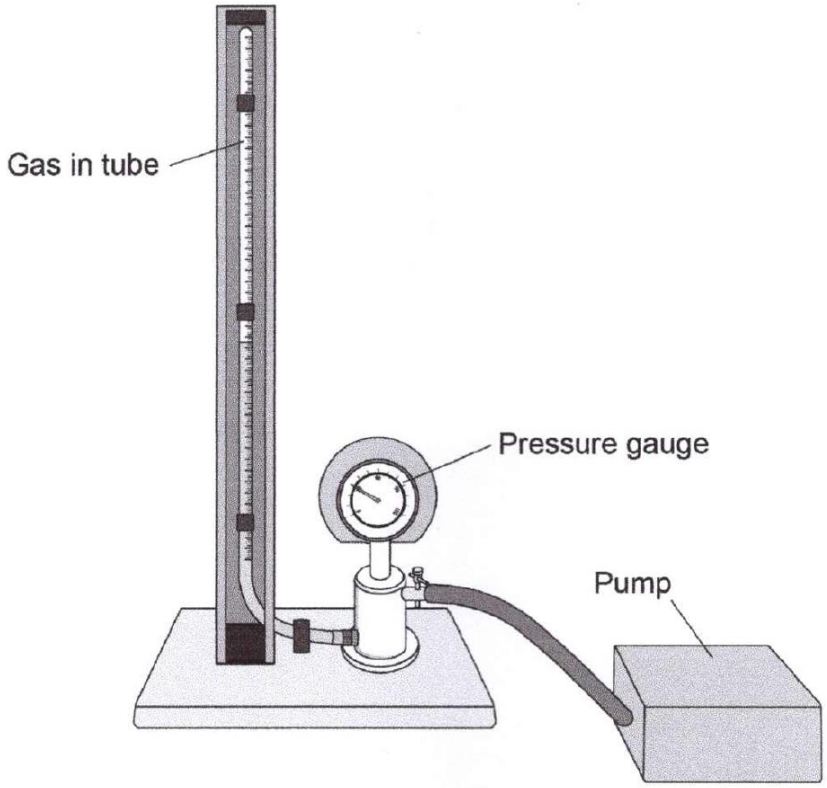
Particle model and pressure – GCSE Physics Paper 1

1. No.7

0 7 A teacher demonstrated the relationship between the pressure and the volume of a fixed mass of gas at a constant temperature.

Figure 9 shows the equipment used.

Figure 9



0 7 . 1 Complete the sentence.

Choose the answer from the box.

[1 mark]

circular paths	**random directions**	**the same direction**

Particles in a gas move in random directions.

0 7 . 2 Complete the sentence.

Choose the answer from the box.

[1 mark]

a constant speed	**a constant velocity**	**a range of speeds**

Particles in a gas move with a range of speeds.

0 7 . 3 **Table 6** shows some of the results.

Table 6

Pressure in kPa	Volume in cm^3
300	10
200	15
150	20
120	25
100	30

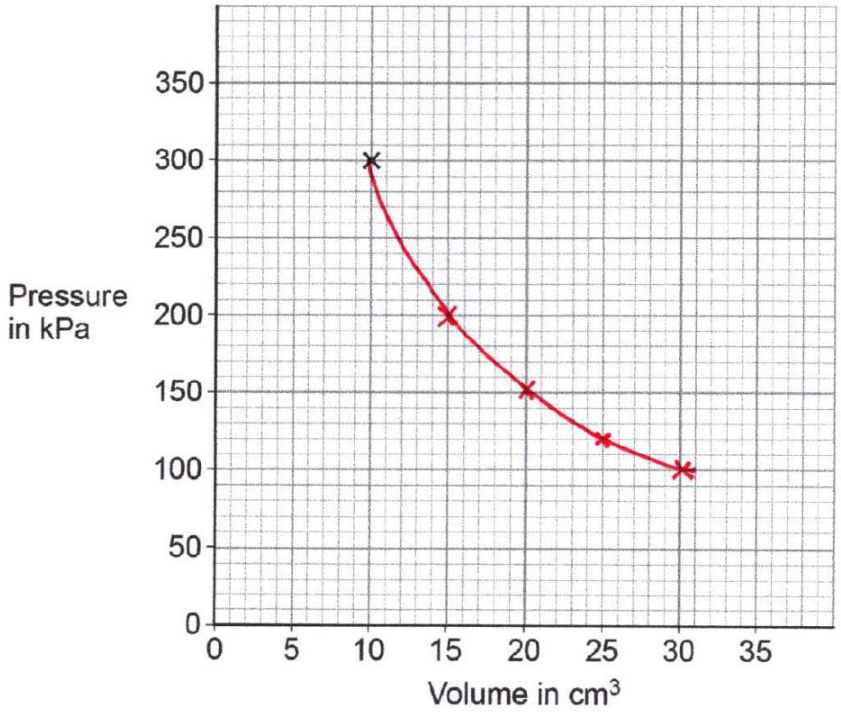
Complete **Figure 10**. The first point has been plotted for you.

You should:

- plot the points from **Table 6**
- draw the line of best fit.

[3 marks]

Figure 10



0 7 . 4 The relationship between the pressure and the volume of a gas is given by the equation:

pressure × volume = constant

Calculate the constant when the pressure of the gas was 300 kPa.

Use **Table 6**.

[2 marks]

@ 300kPa, V = 10

p × V = Constant

300 × 10 = 3000

Constant = _____ kPa cm^3

0 7 . 5 When the volume of the gas increases, the pressure in the gas decreases.

The temperature of the gas stays the same.

How does increasing the volume affect each of the following quantities?

[3 marks]

Tick (✓) **one** box in **each** row.

Quantity	Decreases	Stays the same	Increases
Mean time between collisions of the particles with the tube			✓
Mean distance between the particles			✓
Mean speed of the particles		✓	

2. No.9

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 random 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]

-More air particles added so more number of collisions with the tyre walls. This provides a greater force hence increase in pressure.

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]

- Increase in temperature increase the KE of the particles.
- This causes more collision of particles with the wall per second.
- With a higher rate of change in momentum, a greater force is applied on the walls creating more pressure on the tyre.