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 950 cm^3 at a pressure of 2.10×10^5 Pa and a temperature of 280K. Each molecule has a diameter of approximately 3×10^{-10} m. Estimate the total volume of the gas molecules.

volume = ……m^3

[3]

(c) With 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.

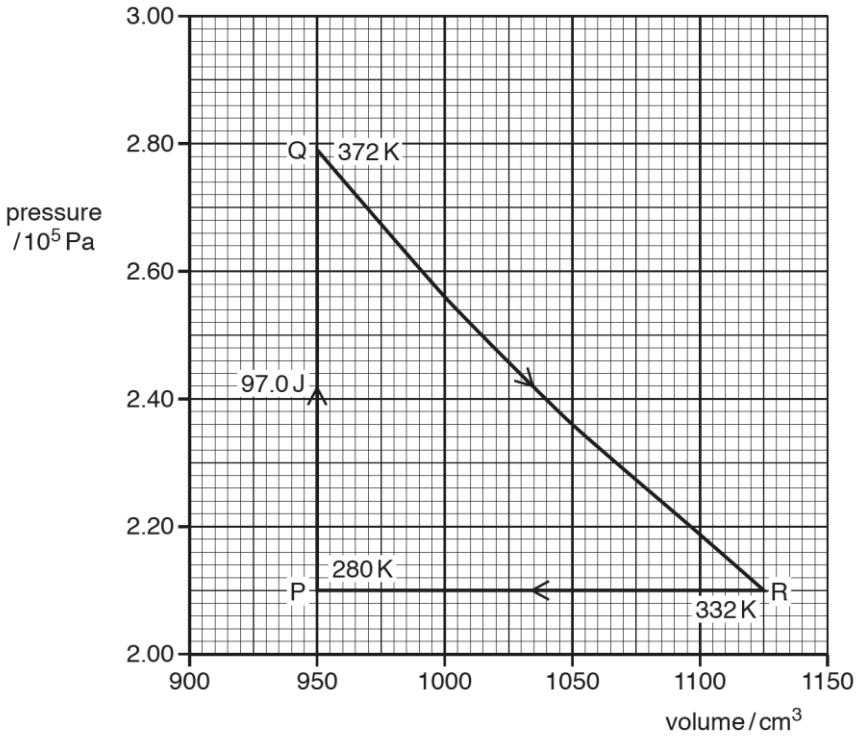

Fig. 2.1

Some energy changes during one complete cycle of PQRP are shown in Table. 2.1.

	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	.....	.....	.....

Table. 2.1

(i) State the total change in internal energy of the gas during one complete cycle PQRP. Explain your answer.

.....

.....

..... [2]

(ii) Complete Table 2.1 to show the energy changes for the gas.
Show your working clearly in the space below.

[5]

[Total: 12]