

Equations

Deformation of Solids

$$\frac{F}{A} = Y \frac{\Delta L}{L_0} \quad \frac{F}{A} = S \frac{\Delta x}{h} \quad \Delta P = -B \frac{\Delta V}{V}$$

Density and Pressure

$$\rho \equiv \frac{M}{V} \quad P \equiv \frac{F}{A}$$

Variation of Pressure with Depth

$$P = P_0 + \rho gh$$

Archimede's Principle

$$B = \rho_{\text{fluid}} V_{\text{fluid}} g$$

Fluids in Motion

$$Av = \text{constant} \quad P + \frac{1}{2}\rho v^2 + \rho gh = \text{constant}$$

Temperature Scales

$$T = T_C + 273.15 \quad T_F = \frac{9}{5}T_C + 32$$

Thermal Expansion

$$\Delta L = \alpha L_0 \Delta T \quad \Delta A = \gamma A_0 \Delta T$$

$$\Delta V = \beta V_0 \Delta T$$

Ideal Gases

$$PV = nRT = Nk_B T$$

Kinetic Theory of Gases

$$P = \frac{2}{3} \left(\frac{N}{V} \right) \left(\frac{1}{2} m \overline{v^2} \right) \quad \frac{1}{2} m \overline{v^2} = \frac{3}{2} k_B T$$

$$U = \frac{3}{2} nRT \quad v_{\text{rms}} = \sqrt{\frac{3k_B T}{m}} = \sqrt{\frac{3RT}{M}}$$

Constants

$$N_A = 6.02 \times 10^{23} \text{ particles/mol}$$

$$R = 8.31 \text{ J/(mol} \cdot \text{K)}$$

$$k_B = 1.38 \times 10^{-23} \text{ J/K}$$