AQA GCSE Physics | 8463

SPECIFICATION POINT 4.3.2.1

Internal energy

Mark schemes and examiner comments

Tier	**Higher**
Question groups	**3**
Available paper years	**2018–2025**

Using this booklet

1. Booklet answer numbers match the question booklet.
2. Use the original question number within marking tables.
3. Examiner comments are included where available.

Name: _____ **Date:** _____

Where a precise marking extract is unavailable, the full source document is included in an appendix. Any missing mark scheme is explicitly identified.

4.3.2.1 Internal energy

Answer 01 · Mark scheme June 2018 | 8463/1H | Original Q7

Question	Answers	Extra information	Mark	AO/ Spec. Ref
07.1	any **two** from: • calculate a mean • reduces the effect of random errors • identify / remove anomalies	 reduces human error is insufficient allow to assess the repeatability of the data	2	AO3 4.3.3.2
07.2	random error (because) eye position would not be the same each time (relative to the liquid)	allow a parallax error human error is insufficient allow systematic error only if it is clear that the student always viewed liquid level from above meniscus (or below)	1 1	AO3 4.3.3.2
07.3	(a temperature increase would) increase the pressure in the tube (even if the volume was constant) (because a higher temperature would mean) higher (average) kinetic energy of molecules / particles	 allow higher (average) speed for higher (average) kinetic energy	1 1	AO1 4.3.3.3

4.3.2.1 Internal energy

Answer 01 · Mark scheme

June 2018 | 8463/1H | Original Q7

Question	Answers	Extra information	Mark	AO/ Spec. Ref
07.4		an answer of 8.0 (cm^3) scores **3** marks		AO2 4.3.3.2
	$1.6 \times 10^5 \times 9.0$ (= 1.44×10^6)		1	
	$1.44 \times 10^6 = 1.8 \times 10^5 \times V$ **or** $V = \frac{1.44 \times 10^6}{1.8 \times 10^5}$	allow for **2** marks $V = \frac{1.6 \times 10^5 \times 9.0}{1.8 \times 10^5}$	1	
	$V = 8.0$ (cm^3)		1	
07.5	work is done on the air (in the tyre)		1	AO1 4.3.3.3
	so the temperature (of the air) increases	allow the (average) kinetic energy of the particles increases	1	
Total			**11**	

4.3.2.1 Internal energy

Answer 02 · Mark scheme

June 2019 | 8463/1H | Original Q11

Question 11

Question	Answers	Extra information	Mark	AO / Spec. Ref.
11.1	the (mean) kinetic energy of the particles increases	allow the (mean) speed of the particles increases 'kinetic energy increases' is insufficient by itself do not accept particles vibrating	1	4.3.2.1 AO1
	which increases the (internal) energy of the water	ignore description of evaporation	1	
11.2	Particles in a gas have more potential energy than particles in a liquid.		1	4.3.1.1 AO1
11.3	Energy given to water E = mL with quantities defined		1	4.3.3.1 AO1
	power output (of Bunsen burner) $= \frac{\text{energy transferred (to water)}}{\text{time}}$	allow $P = \frac{E}{t}$ with quantities defined	1	
	power output $= \frac{\text{change in mass} \times \text{specific latent heat}}{\text{time}}$	allow E = Pt equated with E = mL or stated in words **or** $P = \frac{mL}{t}$ with quantities defined	1	
	time should be converted to seconds **or** use a time of 300 seconds		1	
Total			**7**	

4.3.2.1 Internal energy

Answer 03 · Mark scheme

June 2025 | 8463/1H | Original Q8

Question 8

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.1	m = 0.050 (kg)	all subsequent marks can score using an incorrectly / not converted value of m	1	AO2 4.3.2.3
	9950 = 0.050 × L		1	
	$L = \frac{9950}{0.050}$		1	
	L = 199 000 (J/kg)		1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.2	the potential energy of the particles increases		1	AO1 4.3.2.1
	(but) the kinetic energy of the particles does not change (as temperature does not change)		1	
	(so the) internal energy increases	MP3 dependent on MP1 **and** MP2	1	

Question	Answers	Extra information	Mark	AO / Spec. Ref.
08.3	the *(mean)* kinetic energy of the gas particles increased	allow the *(mean)* speed of the gas particles increased	1	AO1 4.3.3.1
	(so) particles exert a greater force on the walls of the container during each collision		1	
	(and) the frequency of collisions of the particles and the walls of the container increases	allow 'rate of' for 'frequency'	1	
	(so) pressure increases	this mark is dependent on scoring at least 1 other mark	1	

Total Question 8	11

4.3.2.1 Internal energy

Answer 03 · Examiner comments June 2025 | 8463/1H | Original Q8

08.1

Just fewer than 90 % of the students scored 4 marks on this calculation of specific latent heat. Students who did not convert or incorrectly converted the mass could score a maximum of 3 marks.

08.2

Most students did not refer to the energy of the particles in terms of kinetic and potential energy, so scoring no marks. Many students thought the kinetic energy of the particles changed which limited them to scoring only the first marking point. Only about 3 % of the students scored 2 or 3 marks, while just over 10 % of the students scored 1 mark.

08.3

Students made good attempts at answering this challenging question about gas pressure. Technical accuracy was important for the second and third marking points, so it needed to be clear that particle collisions with the container walls were more frequent, more often or at a greater rate of collision. More frequent collisions between particles was insufficient for the second mark. The third marking point needed to reference the forces involved in collisions with the container walls, an implied greater force per collision was acceptable, but not a macroscopic force linked to force and area as that was not being tested. Almost half of the students scored 3 or 4 marks, while almost 40 % of the students scored 1 or 2 marks.