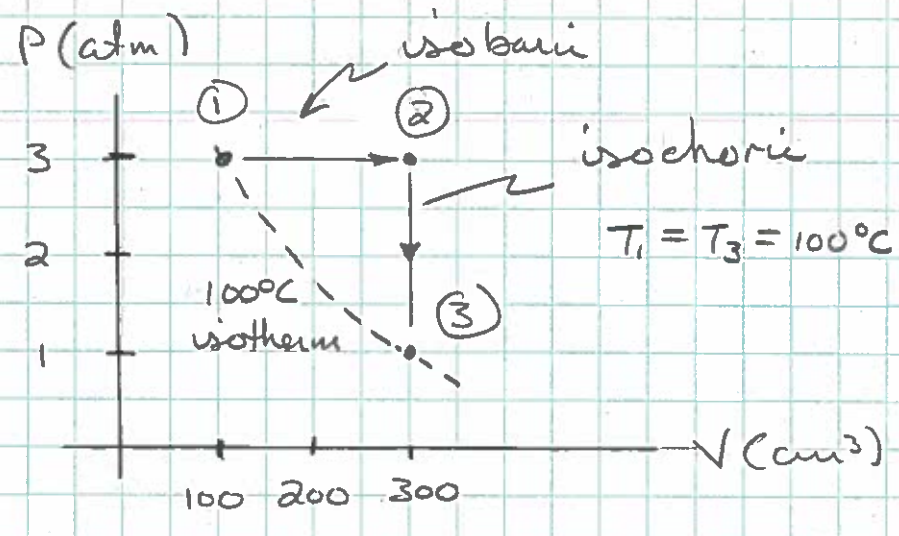

Monatomic Gas $\Rightarrow$ $C_V = 12.5 \frac{J}{mol\,K}$ & $C_P = 20.8 \frac{J}{mol\,K}$

a.) Find $Q_{1\to2}$:

$$Q_{1\to2} = nC_P\Delta T = nC_P(T_2 - T_1)$$

Now: $PV = nRT \Rightarrow T = \frac{PV}{nR}$

So

$$Q_{1\to2} = nC_P\frac{1}{nR}(P_2V_2 - P_1V_1) = \frac{C_P}{R}(P_2V_2 - P_1V_1)$$

where = $P_1 = 3.039\times10^5 Pa$, $V_1 = 100\times10^{-6} m^3$
$P_2 = P_1$ $V_2 = 300\times10^{-6} m^3$

$$\underline{Q_{1\to2} = 152.1\ J}$$

— or, you could find n & T_2

b.) Find $Q_{2\to3}$

$$Q_{2\to3} = nC_V\Delta T = nC_V(T_3 - T_2)$$

$$= nC_V\frac{1}{nR}(P_3V_3 - P_2V_2) = \frac{C_V}{R}(P_3V_3 - P_2V_2)$$

$P_3 = 1.013\times10^5 Pa$
$V_3 = V_2$

$\therefore$ $\underline{Q_{2\to3} = -91.38}$