Formulas and Constants Test 3

$g = 9.8\ \text{m/s}^2 \qquad \rho_{\text{water}} = 1000\ \text{kg/m}^3 \qquad \rho_{\text{air}} = 1.29\ \text{kg/m}^3 \qquad P_{\text{atm}} = 1.013 \times 10^5\ \text{Pa} \qquad \text{Pa} = \text{N/m}$

$$C_{\text{circle}} = 2\pi R \qquad A_{\text{disk}} = \pi R^2 \qquad A_{\text{sphere}} = 4\pi R^2 \qquad V_{\text{sphere}} = \frac{4}{3}\pi R^3$$

$$\theta = \frac{s}{r} \qquad \bar{\omega} = \frac{\Delta\theta}{\Delta t} \qquad \bar{\alpha} = \frac{\Delta\omega}{\Delta t} \qquad \omega = \omega_0 + \alpha t \qquad \Delta\theta = \omega_0 t + \frac{1}{2}\alpha t^2 \qquad \omega^2 = \omega_0^2 + 2\alpha\Delta\theta$$

$$v_{\text{linear}} = v_T = r\omega \qquad a_{\text{linear}} = a_T = r\alpha \qquad a_c = r\omega^2 \qquad a_{\text{total}} = \sqrt{a_T^2 + a_c^2}$$

$$I_{\text{point}} = mr^2 \qquad I_{\text{rod,axis at center}} = \frac{1}{12}ML^2 \qquad I_{\text{sphere,axis at center}} = \frac{2}{5}MR^2 \qquad I_{\text{system}} = I_1 + I_2 + \cdots$$

$$\text{torque} = \tau = F\ell\sin\theta = F\ell_\perp \qquad \tau_{\text{net}} = I\alpha \qquad \text{KE}_{\text{rot}} = \frac{1}{2}I\omega^2$$

$$L = I\omega \qquad \tau_{\text{ext}} = \frac{\Delta L}{\Delta t} \qquad \text{equilibrium}: \sum F = 0 \ \text{ and } \ \sum \tau = 0$$

$$F = -kx \qquad f = \frac{1}{T} \qquad \omega = 2\pi f = \frac{2\pi}{T}$$

$$x(t) = A\cos(\omega t) \qquad v_{\text{max}} = A\omega \qquad a_{\text{max}} = A\omega^2 \qquad \omega = \sqrt{\frac{k}{m}}$$

$$\text{PE}_{\text{spring}} = \frac{1}{2}kx^2 \qquad E_{\text{tot}} = \frac{1}{2}mv^2 + \frac{1}{2}I\omega^2 + mgh + \frac{1}{2}kx^2$$

$$\omega_{\text{simple pend}} = 2\pi f = \sqrt{\frac{g}{L}} \qquad \omega_{\text{phys pend}} = 2\pi f = \sqrt{\frac{mgL}{I}}$$

$$\rho = \frac{m}{V} \qquad P = \frac{F}{A} \qquad P_2 = P_1 + \rho g h \qquad F_B = W_{\text{displaced fluid}}$$

$$\text{mass flow rate} = \rho A v \qquad \rho_1 A_1 v_1 = \rho_2 A_2 v_2 \qquad (\text{if incompressible}): \ A_1 v_1 = A_2 v_2$$

$$P_1 + \frac{1}{2}\rho v_1^2 + \rho g y_1 = P_2 + \frac{1}{2}\rho v_2^2 + \rho g y_2$$