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

Question Number	Answer	Acceptable answers	Mark
1(a)(ii)	**C** temperature of the gas measured in Kelvin		**(1)**

Question Number	Answer	Acceptable answers	Mark
1(b)(i)	an explanation **linking** 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	**(2)**

Question Number	Answer	Acceptable answers	Mark
1(b)(ii)	 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 10^7/ 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	**(3)**

Total for Question 2 = 8 marks

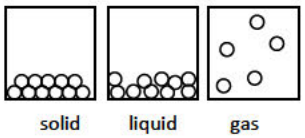
Question Number	Answer	Acceptable answers	Mark
2 (a)(i)	volume in range 9.0 – 10.5 (cm^3) (1) pressure in range 1.5 – 1.7 (kPa) (1)		**(2)**

Question Number	Answer	Acceptable answers	Mark
2 (a)(ii)	☒ **D** 296 K		**(1)**

Question Number	Answer	Acceptable answers	Mark
2 (a)(iii)	Volume in range 4 – 8 (cm^3)	Any value between 4 (cm^3) and 8 (cm^3)	**(1)**

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

Question Number		Indicative Content	Mark
QWC	*)	An explanation including some of the following points: particles in gas • move rapidly • throughout container • collide with each other • collide with walls/lid of container • exerting a force particles in solid • in fixed positions • vibrate • do not reach lid	**(6)**
Level	**0**	No rewardable content	
1	**1 - 2**	• a limited explanation e.g. particles in the copper do not touch the lid / particles in the oxygen do touch the lid • the answer communicates ideas using simple language and uses limited scientific terminology • spelling, punctuation and grammar are used with limited accuracy	
2	**3 - 4**	• a simple explanation e.g. particles in a gas can move freely and collide with the lid • the answer communicates ideas showing some evidence of clarity and organisation and uses scientific terminology appropriately • spelling, punctuation and grammar are used with some accuracy	
3	**5 - 6**	• 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 • the answer communicates ideas clearly and coherently uses a range of scientific terminology accurately • spelling, punctuation and grammar are used with few errors	

Question number	Answer	Additional guidance	Mark
3(a)(i)	In the solid box: regular arrangement and particles touching (1) In the liquid box: irregular arrangement and most particles touching (1) In the gas box: random and spaced (compared to liquid) (1)	ignore variation in particle size ignore arrows/lines indicating movement allow solid and liquid arrangements that do not fill the box  	**(3)**

Question number	Answer	Mark
3(a)(ii)	C	**(1)**

Question number	Answer	Additional guidance	Mark
3(b)(i)	substitution (1) 100 ÷ 13 answer (1) 7.7 (g/cm^3)	award full marks for correct numerical answer without working allow 7.692 (g/cm^3)	**(2)**

Question number	Answer	Additional guidance	Mark
3(b)(ii)	An answer that provides a description by making reference to: • part fill a measuring cylinder with water and record the starting volume (1) • completely immerse the stone in the water and record the final volume of water and stone (1) • volume of stone = final volume – initial volume (1)	accept valid alternative methods, e.g. fill a displacement can until some water overflows/flows out of spout completely immerse the stone in the displacement can and collect the displaced water in a measuring cylinder volume of water displaced = volume of stone	**(3)**

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 × 1.5 = 3.6 substitution (1) (F =)12 000 × 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: • put weights on the plunger to increase the pressure of the trapped air (1) • use scale on syringe to measure the volume of trapped air (1) • calculate the pressure from P = weight added/area of plunger (1) • compare the increase in pressure to the volume of trapped air (1)	(4)