1. You should know from memory:
   - the ideal gas, van der Waals, and virial (1/V and p forms) equations of state
   - R in J/K mol and in L atm/K mol
   - the definitions of $\alpha$ and $\kappa_T$
   - the definition of the ideal gas temperature scale
   - the algebraic sign conventions on $q$ and $w$
   - the expressions for pV work
   - the first law of thermodynamics (dU and $\Delta U$ forms)
   - the definition of enthalpy, H
   - the definitions of $C_v$ and $C_p$
   - the expression for the adiabatic expansion of an ideal gas
   - the definition of the coefficient of the Joule-Thompson effect
   - the relationship between $C_p$ and $C_v$ for an ideal gas
   - the definition of the efficiency of a Carnot cycle
   - the general form of the second law of thermodynamics

2. You should know how to:
   - find the critical point of a gas from the equation of state
   - calculate the pV work given the path
   - calculate $q_v$ and $q_p$ for the appropriate paths
   - determine if a differential is an exact differential
   - determine if a function is a state function
   - derive the pV expression for the adiabatic expansion of an ideal gas
   - derive the general expression relating $C_p$ and $C_v$ given the equation of state
   - estimate $q_p$ from $q_v$ for a chemical reaction and vice versa
   - calculate $\Delta H^\circ$ and $\Delta U^\circ$ from calorimetric data or from tables of $\Delta H^\circ$
   - calculate $\Delta H^\circ$ at $T_2$ from $\Delta H^\circ$ at $T_1$ and $C_p$ data
   - calculate $\Delta H^\circ$ from bond energies
   - analyze a Carnot cycle
   - calculate $\Delta S$ for various processes at constant p, constant V, or constant T (reversible or irreversible)

3. You should understand:
   - what is an equation of state
   - what is a critical point
   - the law of corresponding states
   - the relationship between heat, work, kinetic energy and potential energy
   - what is a state function
   - what is the experimental result of the Joule expansion
   - the meaning of the term "adiabatic"