3 A fixed mass of an ideal gas is initially at a temperature of 17 °C.
The gas has a volume of 0.24 m^3 and a pressure of 1.2×10^5 Pa.

(a) (i) State what is meant by an ideal gas.

.....

.....

..... [2]

(ii) Calculate the amount n of gas.

n = ... mol [2]

(b) The gas undergoes three successive changes, as shown in Fig. 3.1.

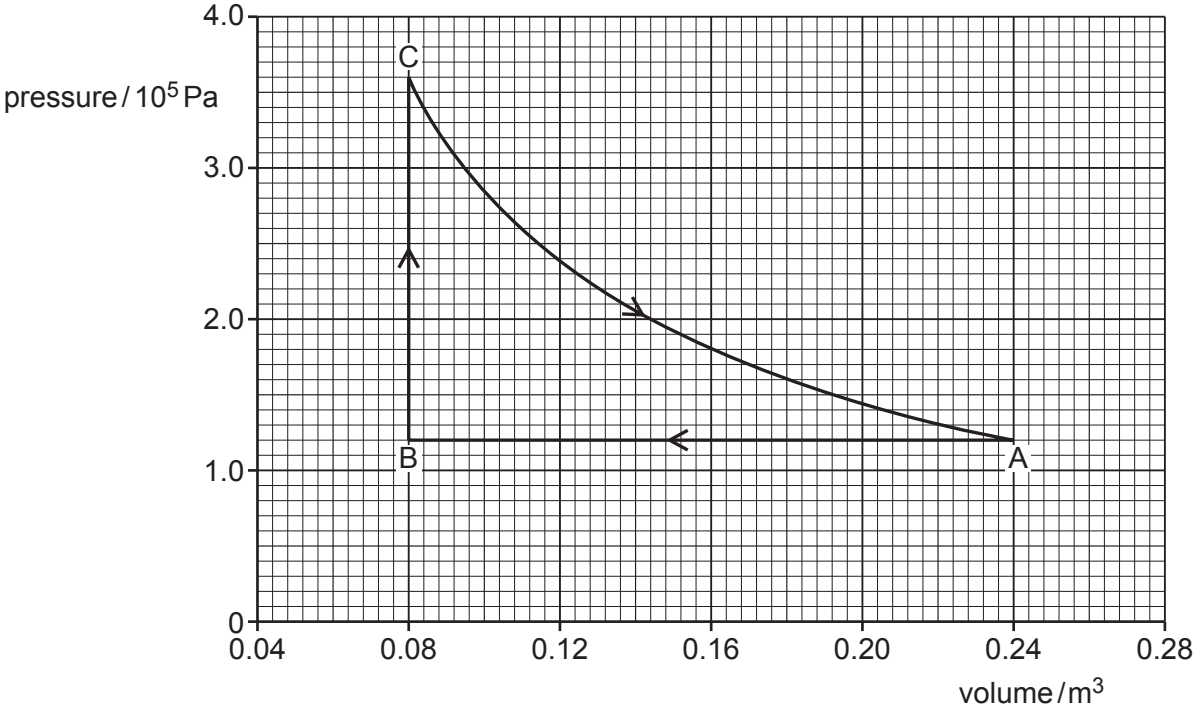

Fig. 3.1

The initial state is represented by point A. The gas is cooled at constant pressure to point B by the removal of 48.0 kJ of thermal energy.

The gas is then heated at constant volume to point C.

Finally, the gas expands at constant temperature back to its original pressure and volume at point A. During this expansion, the gas does 31.6 kJ of work.

(i) Show that the magnitude of the work done during the change AB is 19.2 kJ.

[2]

(ii) Complete Table 3.1 to show the work done on the gas, the thermal energy supplied to the gas and the increase in internal energy of the gas, for each of the changes AB, BC and CA.

Table 3.1

change	work done on gas / kJ	thermal energy supplied to gas / kJ	increase in internal energy of gas / kJ
AB		–48.0	
BC			
CA	–31.6		

[5]

[Total: 11]