Chapters 12, 13 & 15

At equilibrium

$$\sum \vec{F} = 0\,; \qquad \sum \vec{\tau} = 0$$

$x_{CM} = \dfrac{\sum_i m_i x_i}{\sum_i m_i}$ (Center of Gravity); Elastic Modulus $\equiv \dfrac{\text{stress}}{\text{strain}}$;

$Y \equiv \dfrac{F/A}{\Delta L/L_i}$ (Young's Modulus); $S \equiv \dfrac{F/A}{\Delta x/h}$ (Shear Modulus);

$B \equiv -\dfrac{\Delta F/A}{\Delta V/V_i} = -\dfrac{\Delta P}{\Delta V/V_i}$ (Bulk Modulus);

$F_g = G\dfrac{m_1 m_2}{r^2}$ (Newton's Law of Universal Gravitation);

$\dfrac{dA}{dt} = \dfrac{L}{2M_P} = \text{constant}$ (Kepler's Second Law); $T^2 = \left(\dfrac{4\pi^2}{GM_S}\right)a^3 = K_S a^3$ (Kepler's 3rd Law);

$U = -\dfrac{Gm_1 m_2}{r}$ (Gravitational Potential Energy);

(General Expressions for Angular Frequency & Period)

$$\omega = 2\pi f\,; \qquad T = \frac{1}{f}\,;$$

$F_S = -kx$ (Hooke's Law); $\omega = \sqrt{\dfrac{k}{m}}$ (Angular Frequency of Spring Motion);

$T = 2\pi\sqrt{\dfrac{k}{m}}$ (Period of Spring Motion); $E = \frac{1}{2}kA^2$ (Energy for Spring Motion);

$T = 2\pi\sqrt{\dfrac{L}{g}}$ (Period of Simple Pendulum);