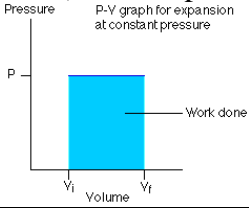
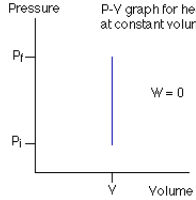
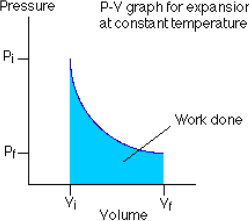
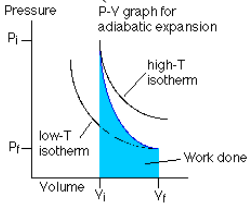


Thermodynamics Equations

type of thermal process	work done $W = Q - \Delta U$	change in internal energy $\Delta U = Q - W$	heat flow $Q = \Delta U + W$
isobaric (constant pressure) 	$W = P\Delta V = nR\Delta T$	$\Delta U = Q - P\Delta V = \frac{3}{2}nR\Delta T$	$Q = \Delta U + P\Delta V = \frac{5}{2}nR\Delta T$
isochoric (constant volume) 	$W = 0$	$\Delta U = Q = \frac{3}{2}nR\Delta T$	$Q = \Delta U = \frac{3}{2}nR\Delta T$
isothermal (constant temperature)  $PV_i = P_fV_f = nRT$	$W = Q = nRT \ln\left(\frac{V_f}{V_i}\right) = P_iV_i \ln\left(\frac{V_f}{V_i}\right)$	$\Delta U = 0$	$Q = W = nRT \ln\left(\frac{V_f}{V_i}\right) = P_iV_i \ln\left(\frac{V_f}{V_i}\right)$
adiabatic (no heat flow)  $PV_i^\gamma = P_fV_f^\gamma,$ $\gamma = \frac{5}{3}$ for monatomic ideal gas	$W = -\Delta U = \frac{3}{2}nR\Delta T$	$\Delta U = -W = \frac{3}{2}nR\Delta T$	$Q = 0$