Fluids

Pressure: $P = \frac{F}{A}$ Density: $\rho = \frac{m}{V}$

Pressure in a static fluid: $P_2 = P_1 + pgh$ Buoyant Force: $F_B = \rho_{fluid} V_{disp} g$

Rotation

$s = r\theta$ $v = r\omega$ $a_T = r\alpha$ centripetal acceleration: $a_C = \frac{v^2}{r}$

Rotational kinematics:

$\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$ $\omega = \omega_0 + \alpha t$ $\omega^2 = \omega_0^2 + 2\alpha\,\Delta\theta$

Static Equilibrium: $\sum \vec{F} = 0$ $\sum \vec{\tau} = 0$

Newton's Second Law for Rotation: $\sum \vec{\tau} = I\vec{\alpha}$

Angular Momentum: $\vec{L} = I\vec{\omega}$ Rotational Kinetic Energy: $KE = \frac{1}{2} I\omega^2$

Energy Conservation: $U_1 + K_1 + W_{nc} = U_2 + K_2$

Heat and Thermodynamics

Thermal Expansion: $L = L_o(1 + \alpha\,\Delta T)$ $V = V_o(1 + \alpha\,\Delta T)$

Calorimetry: $Q = mc\Delta T$ $Q = mL_V$ $Q = mL_f$

Ideal Gas Law: PV = nRT = NkT First Law: $\Delta U = Q - W$

$Q = n\,C\,\Delta T$ At constant pressure: $W = P\,\Delta V$

$\Delta U = n\,C_V\,\Delta T$ $C_P = C_V + R$