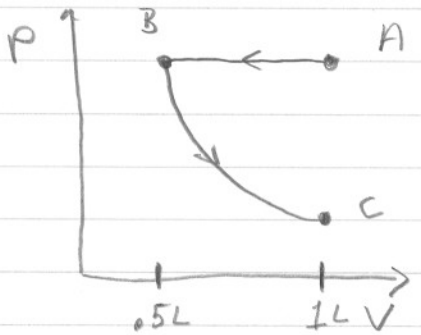
p433 1, 3, 5, 7, 11 and Questions 19, 22

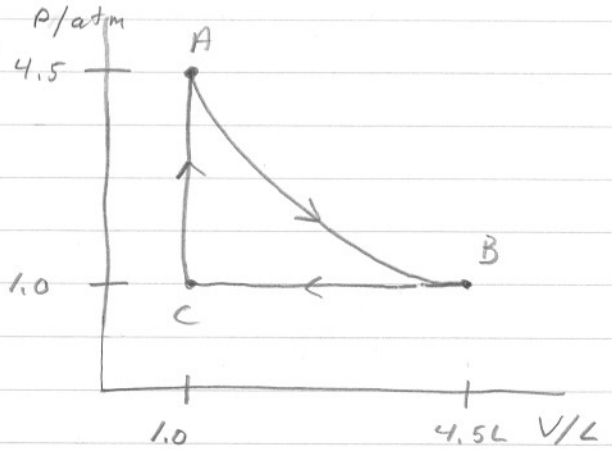
(1) (a) $Q = \Delta U + W$ $\quad \underline{\Delta U = 0}$

(b) $Q = \underline{3.4 \times 10^6 \text{ J}}$

(3)



(5)



$P_1V_1 = nRT = P_2V_2$

$(4.5 \text{ atm})(1.0 \text{ L}) = (1.0 \text{ atm})V_2$

$V_2 = 4.5 \text{ L}$

(7) (a) adiabatic, so $\underline{Q = 0}$

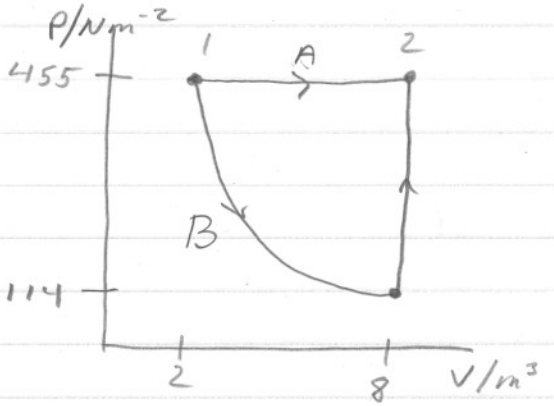
(b) $Q = \Delta U + W$

$\Delta U = -W = -(-1850 \text{ J}) = \underline{1850 \text{ J}}$

(work is negative because the work is done ON the gas)

(c) internal energy increases, so <u>temperature rises</u>

(11)



(b) $W = P\Delta V = (455\ Nm^{-2})(8-2\ m^3) = \underline{2730\ J}$

$PV = nRT$

$T = \frac{PV}{nR}$

$\Delta T = \frac{P}{nR}\Delta V \quad \Delta U = \frac{3}{2}nR\Delta T$ Note: you are not expected to know this equation

$\Delta U = \frac{3}{2}\cancel{nR}\left(\frac{P}{\cancel{nR}}\Delta V\right) = \frac{3}{2}(455\ Nm^{-2})(8-2\ m^3) = \underline{4095\ J}$

(c) $P_1V_1 = nRT = P_2V_2$

$P_2 = \frac{P_1V_1}{V_2} = \frac{(455\ Nm^{-2})(2\ m^3)}{8\ m^3} = 113.75\ Nm^{-2}$

(d) the first part is isothermal so $\Delta U = 0$

the second part goes to (2)

the process B goes from point 1 to 2, which is the same as process A, that means that the change in internal energy will be the same.

$\underline{4095\ J}$

Q 19 NO. Work was done (by you) on the system. So while the stacking of the papers decreased entropy, the heat energy given off by you increased entropy more.

Q 22. NO. The entropy of the organism decreases, but the entropy of the surroundings increases more (heat given off)