

GCSE Physics A (Gateway)

J249/03 Physics A P1-P4 and P9 (Higher Tier)

Question Set 15

1

A student investigates four gases.

Look at her data.

$$P_1 V_1 = k$$

Gas	Pressure (Pa)	Volume (m ³)
A	5	0.5
B	10	0.4
C	20	0.2
D	40	0.2

2.5

4

4

8

Two readings are for the same mass of the same gas at a constant temperature.

- (a) Which two readings are for the **same mass** of the **same gas** at a constant temperature?

Use calculations in your answer.

$$A : 5 \times 0.5 = 2.5$$

$$B : 10 \times 0.4 = 4$$

$$C : 20 \times 0.2 = 4$$

$$D : 40 \times 0.2 = 8$$

Readings B and C are the same [3]

- (b) The student investigates another gas at **constant volume**.

Explain, using ideas about particles, how temperature affects gas pressure.

As temperature increases, the gas particles have more energy so they will move faster. This means that there will be more collisions between the particles and the wall of the container, this causes an increase in gas pressure. [3]

- (c) Calculate the pressure at the bottom of a 0.5 m tall measuring cylinder filled with a liquid.

Density of the liquid = 1100 kg/m³.

$$\text{Pressure} = h \rho g = 0.5 \times 1100 \times 10 = 5500$$

Pressure = 5500 Pa

[3]

Equations in physics

$$(\text{final velocity})^2 - (\text{initial velocity})^2 = 2 \times \text{acceleration} \times \text{distance}$$

$$\text{change in thermal energy} = \text{mass} \times \text{specific heat capacity} \times \text{change in temperature}$$

$$\text{thermal energy for a change in state} = \text{mass} \times \text{specific latent heat}$$

$$\text{energy transferred in stretching} = 0.5 \times \text{spring constant} \times (\text{extension})^2$$

$$\text{potential difference across primary coil} \times \text{current in primary coil} = \text{potential difference across secondary coil} \times \text{current in secondary coil}$$

Higher tier only –

$$\text{force on a conductor (at right angles to a magnetic field) carrying a current} = \text{magnetic flux density} \times \text{current} \times \text{length}$$

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