

path	W	Q	ΔU	ΔS
P -constant	$-P\Delta V$	$nC_p\Delta T$	$nC_v\Delta T$	$nC_p \ln(T_f/T_i)$
V -constant	0	$nC_v\Delta T$	$nC_v\Delta T$	$nC_v \ln(T_f/T_i)$
T -constant	$-nRT \ln(V_f/V_i)$	$-W$	0	$nR \ln(V_f/V_i)$
S -constant	$nC_v\Delta T$	0	$nC_v\Delta T$	0
line	$-\frac{1}{2}(P_f + P_i)\Delta V$	$\Delta U - W$	$nC_v\Delta T$	$nC_p \ln(V_f/V_i) + nC_v \ln(P_f/P_i)$
cycle	-area	area	0	0

Note: $nR\Delta T = P_f V_f - P_i V_i$

$$C_p = C_v + R$$

$$C_v = \frac{f}{2} R$$

$$\gamma = \frac{C_p}{C_v} = \frac{f+2}{f}$$

$$PV^\gamma = \text{constant}$$

$$TV^{\gamma-1} = \text{constant}$$

$$P^{1-\gamma}T^\gamma = \text{constant}$$

