

Problem 1

Given: $P_1 = 1 \text{ bar}$, $V_1 = 0.3 \text{ m}^3$

$P_2 = 3 \text{ bar}$, $V_2 = 0.1 \text{ m}^3$

Pressure varies linearly with volume

Determine: The work done

Work = $A_{\text{triangle}} + A_{\text{rectangle}}$
Volume is decreasing

$$= \left[\frac{1}{2} (0.3 \text{ m}^3 - 0.1 \text{ m}^3) (3 \text{ bar} - 1 \text{ bar}) \left(\frac{10^5 \text{ Pa}}{1 \text{ bar}} \right) + (0.3 \text{ m}^3 - 0.1 \text{ m}^3) (1 \text{ bar}) \left(\frac{10^5 \text{ Pa}}{1 \text{ bar}} \right) \right]$$

$$W_{12} = -40,000 \text{ J}$$

$$W_{12} = -40 \text{ kJ}$$

