Name: Date: Period:

# Honors Physics Equation Sheet (Spring Final Exam)

## Momentum

$$p \equiv mv \qquad J \equiv F\Delta t \qquad \Sigma F = \frac{\Delta p}{t} \qquad \Sigma p = \Sigma p' \qquad v_A + v'_A = v_B + v'_B \qquad x_{CM} = \frac{\Sigma m_i x_i}{m_i}$$

## Rotational Motion

| | | |
|---|---|---|
| $\omega \equiv \frac{\Delta\theta}{\Delta t}$ | $v = r\omega$ | 1 rev $= 360^\circ = 2\pi$ rad |
| $\alpha \equiv \frac{\Delta\omega}{\Delta t}$ | $a_T = r\alpha$ | 1 rpm $= 0.1047$ rad/s |
| $\tau = I\alpha$ | $\tau \equiv rF_\perp$ | |
| $L = I\omega$ | $a_C = \omega^2 r$ | $I = mr^2$ |
| $I_{\text{hoop}} = MR^2$ | $I_{\text{disc}} = \frac{1}{2}MR^2$ | $I_{\text{sphere}} = \frac{2}{5}MR^2$ |

| | | |
|---|---|---|
| $\omega = \omega_0 + \alpha t$ | $\theta = \theta_0 + \omega_0 t + \frac{1}{2}\alpha t^2$ | $\omega^2 = \omega_0^2 + 2\alpha(\theta - \theta_0)$ |
| *"Old Faithful"* | *"The Big Chalupa"* | *"Ain't Got No Time"* |

## Simple Harmonic Motion & Waves

$$F_S = -kx \qquad KE = \frac{1}{2}mv^2 \qquad PE_e = \frac{1}{2}kx^2 \qquad PE_g = mgy$$

$$f_s = \frac{1}{2\pi}\sqrt{\frac{k}{m}} \qquad f_p = \frac{1}{2\pi}\sqrt{\frac{g}{L}} \qquad \omega = 2\pi f$$

$$x(t) = A\cos(\omega t + \phi) \qquad v(t) = -A\omega\sin(\omega t + \phi) \qquad a(t) = -A\omega^2\cos(\omega t + \phi)$$

$$v = f\lambda \qquad f_n = \frac{nv}{2L} = nf_1 \qquad f_{BEAT} = |f_1 - f_2|$$

## Electricity

$$F = \frac{kq_1q_2}{r^2} \qquad E \equiv \frac{F}{q} = \frac{kq}{r^2} \qquad I \equiv \frac{\Delta q}{t} \qquad V = IR$$

$$k = 9.0 \times 10^9\,\text{Nm/C}^2 \qquad e = 1.60 \times 10^{-19}\,\text{C}$$

Name: Date: Period:

## Magnetism

$$F = BIL \qquad \vec{F} = q\vec{v} \times \vec{B} \qquad B_{\text{wire}} = \frac{\mu_0 I}{2\pi r} \qquad V = IR$$

$$\mathcal{E} = -\frac{\Delta\Phi}{\Delta t} \qquad \frac{F}{\ell} = \frac{\mu_0 I_1 I_2}{2\pi d} \qquad \vec{a} \times \vec{b} = ab\sin\theta$$

$$\mu_0 = 4\pi \times 10^{-7}\,\text{Tm}^2/\text{A} \qquad e = 1.60 \times 10^{-19}\,\text{C}$$

## Optics

$$n = \frac{c}{v} \qquad n_1 \sin\theta_1 = n_2 \sin\theta_2 \qquad \sin\theta_c = \frac{n_2}{n_1}$$

$$\frac{1}{d_i} + \frac{1}{d_o} = \frac{1}{f} \qquad m \equiv \frac{h_i}{h_o} = -\frac{d_i}{d_o} \qquad P \equiv \frac{1}{f}$$

$$c = 3.0 \times 10^8\,\text{m/s}$$