2 **(a)** A cube of volume V contains N molecules of an ideal gas. Each molecule has a component c_x of velocity normal to one side S of the cube as shown in Fig. 2.1.

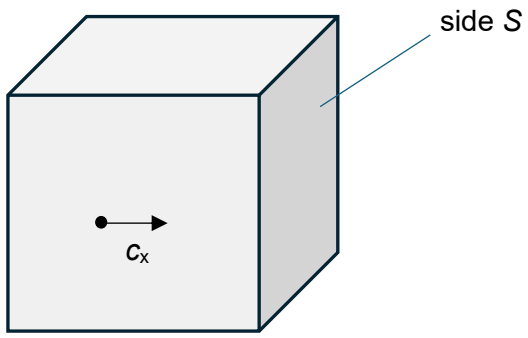

Fig. 2.1

The pressure due to one molecule with the component c_x of velocity is given by the expression

$$\frac{m}{V}c_x^2$$

where m is the mass of one molecule.

Explain how the expression leads to the relation

$$pV = \frac{1}{3}Nm\langle c^2 \rangle$$

where p is the pressure due to N molecules.

.....

.....

..... [3]

(b) Three moles of an ideal gas are in a rigid cubical box with sides of length 0.200 m.

(i) Calculate the force that the gas exerts on one side of the box when the gas temperature is 20.0 °C.

force = ... N [3]

(ii) Kinetic theory of gases assumes that the intermolecular forces between the gas particles are negligible.

Suggest and explain how your answer in **(b)(i)** may change if there are intermolecular forces between particles.

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..... [2]