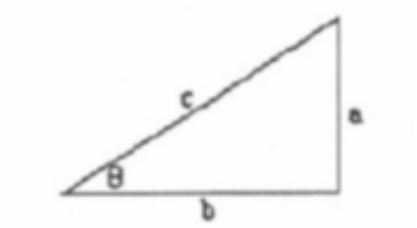
Physics 161 Exam 2

Instructions:

- Please do not write on the exams. They will be used for the next class.
- Blank paper will be on the center table for you to use for your calculations.
- Please fill in the scantron sheet provided. You should fill in your name and student ID number.

- 

- $a^2 + b^2 = c^2$

  $\sin\theta = \frac{a}{c}$
- $\cos\theta = \frac{b}{c}$

  $\tan\theta = \frac{a}{b}$

  If $Ax^2 + Bx + C = 0$ then

  $x = \frac{-B \pm \sqrt{B^2 - 4AC}}{2A}$
- $C = 2\pi r$

  $A = \pi r^2$

  $V = \frac{4}{3}\pi r^3$

  $V = L^3$

  $V = 4\pi r^2 \Delta r$
- 1 km=0.621 mi
- 1 d=24 h
- 1h=3600 s
-
- $X_{CM} = \frac{x_1 m_1 + x_2 m_{2+\ldots}}{M}$

$x = x_0 + v\Delta t$

$x = x_0 + v_0\Delta t + \frac{1}{2}a\Delta t^2$

$v = v_0 + a\Delta t$

$v^2 = v_0^2 + 2a\Delta x$

$g = 9.8\ \text{m/s}^2$

$\sum \vec{F} = m\vec{a}$

$W = Fd\cos\theta$

$W_{net} = KE_2 - KE_1$

$KE = \frac{1}{2}mv^2$

$PE = mgh$

$PE = \frac{1}{2}kx^2$

$s = r\theta$ (radians)

$v_T = r\omega$

$a_T = r\alpha$

$KE_1 + PE_1 + W_{non-cons} = KE_2 + PE$

$\vec{P}_1 + \vec{J} = \vec{P}_2$

$\vec{J} = \sum \vec{F}\Delta t$

$\sum \vec{F} = \frac{\Delta \vec{p}}{\Delta t}$

$\vec{p} = m\vec{v}$

$\sum F = \frac{mv^2}{r}$

$f_s \le \mu_s N$

$f_k = \mu_k N$

$\theta = \theta_0 + \omega\Delta t$

$\theta = \theta_0 + \omega_0\Delta t + \frac{1}{2}\alpha\Delta t^2$

$\omega = \omega_0 + \alpha\Delta t$

$\omega^2 = \omega_0^2 + 2\alpha\Delta\theta$

$\sum \vec{\tau} = I\vec{\alpha}$

$\tau = Fr\sin\theta$

$I = \sum m_i r_i^2$

$KE = \frac{1}{2}I\omega^2$

$I = \begin{cases} MR^2 & \text{for a ring} \\ \frac{1}{2}MR^2 & \text{for solid cylinder or dis} \\ \frac{2}{5}MR^2 & \text{for a solid sphere} \end{cases}$

$\sum \vec{\tau} = \frac{\Delta \vec{\ell}}{\Delta t}$

$\vec{\ell} = I\vec{\omega}$

$\frac{F}{A} = Y\frac{\Delta L}{L_0}$

1 atm=101kPa=760 mmHg=14.7 psi

$P_2 = P_1 + \rho gh$

$F_B = \rho g V_{displaced}$

$A_1 v_1 = A_2 v_2$

$$\text{volume flow rate} = \frac{\Delta p}{\left(\frac{8\eta L}{\pi r^4}\right)}$$

e=1.60x10^{-19} C

k=8.99x10^9 N m^2/C^2

$\varepsilon_0 = 8.85x10^{-12}\ C^2/(Nm^2)$

F

$E = F/q$

$\Delta U = -W_{field}$

$\Delta V = \Delta U/q$

$F = kQq/r^2$

$U = kQq/r$

$\Delta U = -qEd\cos(\theta)$

$\Delta V = -Ed\cos(\theta)$

$C = q/\Delta V$

$C_{total} = C_1 + C_2$

$C_{total} = C_1 C_2/(C_1 + C_2)$

$E = \frac{\sigma}{\varepsilon_0} = \frac{q}{\varepsilon_0 A}$

$I = \Delta q/\Delta t$

$R = \rho\frac{L}{A}$

$R = \frac{\Delta V}{I}$

$P = I\Delta V$

$R_{total} = R_1 + R_2$

$R_{total} = R_1 R_2/(R_1 + R_2)$

$V(t) = V_0\exp(-t/\tau)$

$V(t) = V_\infty(1-\exp(-t/\tau))$

$\tau = RC$

$F_B = qvB\sin\theta$

$F_B = ILB\sin\theta$

$\tau = NIAB\sin\theta$

$\mu_0 = 4\pi\times10^{-7}\ T\cdot m/A$

$B = \frac{\mu_0 I}{2\pi r}$

$B = \mu_0\frac{N}{L}I$