Review 10/15/08

- Maxwell - Boltzmann Velocity Dist.

$$N_v = 4\pi N_0 \left(\frac{m}{2\pi k_B T}\right)^{3/2} v^2 e^{-mv^2/2k_BT}$$

- Boltzman Energy Factor

$$n(E) = n_0 e^{-E/k_BT}$$

~~For deter~~ This gives the number of atom w/ energy Between E and E + dE

$$n(E)dE$$

As T increases it becomes more probable that the particle energy rises.
$n = N/V$, number density

- Mean free path

$$\lambda = \frac{1}{\sqrt{2}\pi d^2 n}$$

d ~ diameter of atom

- Blackbody Radiation
  absorp or lose energy by light

  Stefan's Law

  $$P = \sigma A e T^4$$

  A = Surface Area
  e = emissivity, equals 1 black body

  $\sigma = 5.67 \times 10^{-8}$ W/m²-K⁴
  Stefan - Boltzman Const.

  e = 0 perfect reflector, no energy absorbed

  e = 1 all energy absorbed

- Thermal Conductivity
  absorb or lose energy via heat

  $$\frac{dQ}{dt} = -\sigma A \frac{dT}{dx}$$

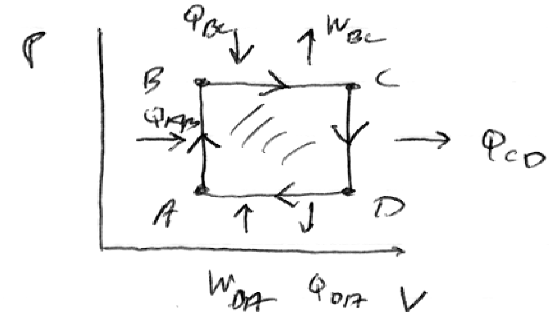
  σ = thermal conductivity
  (not same as above!)

  A = area

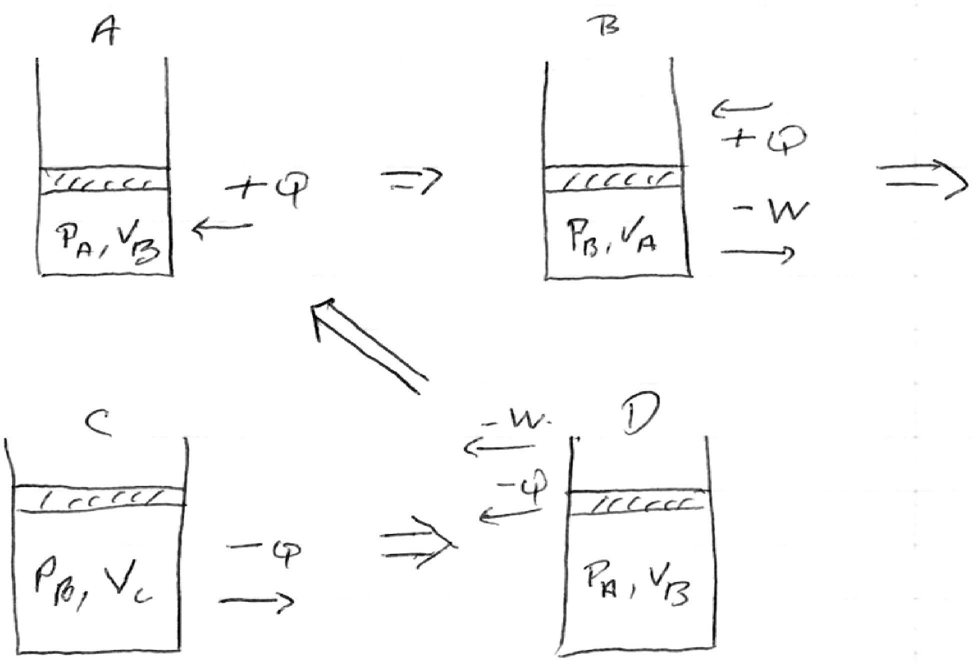
  $\frac{dT}{dx}$ = temperature gradient

- Convection
  ~~ats~~ movement of particles to distribute energy.

- Cyclic Process

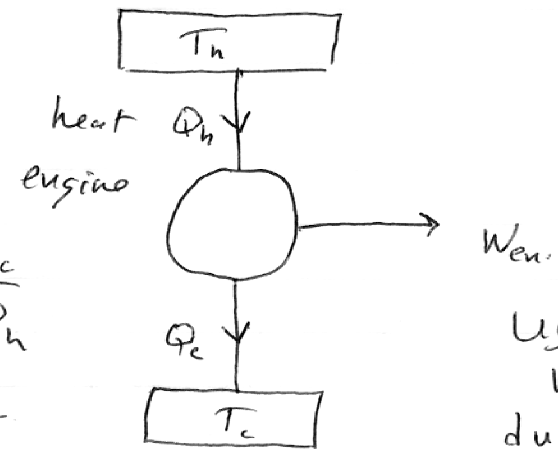


Ideal Gas



When back to A $\Delta E = 0$ for cycle

- Engine model



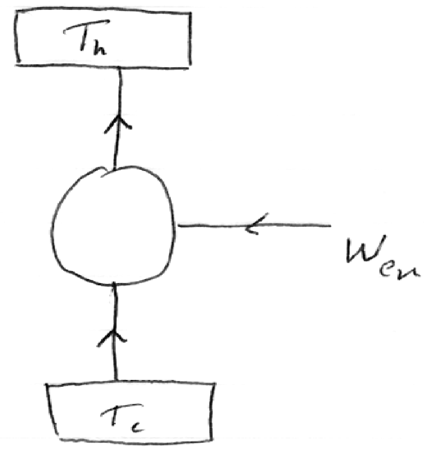
efficiency

$$\eta = 1 - \frac{Q_c}{Q_h}$$

$$= \frac{W_{en}}{Q_h}$$

Use T_h to do work
dump waste heat to T_c

refrigerator
(heat pump)



Coefficient of Performance

$$\kappa_c = \frac{Q_c}{W} \qquad \kappa_h = \frac{Q_h}{W}$$

cooling heating

transfer heat from T_c to T_h
by supplying W.