AQA GCSE Physics | 8463

SPECIFICATION POINT 4.3.2.1

# Internal energy

## Past-paper questions

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

## Using this booklet

1. Answer the questions in order and show your working.
2. Original question numbers and marks are retained.
3. Print at actual size (100%) for measuring questions.
4. Use the companion answer booklet to check your work.

**Name:** _____ **Date:** _____

Whole questions are retained for context, so some parts assess other specification points. Current and legacy sources are labelled. Continue on extra paper if needed.

### 4.3.2.1 Internal energy

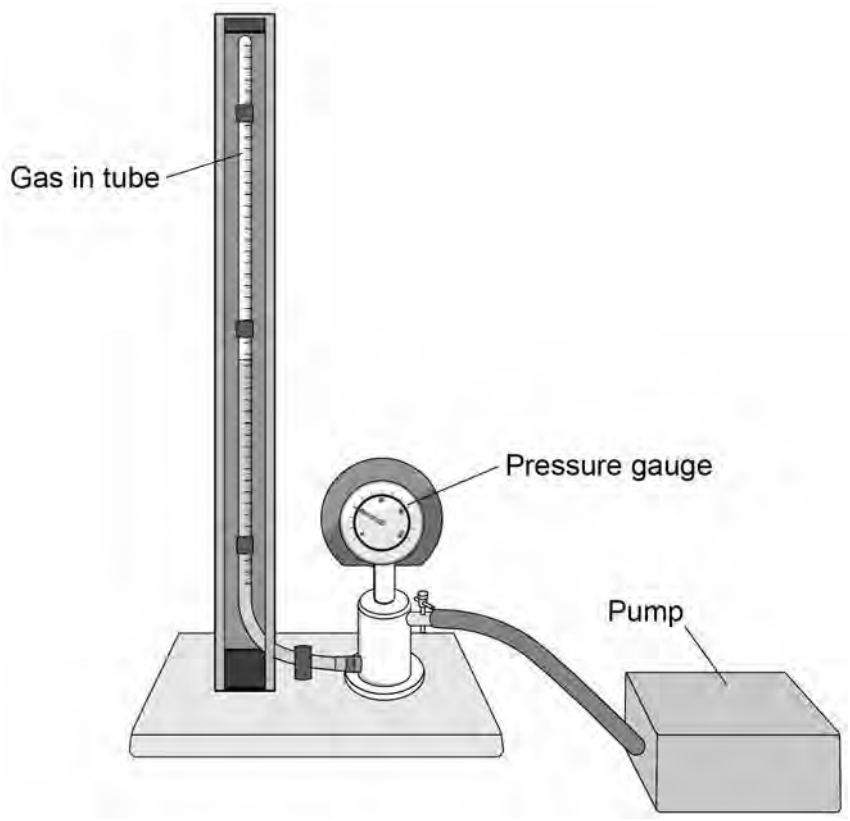
**Question 01**

June 2018 | 8463/1H | Original Q7

**0 7** A student investigated how the pressure exerted by a gas varied with the volume of the gas.

**Figure 12** shows the equipment the student used.

**Figure 12**




A pump was used to compress the gas in a tube. As the volume of the gas decreases, the pressure of the gas increases.

**0 7 . 1** The student only recorded one set of results.

Give **two** reasons why taking repeat readings could provide more accurate data.

**[2 marks]**

1 _____

_____

2 _____

_____

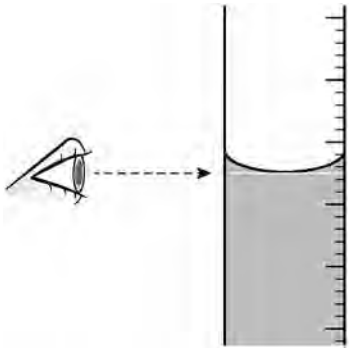
4.3.2.1 Internal energy

Question 01 · continued



**0 7 . 2** **Figure 13** shows the position of the student's eye when taking volume measurements.

**Figure 13**



Explain what type of error would be caused if the student's eye was **not** in line with the level of the liquid in the tube.

**[2 marks]**

**0 7 . 3** If the gas is compressed too quickly the temperature of the gas increases.

Explain how the temperature increase would affect the pressure exerted by the gas.

**[2 marks]**

**Question 7 continues on the next page**

4.3.2.1 Internal energy

Question 01 · continued



**0 7 . 4** One of the student's results is given below.

pressure = $1.6 \times 10^5$ Pa
volume = 9.0 $cm^3$

Calculate the volume of the gas when the pressure was $1.8 \times 10^5$ Pa.

The temperature of the gas was constant.

**[3 marks]**

Volume = _____ $cm^3$

4.3.2.1 Internal energy

Question 01 · continued



**0 7 . 5** **Figure 14** shows a person using a bicycle pump to inflate a tyre.

**Figure 14**



The internal energy of the air increases as the tyre is inflated.

Explain why.

**[2 marks]**

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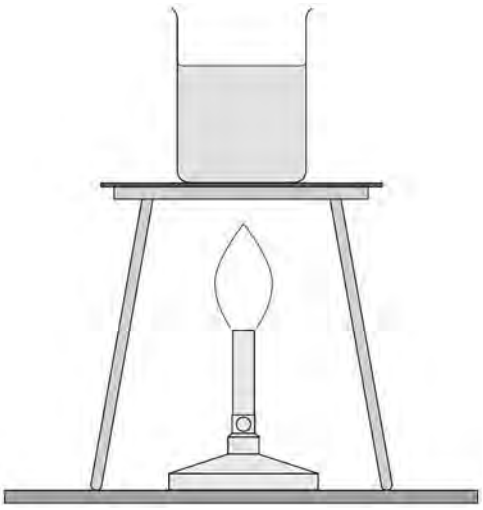
4.3.2.1 Internal energy

Question 02

June 2019 | 8463/1H | Original Q11

**1 1** **Figure 14** shows a Bunsen burner heating some water in a beaker. Eventually the water changes into steam.

**Figure 14**



**1 1 . 1** Explain how the internal energy of the water changes as it is heated from 20 °C to 25 °C

**[2 marks]**

**1 1 . 2** How is the particle model used to explain the difference in density between a liquid and a gas?

**[1 mark]**

Tick (✓) **one** box.

- Particles in a gas have less kinetic energy than particles in a liquid. ☐
- Particles in a gas have more potential energy than particles in a liquid. ☐
- Particles in a liquid are further apart than particles in a gas. ☐
- Particles in a liquid are larger than particles in a gas. ☐

4.3.2.1 Internal energy

**Question 02 · continued**



**1 1 . 3** A student measured the mass of boiling water that was turned into steam in five minutes.

Explain how the student could use this information to estimate the power output of the Bunsen burner in watts.

**[4 marks]**

7

4.3.2.1 Internal energy

Question 03

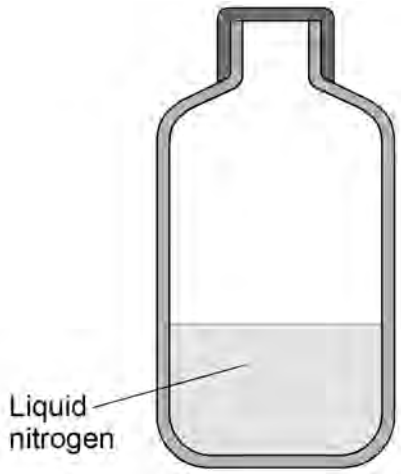


**0 8** A scientist poured some liquid nitrogen into a container.

The container was then sealed.

**Figure 10** shows the container.

**Figure 10**




**0 8 . 1** The liquid nitrogen was at its boiling point.

When 9950 J of thermal energy was transferred to the liquid nitrogen, 50 g of the nitrogen turned into a gas.

Calculate the specific latent heat of vaporisation of nitrogen.

Use the Physics Equations Sheet.

**[4 marks]**

Specific latent heat of vaporisation = _____ J/kg

4.3.2.1 Internal energy

Question 03 · continued



**0 8 . 2** Explain how the internal energy of the nitrogen changed as the nitrogen turned from a liquid to a gas.

**[3 marks]**

**0 8 . 3** After the nitrogen had boiled, the temperature of the gas increased.

Explain how the pressure in the container changed as the temperature increased.

**[4 marks]**

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