5 (a) (i) Explain the concept of *absolute zero* on the thermodynamic temperature scale.

....

....[1]

(ii) State how the temperature of an ideal gas is related to the energy of the molecules of the gas.

....

....

....[1]

(b) An oven has a volume of 0.064 m^3. The pressure and temperature of the air in the oven are 1.0 × 10^5 Pa and 27 °C respectively. The mass of one mole of air is 0.030 kg. The air behaves as an ideal gas.

(i) Calculate the mass of air in the oven.

mass = ... kg [3]

(ii) The oven is heated to a temperature of 180 °C. The oven door is opened.

Calculate the mass of air that must escape from the oven for the pressure in the oven to return to 1.0 × 10^5 Pa.

mass = ... kg [2]