water displaced = volume of stone</p>	<b>(3)</b>



Question number	Answer	Mark
4(a)(i)	pressure = force ÷ area	(1)

Question number	Answer	Additional guidance	Mark
4(a)(ii)	rearrangement (1) $(F =) P \times A$  calculation of area (1) $2.4 \times 1.5 = 3.6$  substitution (1) $(F =) 12\,000 \times 3.6$  answer (1) 43 200 (N)	award full marks for correct numerical answer without working  maximum 3 marks if kPa not converted to Pa	(4)

Question number	Answer	Mark
4(a)(iii)	B	(1)

Question number	Answer	Mark
4(b)	An answer that combines the following points to provide a plan: <ul style="list-style-type: none"> <li>• put weights on the plunger to increase the pressure of the trapped air (1)</li> <li>• use scale on syringe to measure the volume of trapped air (1)</li> <li>• calculate the pressure from <math>P = \text{weight added}/\text{area of plunger}</math> (1)</li> <li>• compare the increase in pressure to the volume of trapped air (1)</li> </ul>	(4)