AQA GCSE Physics | 8463

SPECIFICATION POINT 4.3.3.3

Increasing the pressure of a gas (physics only) (HT only)

Past-paper questions

Tier	**Higher**
Question groups	**5**
Available paper years	**2018–2024**

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.

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

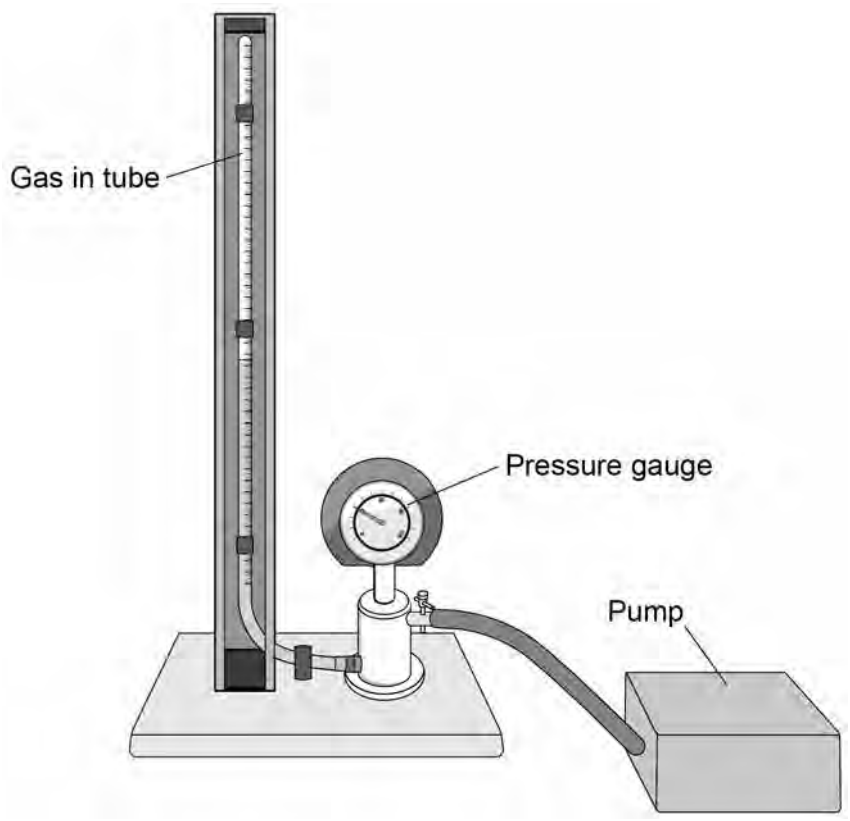
Question 01

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 _____

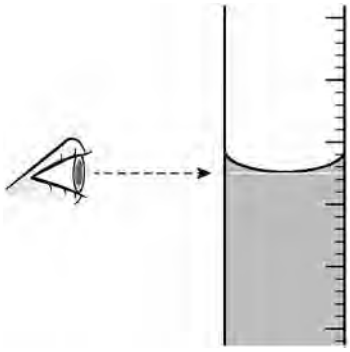
_____

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

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

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 01 · continued

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

pressure = 1.6×10^5 Pa
volume = 9.0 cm^3

Calculate the volume of the gas when the pressure was 1.8×10^5 Pa.

The temperature of the gas was constant.

[3 marks]

Volume = _____ cm^3

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

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]

11

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 02

November 2020 | 8463/1H | Original Q10

1 0 **Figure 15** shows a balloon filled with helium gas.

Figure 15



1 0 . 1 Which statements describe the movement of the gas particles in the balloon?

[2 marks]

Tick (✓) **two** boxes.

- The particles all move in a predictable way. ☐
- The particles move at the same speed. ☐
- The particles move in circular paths. ☐
- The particles move in random directions. ☐
- The particles move with a range of speeds. ☐
- The particles vibrate about fixed positions. ☐

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 02 · continued

1 0 . 2 The pressure of the helium in the balloon is 100 000 Pa.

The volume of the balloon is 0.030 m^3.

The balloon is compressed at a constant temperature causing the volume to decrease to 0.025 m^3.

No helium leaves the balloon.

Calculate the new pressure in the balloon.

[4 marks]

New pressure = _____ Pa

1 0 . 3 The temperature of the helium in the balloon was increased.

The mass and volume of helium in the balloon remained constant.

Explain why the pressure exerted by the helium inside the balloon would increase.

[4 marks]

10

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

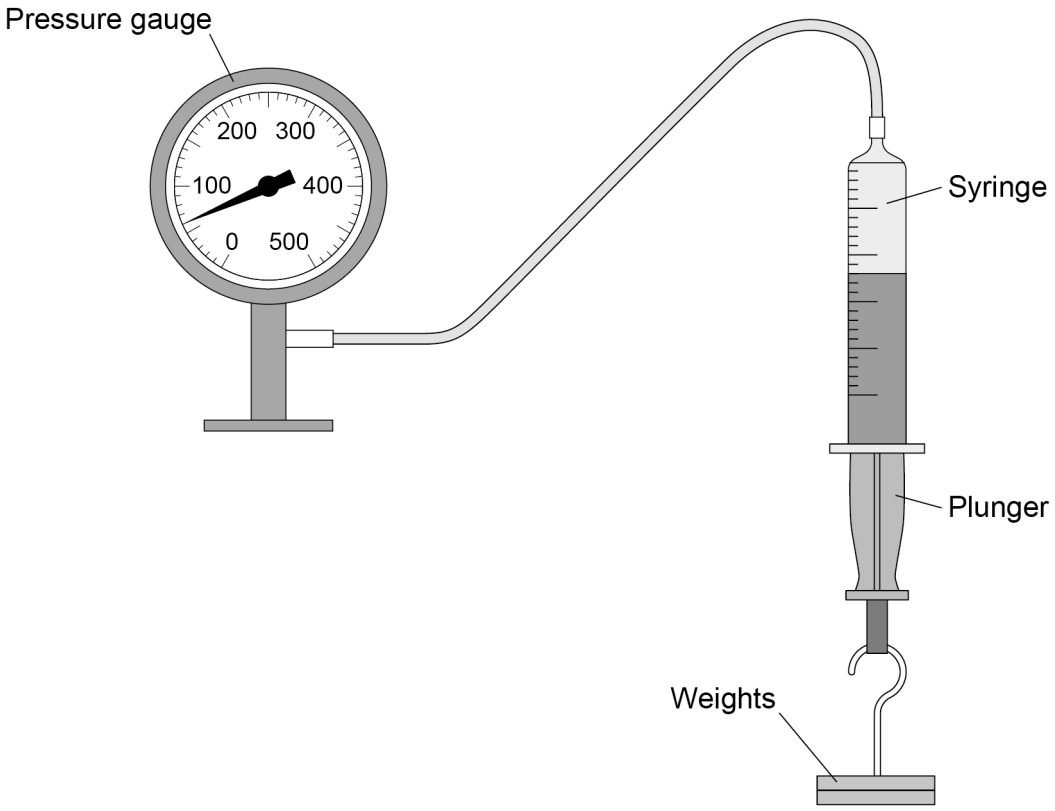
Question 03

November 2021 | 8463/1H | Original Q9

0 9 A teacher demonstrated the relationship between the pressure in a gas and the volume of the gas.

Figure 12 shows the equipment used.

Figure 12



This is the method used.

1. Record the initial volume of gas in the syringe and the pressure reading before any weights are attached.
2. Attach a 2.0 N weight to the syringe.
3. Record the volume of the gas and the reading on the pressure gauge.
4. Repeat steps 2 and 3 until a weight of 12.0 N is attached to the syringe.

0 9 . 1 What was the range of force used?

[1 mark]

From _____ N to _____ N

0 9 . 2 Give **one** control variable in the investigation.

[1 mark]

_____

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 03 · continued

0 9 . 3 When the volume of gas in the syringe was 45 cm^3, the pressure gauge showed a value of 60 kPa.

Calculate the pressure in the gas when the volume of gas in the syringe was 40 cm^3.

[4 marks]

Pressure = _____ kPa

0 9 . 4 When the volume of gas in the syringe increased, the pressure on the inside walls of the syringe decreased.

Explain why.

[3 marks]

9

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 04

June 2023 | 8463/1H | Original Q9

0 9 **Figure 9** shows air being pumped into a car tyre.

Figure 9



0 9 . 1 Complete the sentence.

[1 mark]

Air particles in the tyre move quickly in _____ directions.

0 9 . 2 When the tyre is at the correct pressure, pumping more air into the tyre causes the pressure to increase further.

The volume and temperature of the air in the tyre do **not** change.

Explain why the pressure increases as more air is pumped into the tyre.

[2 marks]

_____

_____

_____

_____

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 04 · continued

0 9 . 3 The air pressure in a car tyre changes if the temperature of the air in the tyre increases.

Explain why.

[4 marks]

7

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

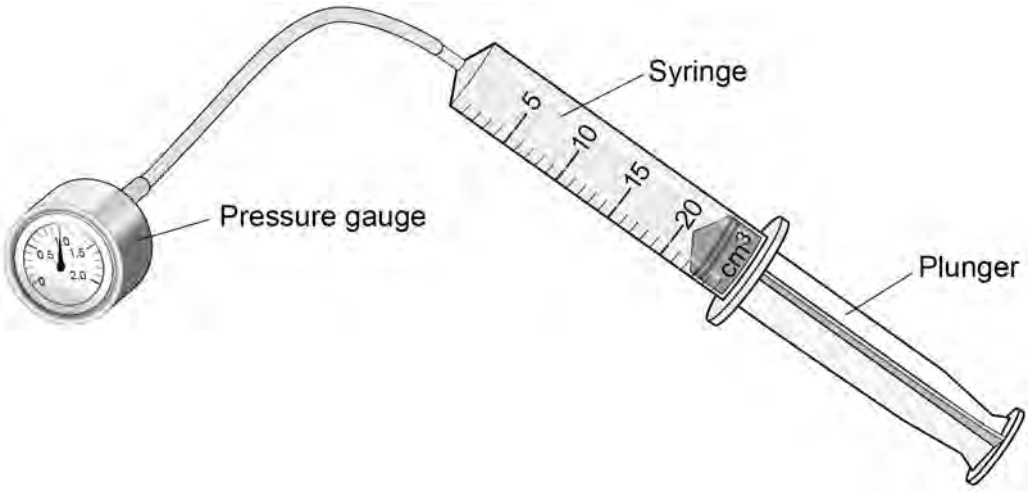
Question 05

June 2024 | 8463/1H | Original Q8

0 8 A student investigated how the pressure in a fixed mass of air varies with the volume of the air.

Figure 12 shows the equipment used.

Figure 12



0 8 . 1 When the plunger was pushed slowly into the syringe, the pressure in the syringe increased.

The temperature of the air remained constant.

Explain why the pressure increased.

[3 marks]

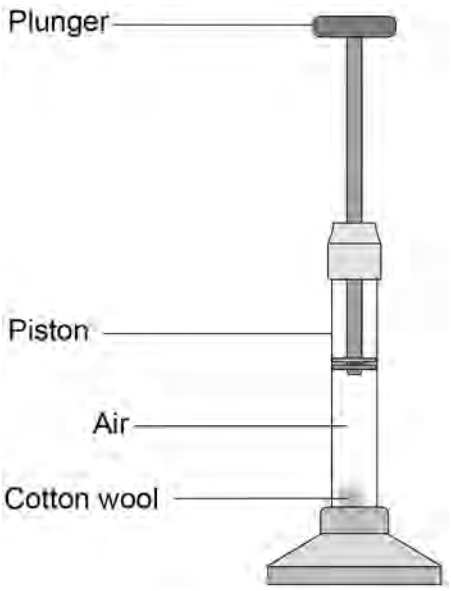
4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 05 · continued

A fire piston is a special type of syringe that can be used to start fires.

Figure 13 shows a fire piston.

Figure 13



The plunger is pushed quickly downwards and compresses the air.

When the air is compressed quickly, the temperature of the air increases.

0 8 . 2 How does an increase in temperature affect the air particles inside the piston?

[1 mark]

Tick (✓) **one** box.

The mean kinetic energy of the particles increases. ☐

The mean potential energy of the particles increases. ☐

The mean separation of the particles increases. ☐

4.3.3.3 Increasing the pressure of a gas (physics only) (HT only)

Question 05 · continued

0 8 . 3 When the air is hot enough, a small piece of cotton wool in the piston catches fire.

The energy transferred to the air in the piston is 0.0130 J.

The mass of air in the piston is 2.60×10^{-8} kg.

specific heat capacity of air = 1.01 kJ/kg °C

Calculate the temperature change of the air.

Use the Physics Equations Sheet.

[4 marks]

Temperature change = _____ °C

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