

Third Quiz for Physics 131 on Thursday, 24 June 2010, Name _____

I will grade all eight (8) problems. Your grade will be based on the best seven of the first eight. Problems A and B are optional and are each worth 2 points.

$$v_{xf} = v_{xi} + a_x t$$

Read all the words!

$$x_f - x_i = v_x t = (1/2)(v_{xi} + v_{xf}) t$$

Check all the units!

$$x_f - x_i = v_{xi} t + (1/2) a_x t^2$$

Distinguish between diameter and radius!

$$v_{xf}^2 = v_{xi}^2 + 2a_x (x_f - x_i)$$

$$\omega_f = \omega_i + \alpha t$$

$$\theta_f - \theta_i = \omega t = (1/2)(\omega_i + \omega_f) t$$

$$\theta_f = \theta_i + \omega_i t + (1/2) \alpha t^2$$

$$\omega_f^2 = \omega_i^2 + 2\alpha(\theta_f - \theta_i)$$

Conservation of angular momentum, $I_i \omega_i = I_f \omega_f$

$$\text{Volume of sphere, } V = (4/3) \pi r^3$$

$$\text{Mass of earth, } M_E = 5.98 \times 10^{24} \text{ kg}$$

$$\text{Mean radius of earth, } R_E = 6.37 \times 10^6 \text{ m}$$

$$\text{Gravitational Constant, } G = 6.672 \times 10^{-11} \text{ N}\cdot\text{m}^2/\text{kg}^2$$

$$\text{Moment of inertia, } I_{cm}, \text{ of cylinder/pulley/wheel, } \frac{1}{2} MR^2$$

$$\text{Moment of inertia, } I_{cm}, \text{ of hoop, } MR^2$$

$$R = 8.31451 \text{ J/mol K}$$

$$\text{Energy Transfer by Conduction, Power} = k A (T_{hot} - T_{cold}) / L$$

$$\text{Energy Transfer by Radiation, Power}_{net} = \sigma A e (T^4 - T_o^4)$$

$$\text{Linear expansion, } \alpha \Delta T = \Delta L / L_o$$

$$\text{Volume expansion, } \beta \Delta T = \Delta V / V_o$$

$$\text{Calorimetry, } \Delta Q = 0$$

$$\text{Torricelli, } v^2 = 2 g h$$

$$\text{Bernoulli, } P_1 + (1/2)\rho v_1^2 + \rho g y_1 = P_2 + (1/2)\rho v_2^2 + \rho g y_2$$

$$\text{Pascal, } P_1 = P_2, \text{ or } F_1 / A_1 = F_2 / A_2$$

Continuity, $A_1 v_1 = A_2 v_2$

Pendulum, $T = 2\pi (L / g)^{1/2}$

Transverse waves, $v = (\text{Tension} / \mu)^{1/2}$

Carnot heat engine efficiency $e_c = 1 - (T_{\text{cold}} / T_{\text{hot}})$

Mass on spring, $T = 2\pi (m / k)^{1/2}$

Simple Harmonic Motion (SHM), $x = A \cos(2\pi f t)$

$PE_{\text{spring}} = \frac{1}{2} k x^2$

$N_A = 6.022 \times 10^{23}$ particles per mole

$v_{\text{sound}} = [331 \text{ m/s}] \{T (\text{K}) / 273 \text{ K}\}^{1/2}$

$K = ^\circ\text{C} + 273.15$

Work on the gas: $W = -P \Delta V$. Work by the gas, $W = P \Delta V$.

$\Delta U = Q + W$, Q energy to the gas by heat from environment.

Ideal gas, $PV = nRT$

Volume of sphere = $\frac{4}{3} \pi r^3$

Pipe open both ends, $f_n = nv/2L$, $n = 1, 2, 3 \dots$

Pipe open one end, closed one end, $f_n = nv / 4L$, $n = 1, 3, 5 \dots$