PHY "Physics with Calculus 1" Summer 2012
Physical Constants and Formula Sheet (version of 26 July 2012)
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PLEASE note these general rules for graded quiz material. Use only pencil. Show all work for full credit. Work must be clear and unambiguous for credit. Please place your name and the "last-4" of your UFID on the upper right-hand corner of your quiz. Calculators may be used for numerical work, but they may not be used to store/recall formula. The quizzes, tests, and final exam must be your own independent work. Unless otherwise stated, the notation is the same as used in lecture and the textbook. Please do not share quiz and small group work with students in other discussion sections until Thursday morning.
Recall that by participating in the graded work, you agree to abide by the the UF Honor Code:
"On my honor, I have neither given nor received unauthorized aid in doing this assignment."

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$g = 9.8\,\frac{\mathrm{m}}{\mathrm{s}^2}$ $\quad g = 32\,\frac{\mathrm{ft}}{\mathrm{s}^2}$ $\quad 1.00\,\mathrm{in} = 2.54\,\mathrm{cm}$ $\quad c = 2.998\times10^{8}\,\mathrm{m/s}$

$G = 6.67\times10^{-11}\,\mathrm{N\cdot m^2/kg^2}$

$v = v_o + at$ $\quad x - x_o = v_o t + \frac{1}{2}at^2$

$v^2 = v_o^2 + 2a(x - x_o)$

$x - x_o = \frac{1}{2}(v_o + v)t$ $\quad x - x_o = vt - \frac{1}{2}at^2$

$\vec{a}\cdot\vec{b} = a_x b_x + a_y b_y + a_z b_z$ $\quad \vec{a}\cdot\vec{b} = |\vec{a}|\,|\vec{b}|\,\cos(\theta)$

$|\vec{a}\times\vec{b}| = |\vec{a}|\,|\vec{b}|\,\sin(\theta)$ $\quad \vec{a}\times\vec{b} = (a_y b_z - a_z b_y)\hat{i} + (a_z b_x - a_x b_z)\hat{j} + (a_x b_y - a_y b_x)\hat{k}$

$\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$ $\quad \vec{v} = \frac{d\vec{r}}{dt}$ $\quad \vec{a} = \frac{d\vec{v}}{dt}$ $\quad R = \frac{v_o^2}{g}\sin(2\theta_o)$

$f = \frac{1}{T}$ $\quad \omega = 2\pi f$ $\quad \vec{a} = -\omega^2\,\vec{r}$ $\quad a = \frac{v^2}{r}$ $\quad v = \omega r$

$\vec{F} = m\,\vec{a}$ $\quad f_s \le \mu_s F_N$ $\quad f_k = \mu_k F_N$

$K = \frac{1}{2}mv^2$ $\quad \Delta K = K_f - K_i = W$ $\quad W = \vec{F}\cdot\vec{d} = \int_i^f F(x)\,dx$

$P = \frac{dW}{dt} = \frac{dE}{dt}$ $\quad \vec{F}_s = -k\vec{d}$ $\quad F_x = -kx$

$\Delta U = mg(\Delta y)$ $\quad U(x) = \frac{1}{2}kx^2$ $\quad W = \Delta E$ $\quad \Delta E = \Delta E_{\mathrm{mec}} + \Delta E_{\mathrm{th}} + \Delta E_{\mathrm{int}}$

$\vec{r}_{\mathrm{com}} = \frac{1}{M}\sum_i m_i\vec{r}_i$ $\quad M = \sum_i m_i$ $\quad \vec{F}_{\mathrm{net}} = M\,\vec{a}_{\mathrm{com}}$

$\vec{p} = m\,\vec{v}$ $\quad \vec{F}_{\mathrm{net}} = \frac{d\vec{p}}{dt}$ $\quad \vec{J} = \Delta\vec{p}$ $\quad \vec{J} = \int_i^f \vec{F}(t)\,dt$

$\vec{P} = M\,\vec{v}_{\mathrm{com}}$ $\quad \vec{F}_{\mathrm{net}} = \frac{d\vec{P}}{dt}$ $\quad \vec{P}_i = \vec{P}_f$ $\quad \Delta K_{\mathrm{elastic}} = 0$

$R\,v_{\mathrm{rel}} = Ma$ $\quad v_f - v_i = v_{\mathrm{rel}}\ln(\frac{M_i}{M_f})$

$s = r\theta$ $\quad \omega = \frac{d\theta}{dt}$ $\quad \alpha = \frac{d\omega}{dt}$ $\quad a_r = \frac{v^2}{r} = r\omega^2$ $\quad a_t = r\alpha$

$I = \sum_i m_i r_i^2 = \int r^2 dm$ $\quad I = I_{\mathrm{com}} + Mh^2$ $\quad \vec{\tau} = \vec{r}\times\vec{F}$ $\quad \tau = I\alpha$

$\vec{L} = \vec{r}\times\vec{p}$ $\quad L = I\omega$ $\quad \vec{L}_i = \vec{L}_f$ $\quad \vec{\tau} = \frac{d\vec{L}}{dt}$

$K = \frac{1}{2}I_{\mathrm{com}}\omega^2 + \frac{1}{2}mv_{\mathrm{com}}^2$ $\quad W = \int \tau\, d\theta$ $\quad P = \tau\omega$

$\vec{F}_{\mathrm{net}} = 0$ and $\vec{\tau}_{\mathrm{net}} = 0$ in equilibrium. $\quad F = G\,\frac{m_1 m_2}{r^2}$

$\frac{F}{A} = E\,\frac{\Delta L}{L}$ $\quad \frac{F}{A} = G\,\frac{\Delta x}{L}$ $\quad p = \frac{F}{A} = B\,\frac{\Delta V}{V}$ $\quad U = -G\,\frac{m_1 m_2}{r}$

$\rho = \frac{m}{V}$ $\quad p_2 = p_1 + \rho g(y_1 - y_2)$ $\quad F_b = m_f g$ $\quad R_v = Av = \text{"}C\text{"}$

$R_m = \rho R_v = \rho A v = \text{"}C\text{"}$ $\quad p + \frac{1}{2}\rho v^2 + \rho g y = \text{"}C\text{"}$

$x(t) = x_m\cos(\omega t + \phi)$ $\quad a = \frac{d^2x}{dt^2} = -\omega^2 x$ $\quad \omega^2 = \frac{k}{m}$ or $\frac{\kappa}{I}$ or $\frac{g}{L}$ or $\frac{mgh}{I}$

$k = \frac{2\pi}{\lambda}$ $\quad v = \lambda f = \frac{\omega}{k}$ $\quad y(x,t) = y_m\sin(kx \mp \omega t + \phi)$

$I = P/A$ $\quad I = P_s/(4\pi r^2)$ $\quad I_o = 10^{-12}\,\mathrm{W/m^2}$ $\quad \beta = (10\,\mathrm{dB})\log(I/I_o)$