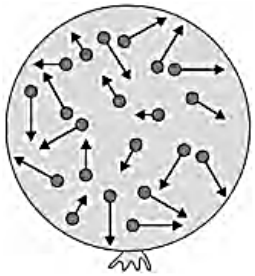
Gas pressure GCSE AQA Higher Physics Past Papers Questions

01. **Figure 1** shows a balloon filled with helium gas.

Figure 1



1 Describe the movement of the particles of helium gas inside the balloon.

[2 marks]

2 What name is given to the total kinetic energy and potential energy of all the particles of helium gas in the balloon?

[1 mark]

Tick **one** box.

- External energy ☐
- Internal energy ☐
- Movement energy ☐

3 Write down the equation which links density, mass and volume.

[1 mark]

4 The helium in the balloon has a mass of 0.00254 kg.

The balloon has a volume of 0.0141 m^3.

Calculate the density of helium. Choose the correct unit from the box.

[3 marks]

m^3 / kg	kg / m^3	kg m^3

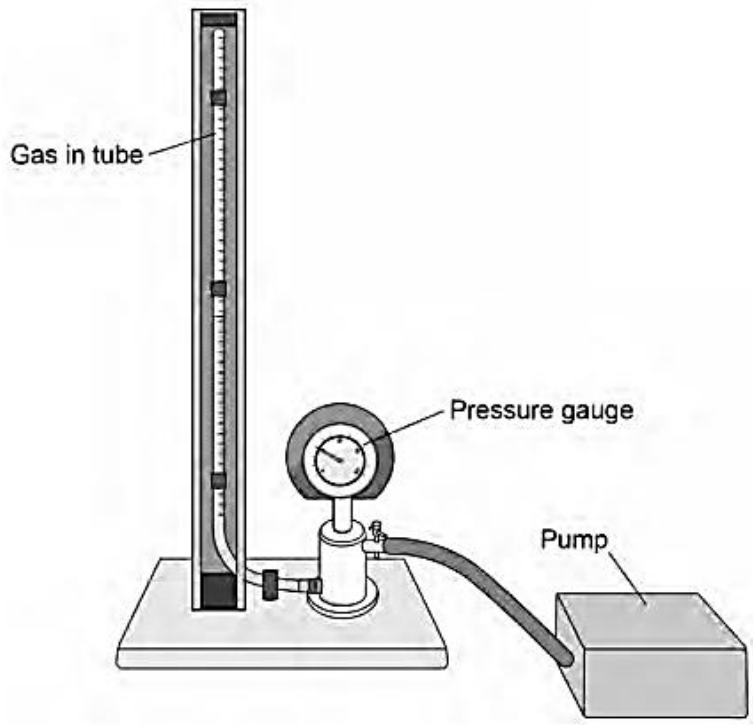
Density = _____ Unit: _____

02.

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.

. 1 The student only recorded one set of results.

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

[2 marks]

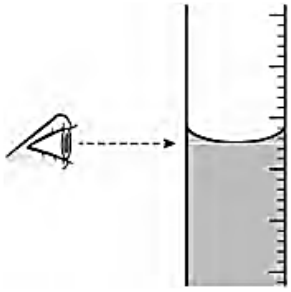
1 _____

_____

2 _____

. 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]

. 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]

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

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

03.

Figure 15 shows a balloon filled with helium gas.

Figure 15

. 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. ☐

. 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

. 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]

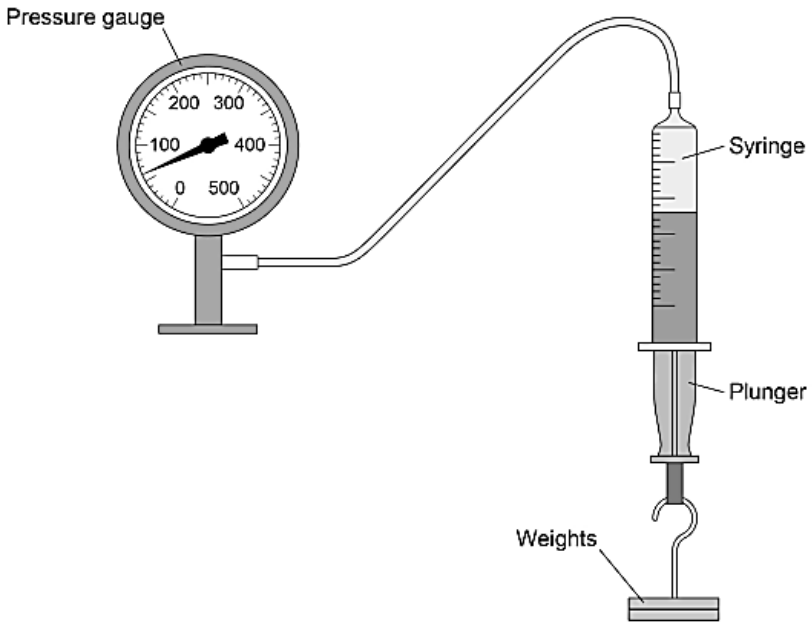
10

04.

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.

1 What was the range of force used?

[1 mark]

From _____ N to _____ N

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

[1 mark]

_____

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

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

05.

Figure 9 shows air being pumped into a car tyre.

Figure 9

1 Complete the sentence.

[1 mark]

Air particles in the tyre move quickly in _____ directions.

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]

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

Explain why.

[4 marks]

7