

- 2** A large container of volume  $85\text{ m}^3$  is filled with  $110\text{ kg}$  of an ideal gas. The pressure of the gas is  $1.0 \times 10^5\text{ Pa}$  at temperature  $T$ .

The mass of  $1.0\text{ mol}$  of the gas is  $32\text{ g}$ .

- (a)** Show that the temperature  $T$  of the gas is approximately  $300\text{ K}$ .

[3]

- (b)** The temperature of the gas is increased to  $350\text{ K}$  at constant volume. The specific heat capacity of the gas for this change is  $0.66\text{ J kg}^{-1}\text{ K}^{-1}$ .

Calculate the energy supplied to the gas by heating.

energy = ..... J [2]

- (c)** Explain how movement of the gas molecules causes pressure in the container.

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[3]

- (d) The temperature of a gas depends on the root-mean-square (r.m.s.) speed of its molecules.

Calculate the ratio:

$$\frac{\text{r.m.s. speed of gas molecules at } 350\text{K}}{\text{r.m.s. speed of gas molecules at } 300\text{K}}$$

ratio = ..... [2]