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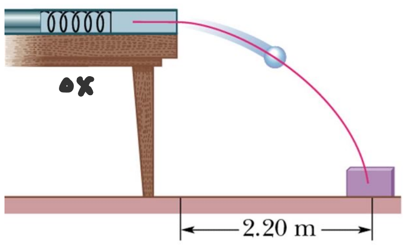

$\frac{.011}{1.93} = \frac{x}{2.2}$

$.0242 = 1.93x$

$x = .0125 = 1.25$ cm

$\Delta x = 1.1$ cm $= .011$ m

27 cm short or .27m

$2.2 - .27 = 1.93$m

$V_f^2 - V_i^2 = 2a\Delta x$

$V_f^2 - 0 = 2(-9.8)(1.93)$

$V_f^2 = 37.828$

$V = 6.15$

Equations +for+Physi...

Possible useful equations for Physics 1250

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

$\Delta v = a \Delta t$

$v_f^2 - v_i^2 = 2a\Delta x$

$\vec{r} = (r\cos\theta)\hat{\imath} + (r\sin\theta)\hat{\jmath}$

$\vec{v} = \frac{d\vec{x}}{dt},\ \vec{a} = \frac{d\vec{v}}{dt}$

$\Sigma\vec{F} = \vec{F}_{net} = m\vec{a}$

$\vec{F}_{12} = -\vec{F}_{21}$

$W = mg$ (weight)

$F_G = GM_1M_2/r^2$

$F_s = -k\Delta x$ (spring force)

$f_k = \mu_k N$ (kinetic friction)

$f_s \le \mu_s N$ (static friction)

$a_c = \frac{v^2}{r}$ (centripetal acceleration)

$W = \vec{F} \cdot \Delta\vec{x}$

$K = \frac{1}{2} m v^2$

$U_g = mgy,\ U_s = \frac{1}{2} k x^2$

$W_{net} = \Delta K = K_f - K_i$

$K_i + U_i + W = K_f + U_f$

$P = \frac{dW}{dt} = \vec{F} \cdot \vec{v}$ (Power)

$\Delta p = F\Delta t$ (change of momentum)

$\Sigma\vec{F} = \vec{F}_{net} = d\vec{p}/dt$

$\vec{p} = m\vec{v},\ \ \vec{p}_i = \vec{p}_f$

$m_1\vec{v}_{1i} + m_2\vec{v}_{2i} = m_1\vec{v}_{1f} + m_2\vec{v}_{2f}$

$v_{1f} = (\frac{m_1 - m_2}{m_1 + m_2})v_{1i} + (\frac{2m_2}{m_1 + m_2})v_{2i}$

$v_{2f} = (\frac{2m_1}{m_1 + m_2})v_{1i} + (\frac{m_2 - m_1}{m_1 + m_2})v_{2i}$

$ax^2 + bx + c = 0$

$x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

$a_c = \frac{v^2}{r} = \omega^2 r$

$s = \theta r,\ \ \omega r = v,\ \ \alpha r = a$

$\Delta\omega = \alpha\Delta t$

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

$\omega_f^2 - \omega_i^2 = 2\alpha\Delta\theta$

$x_{com} = \frac{\Sigma_i m_i r_i}{\Sigma_i m_i}$

$I = \Sigma_i m_i r_i^2$

$I = I_{com} + MD^2$

$I_{rod\ com} = \frac{1}{12} Ml^2\ \ I_{rod\ end} = \frac{1}{3} Ml^2$

$I_{ring} = MR^2,\ \ I_{disk} = \frac{1}{2} MR^2$

$I_{disk\ hollow} = \frac{1}{2} M(R_1^2 + R_2^2)$

$I_{solid\ sphere} = \frac{2}{5} MR^2$

$I_{sphere\ shell} = \frac{2}{3} MR^2$

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

$\vec{\tau} = \vec{r} \times \vec{F}$

$\tau = rF\sin\theta$

$\Sigma\vec{\tau} = d\vec{L}/dt$

$\vec{L} = \vec{r} \times \vec{p} = \vec{r} \times m\vec{V}$

$L = rmV\sin\phi$

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

$E_{mech} = K_{rot_{com}} + K_{trans} + U$

$K_{rot} = \frac{1}{2} I\omega^2$

$\frac{d^2x}{dt^2} = -\omega^2 x$

$x(t) = A\cos(\omega t + \phi_0)$

$v(t) = -\omega A\sin(\omega t + \phi_0)$

$a(t) = -\omega^2 A\cos(\omega t + \phi_0)$

$v_{max} = \omega A,\ a_{max} = \omega^2 A$

$\omega = \frac{2\pi}{T} = 2\pi f,\ \ f = \frac{1}{T}$

$\omega = \sqrt{\frac{k}{m}},\ \ \omega = \sqrt{\frac{g}{l}}$

$T = \frac{2\pi}{\omega} = 2\pi\sqrt{\frac{l}{g}} = 2\pi\sqrt{\frac{m}{k}}$

$\frac{1}{2}kA^2 = \frac{1}{2}mv^2 + \frac{1}{2}kx^2$

$\omega^2(A^2 - x^2) = v^2$

$P = \frac{F}{A}$

$P_{bottom} = \rho g h + P_{top}$

$F_{buoyancy} = \rho g V_{disp}$

$P + \frac{1}{2}\rho v^2 + \rho g y = constant$

$Av = constant$

$Q = mC\Delta T,\ Q = mL$

$\Delta L = \alpha L_i \Delta T$

$PV = nRT,\ \ \frac{P_iV_i}{T_i} = \frac{P_fV_f}{T_f}$

$\Delta U = \frac{3}{2} nR\Delta T,\ \Delta U = \frac{5}{2} nR\Delta T$

$\Delta U = Q + W_{on\ Gas}$

$\Delta U = Q - W_{by\ Gas}$

$W_{on\ Gas} = -P\Delta V$

$W_{on\ Gas} = -nRT\ln\left(\frac{V_f}{V_i}\right)$

$C_v = \frac{3}{2}R,\ \ C_P = \frac{5}{2}R$

$Q = nC_v\Delta T,\ \ Q = nC_p\Delta T$

$m = \frac{N}{N_A}M = nM,\ \ n = \frac{N}{N_A}$

$T_F = T_C \times 1.8 + 32°F$

$T_K = T_C + 273.15°C$

$u' = \frac{u - v}{1 - \frac{uv}{c^2}},\ u = \frac{u' + v}{1 + \frac{vu'}{c^2}},\ \gamma = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}$

$\Delta t = \gamma\Delta t_p,\ L = \frac{L_p}{\gamma}$

$\Delta x' = \gamma(\Delta x - v\Delta t)$

$\Delta t' = \gamma\left(\Delta t - \frac{v}{c^2}\Delta x\right)$

$\Delta x = \gamma(\Delta x' + v\Delta t')$

$\Delta t = \gamma(\Delta t' + \frac{v}{c^2}\Delta x')$

$g = 9.8\ m/s^2$

$c = 3.00 \times 10^8\ m/s$

$R = 8.31\ J/mol \cdot K$

$N_A = 6.022 \times 10^{23}$

$1\ atm = 1.013 \times 10^5\ (Pa)$

$1(Pa) = 1\ N/m^2$

$\rho_{water} = 1000\ kg/m^3$