2 **(a)** Explain why a real gas approaches ideal behaviour at very low pressure.

……

……

……

…… [2]

(b) The variation with pressure p of the volume V of a fixed mass of an ideal gas is shown in Fig. 2.1. The gas undergoes a cycle of changes A to B to C to A.

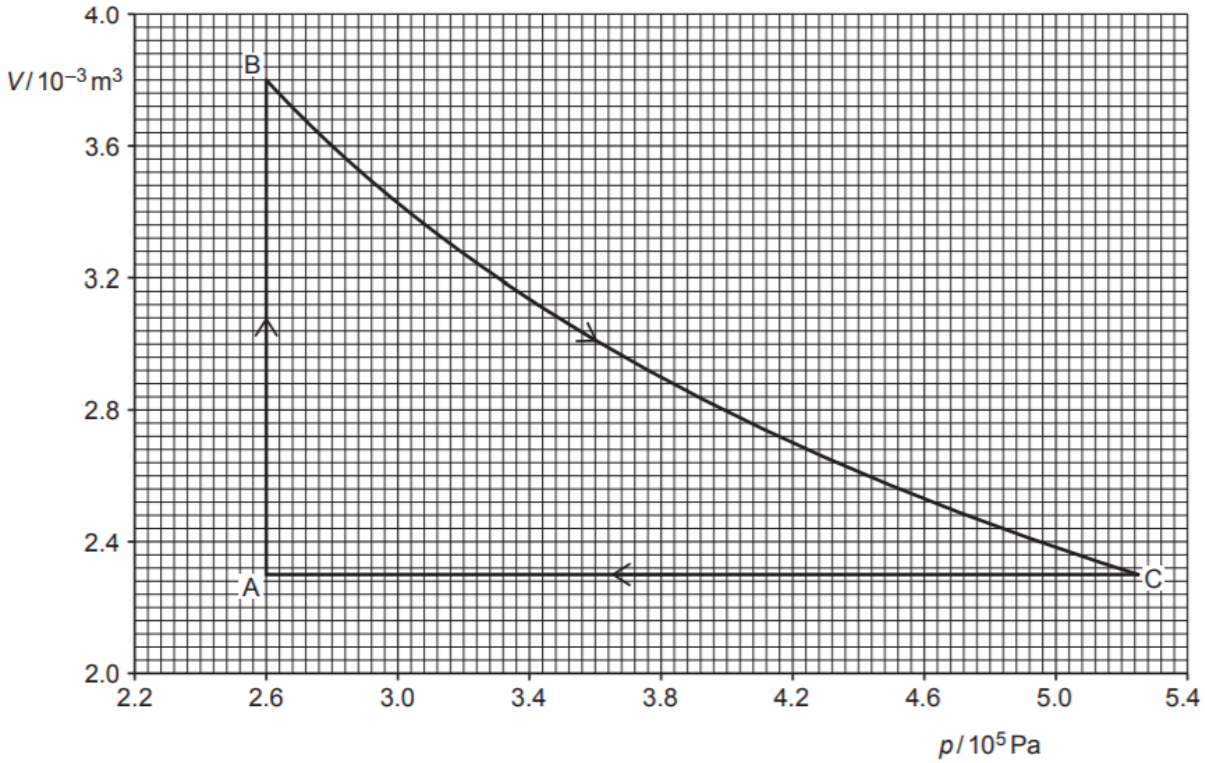

Fig. 2.1

(i) Show that the change from B to C is not an isothermal process.

[1]

(ii) Calculate the work done on the gas during the change A to B and C to A.

work done from A to B = …….. J

work done from C to A = …….. J [2]

(iii) During the change A to B, 1370 J of thermal energy is transferred to the gas. During the change B to C, no thermal energy enters or leaves the gas. The work done on the gas during this change is 550 J.

Complete the table below.

Process	Heat supplied, Q /J	Work done on gas, W / J	Change in internal energy, ΔU / J
A to B	1370		
B to C	0	550	
C to A			

[2]

(iv) The cycle of change is now reversed from A to C to B to A. It is now operating as a heat engine, converting some heat energy to useful work. The efficiency of this heat engine is defined as the

$$\text{Efficiency} = \frac{\text{net work done in a cycle}}{\text{heat absorbed in a cycle}}$$

Calculate the efficiency of this engine.

efficiency = …… [2]