Name of the Student:_____

Max. Marks : 26 Marks **Time : 26 Minutes**

Mark Schemes

Q1.

Question number	Indicative content	Mark
	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. • Gas particles are in (random) motion • Particles hit sides of container / each other • This produces (net) force on (sides of) container • This causes a pressure (on the container) • As volume increases the particles have more space to move • This means that particles hit sides less frequently • Smaller (net) force on sides of container • Pressure decreases. • Change in pressure (with increase in volume) is not linear • Pressure never becomes zero	(6)

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Level	Mark	Descriptor
	0	• No rewardable material.
Level 1	1-2	• Demonstrates elements of physics understanding, some of which is inaccurate. Understanding of scientific ideas lacks detail. (AO1) • Presents an explanation with some structure and coherence. (AO1)
Level 2	3-4	• Demonstrates physics understanding, which is mostly relevant but may include some inaccuracies. Understanding of scientific ideas is not fully detailed and/or developed. (AO1) • Presents an explanation that has a structure which is mostly clear, coherent and logical. (AO1)
Level 3	5-6	• Demonstrates accurate and relevant physics understanding throughout. Understanding of the scientific ideas is detailed and fully developed. (AO1) • Presents an explanation that has a well-developed structure which is clear, coherent and logical. (AO1)

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Level	Mark	Additional Guidance	General additional guidance – the decision within levels e.g. - At each level, as well as content, the scientific coherency of what is stated will help place the answer at the top, or the bottom, of that level.
	0	No rewardable material.	
Level 1	1–2	Additional guidance simple description of how pressure is caused **or** how it changes	Possible candidate responses Particles hit sides of container **or** Pressure becomes less as volume increases
Level 2	3–4	Additional guidance description of how pressure is caused and how it changes	Possible candidate responses Particles hit sides of container. This causes a (net) force on sides of container. Pressure becomes less as volume increases
Level 3	5–6	Additional guidance Description of how pressure is caused, and why it changes in the way shown	Possible candidate responses Particles hit sides of container. This causes a (net) force on sides of the container. As volume increases the particles hit the sides less frequently so the pressure becomes less.

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Q2.

	Answer	Acceptable answers	Mark
(a)	☒ **C** (graph C)		**(1)**
(b)(i)	A description including: • collisions (1) • with (walls of) cylinder (1)	hit / bounce off exert force	**(2)**
(b)(ii)	substitution (1) either 100 × V = 15.0 × 21 000 or $V = \frac{15.0 \times 21\,000}{100}$ evaluation (1) 3 150(litres)	V_1P_1 = 15 × 21000 = 315000 (1 mark) V_2P_2 = **100** × 3200 = 320000 (1 mark) award full marks for 3150 (litres) without working	**(2)**
(b)(iii)	substitution (1) $\frac{21\,000\,(\times V)}{305} = \frac{P\,(\times V)}{278}$ volume same (1) evaluation (1) 19 100 (kPa)	give full marks for correct answer, no working transposition accept 19141 (kPa) or 19000 and numbers rounding down to 191 00	**(3)**

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Q3.

	Answer	Acceptable answers	Mark
(a)(i)	volume in range 9.0 – 10.5 (cm^3) (1) pressure in range 1.5 – 1.7 (kPa) (1)		**(2)**
(a)(ii)	**D** 296 K		**(1)**
(a)(iii)	Volume in range 4 – 8 (cm^3)	Any value between 4 (cm^3) and 8 (cm^3)	**(1)**
(a)(iv)	Substitution (1) 2.2 × 10.8 ÷ 0.2 Evaluation (1) 119 (cm^3)	118.8 (cm^3) give full marks for the correct answer, no working	**(2)**

		Indicative Content	Mark
QWC	***(b)**	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 forceparticles 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	

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		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

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