Question number	Answer	Mark
1(a)	An explanation that combines identification – application of knowledge (1 mark) and reasoning/justification – application of understanding (3 marks): • the gas cylinders have the same weight (1) • but cylinder A has the smallest area (that is in contact with the ground) (1) • the smaller the area, the greater the pressure (or reference to $P = \frac{F}{a}$) (1) • hence cylinder A exerts a greater pressure on the ground (1)	**(4)**

Question number	Answer	Additional guidance	Mark
1(b)	rearrangement (1) force up = (force down × distance of force down from pivot)/distance of force up from pivot substitution into correct equation (1) $F = \frac{120 \times 1.3}{0.40}$ answer (1) 390 (N)	award full marks for correct numerical answer without working	**(3)**

Question number	Indic	Mark
*1(c)	Answers will be credited according to candidate's deployment of knowledge and understanding of the material in relation to the qualities and skills outlined in the generic mark scheme. The indicative content below is not prescriptive and candidates are not required to include all the material which is indicated as relevant. Additional content included in the response must be scientific and relevant. **AO2 (6 marks)** • The bubbles get bigger • Molecules of gas in constant motion • Molecules widely spaced and moving randomly • Molecules impact on surface of bubble/liquid molecules • Average of impacts produces gas pressure • Pressure is due to rate at which gas particles collide with liquid molecules/bubble surface • Liquid pressure decreases as bubble rises • $P_1V_1 = P_2V_2$ • If pressure decreases, volume of bubble will increase/volume of bubble must increase to give a decrease in pressure • As volume increases, rate at which particles collide with surface of bubble decreases	**(6)**

Level	Mark	Descriptor
	0	No awardable content.
Level 1	1–2	The explanation attempts to link and apply knowledge and understanding of scientific ideas, flawed or simplistic connections made between elements in the context of the question. (AO2) Lines of reasoning are unsupported or unclear. (AO2)
Level 2	3–4	The explanation is mostly supported through linkage and application of knowledge and understanding of scientific ideas, some logical connections made between elements in the context of the question. (AO2) Lines of reasoning mostly supported through the application of relevant evidence. (AO2)
Level 3	5–6	The explanation is supported throughout by linkage and application of knowledge and understanding of scientific ideas, logical connections made between elements in the context of the question. (AO2) Lines of reasoning are supported by sustained application of relevant evidence. (AO2)

		the question. (AO2)

Question number	Answer	Mark
2(a)(i)	C	**(1)**

Question number	Answer	Additional guidance	Mark
2(a)(ii)	Equating the same variable in both equations (1) $\Delta Q = m \times c \times \Delta\theta = P \times t$ Rearrangement (1) $t = \frac{(m \times c \times \Delta\theta)}{P}$ Substitution and evaluation (1) $t = \frac{(1 \times 4200 \times 77)}{3500}$ = 92 s	allow $\Delta\theta$ seen as 95 − 18 92.4 evaluation must be seen to at least 2 s.f. at some point in the working	**(3)**

Question number	Answer	Additional guidance	Mark
2(b)(i)	An answer that combines the following points of understanding to provide a logical description: • when steam condenses, its molecules move closer together, so the internal energy decreases (1) • when the water from the condensed steam cools, its molecules move more slowly, therefore storing less kinetic energy (1)	allow as water cools, the distance between the particles decreases which increases the intermolecular forces	**(2)**

Question number	Answer	Additional guidance	Mark
2(b)(ii)	equating the variables in the three equations/principle of conservation of energy (1) $(m_w \times l_w) + (m_w \times c_w \times \Delta\theta_w) = (m_m \times c_m \times \Delta\theta_m)$ rearrangement (1) $m_m = \frac{(m_w \times l_w) + (m_w \times c_w \times \Delta\theta_w)}{(c_m \times \Delta\theta_m)}$ substitution of correctly calculated quantities (1) $= \left(\frac{\left(\left(\frac{25}{1000}\right) \times 2260000\right) + \left(\left(\frac{25}{1000}\right) \times 4200 \times 35\right)}{3840 \times 60}\right)$ evaluation (1) 0.26 (kg)	allow in words or with suitable alternative subscripts temperature changes and l_w must be correct allow maximum of 3 marks for calculations that omit the energy from cooling of water	**(4)**

Question number	Answer	Mark
2(b)(iii)	Any two of the following reasons: • more steam must condense and transfer the energy that is dissipated to the jug during the process (1) • more steam must condense and transfer the energy that is dissipated to the surroundings during the process (1) • more steam must condense and transfer the energy needed to cause the milk to froth (1) • more steam must condense to replace any steam that might leave the milk without condensing (1)	**(2)**

Question Number	Answer	Acceptable answers	Mark
3 (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
3 (a)(ii)	☒ **D** 296 K		**(1)**

Question Number	Answer	Acceptable answers	Mark
3 (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
3 (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	