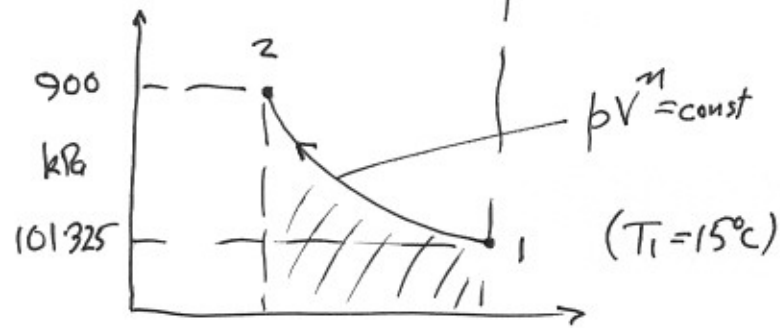


Since specific work is required assume 1 kg of air



(a) Find V_1 from $p_1 V_1 = mRT_1$ $V_1 = \frac{mRT_1}{p_1} = \frac{1 \times 287 \times 288}{101325} = 0.81575 \text{ m}^3$

Find V_2 from $p_1 V_1^n = p_2 V_2^n$ $V_2 = V_1 \left(\frac{p_1}{p_2} \right)^{\frac{1}{n}}$
 $= 0.81575 \left(\frac{101325}{900} \right)^{\frac{1}{1.27}}$
 $= 0.1461 \text{ m}^3$

$W_{12} = \frac{p_2 V_2 - p_1 V_1}{n-1}$
 $= \frac{900 \times 0.1461 - 101325 \times 0.81575}{1.27-1} = 180.91 \text{ kJ/kg}$

(b) $\frac{T_2}{T_1} = \left(\frac{p_2}{p_1} \right)^{\frac{n-1}{n}}$ $\therefore T_2 = T_1 \left(\frac{p_2}{p_1} \right)^{\frac{n-1}{n}}$
 $= 288 \left(\frac{900}{101325} \right)^{\frac{1.27-1}{1.27}} = 458.2 \text{ K}$

(c) $Q + W = \Delta U$ $\therefore Q = \Delta U - W$ $\Delta U = m C_v (T_2 - T_1)$
 $\Delta U = 1 \times 0.72 \times (458.2 - 288) = 122.54 \text{ kJ}$
 $\therefore Q = 122.54 - 180.91 = -58.37 \text{ kJ/kg}$