3 **(a)** **(i)** The kinetic theory of gases leads to the equation

$$\tfrac{1}{2}m\langle c^2\rangle = \tfrac{3}{2}kT.$$

Explain the significance of the quantity $\tfrac{1}{2}m\langle c^2\rangle$.

.....

.....

(ii) Use the equation to suggest what is meant by the absolute zero of temperature.

.....

.....

[3]

(b) Two insulated gas cylinders **A** and **B** are connected by a tube of negligible volume, as shown in Fig. 3.1.

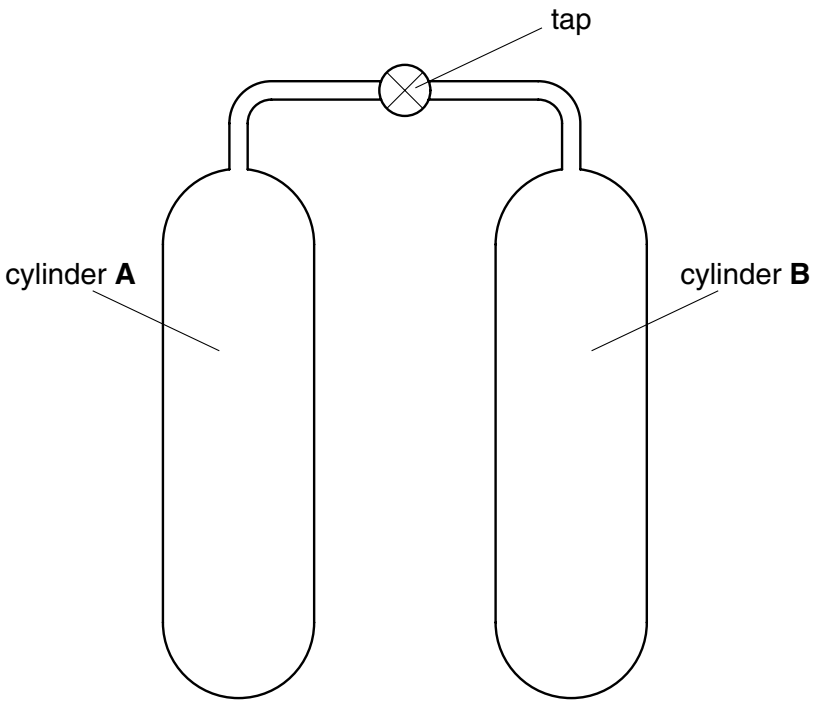

Fig. 3.1

Each cylinder has an internal volume of $2.0 \times 10^{-2}\,m^3$. Initially, the tap is closed and cylinder **A** contains 1.2 mol of an ideal gas at a temperature of 37 °C. Cylinder **B** contains the same ideal gas at pressure 1.2×10^5 Pa and temperature 37 °C.

(i) Calculate the amount, in mol, of the gas in cylinder **B**.

amount = ... mol

(ii) The tap is opened and some gas flows from cylinder **A** to cylinder **B**. Using the fact that the total amount of gas is constant, determine the final pressure of the gas in the cylinders.

pressure = ... Pa
[6]

[Turn over