2 **(a)** The kinetic theory of gases is based on a number of assumptions about the molecules of a gas.

State the assumption that is related to the volume of the molecules of the gas.

……

……..... [1]

(b) An ideal gas occupies a volume of 2.40×10^{-2} m^3 at a pressure of 4.60×10^5 Pa and a temperature of 23 °C. Each molecule has a diameter of approximately 3×10^{-10} m.

Estimate the total volume of the gas molecules.

volume = ……m^3 [3]

(c) By reference to your answer in **(b)**, suggest why the assumption in **(a)** is justified.

……

……..... [1]

(d) The ideal gas undergoes the cycle of changes PQRP as shown in Fig. 2.1.

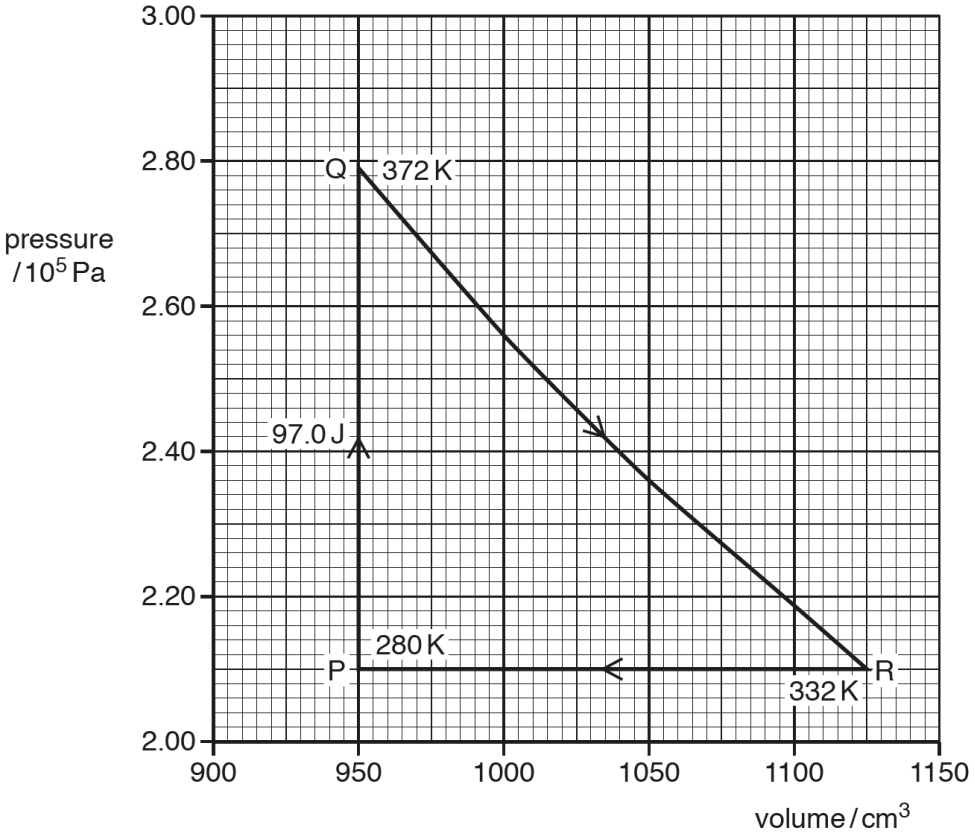

Fig. 2.1

Some energy changes during one cycle PQRP are shown in Fig. 2.2.

	change P → Q	change Q → R	change R → P
thermal energy transferred to gas / J	+97.0	0	.....
work done on gas / J	.....	–42.5	.....
increase in internal energy of gas / J	.....	.....	.....

Fig. 2.2

On Fig. 2.2, complete the energy changes for the gas. [5]

[Total: 10]