General Stuff

- Density - $\rho = \frac{\Delta m}{\Delta V}$
  - Uniform Density - $\rho = \frac{m}{V}$
- Pressure - $p = \frac{\Delta F}{\Delta A}$
  - Uniform Force on Flat Area - $\rho = \frac{F}{A}$
  - Conversions - $1atm = 1.01 \times 10^5 Pa = 760torr = 14.7lb/in^2$

Fluids

We must satisfy several parameters to make life easier, and to use most of these formulae.

1. Incompressible - Density of the fluid is constant
2. Non-turbulent Flow - Think of fluids swirling around an object
3. Isostatic Pressure - Pressure inside the fluid is the same in all directions

- Pressure at Some Depth - $p_2 = p_1 + \rho g \left(y_1 - y_2\right)$
  - Pressure at Depth $h \rightarrow p = p_0 + \rho gh$
- Pascal's Principle - 2 Parts
  1. $\vec{F_o} = \vec{F_i}\ \frac{A_o}{A_i}$
  2. $d_o = d_i \frac{A_i}{A_o}$
- Archimede's Principle - $\vec{F}_{Up} = \vec{F}_{Down}$
  - $\vec{F}_{Bouyant} = m_{Floating} g$
- Continuity - $A_1 v_1 = A_2 v_2$
- Bernoulli's Equation - $p_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = p_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$
  - Fluids at Rest - $p_2 = p_1 + \rho g \left(y_1 - y_2\right)$
  - Fluids not Changing Height - $p_1 + \frac{1}{2}\rho v_1^2 = p_2 + \frac{1}{2}\rho v_2^2$

Waves

Usually of form $y = y_m \sin\left(kx \pm \omega t\right)$

- y_m - Amplitude, m
- k - Angular Wave Number, rad/m
  - $k = \frac{2\pi}{\lambda}$
  - λ is wavelength, m
- ω - Angular Frequency, rad/s
  - $\omega = 2\pi f$
  - f is frequency, Hz
  - Sign of this goes the opposite the direction the wave is going
    1. Wave going in positive direction $(+)$, then the sign should be negative $(-)$
    2. Wave going in negative direction $(-)$, then the sign should be positive $(+)$
- $v = \lambda f$, Wave Velocity, m/s
  - $v = \frac{\omega}{2\pi} * \frac{2\pi}{k} = \frac{\omega}{k}$

Thermodynamics

Quantum Mechanics