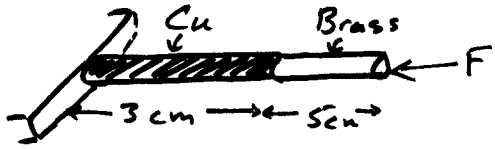
HW #9

10.8.)



$r_{Cu} = r_B = 0.25\,cm$

$F = 6500\,N$

$\Delta L_{TOT}? = \Delta L_{Cu} + \Delta L_B$

$YA\Delta L = FL_o$ $\quad \Delta L_{Cu} = \dfrac{(6500)(5*10^{-3})}{(1.1*10^{11})\,\pi(0.25*10^{-3})^2} = 9.0*10^{-5}\,m$

$\Delta L_B = \dfrac{(6500)(5*10^{-3})}{(9.0*10^{10})(0.25*10^{3})^2\pi} = 1.8*10^{-4}\,cm$

$\Delta L = \Delta L_{Cu} + \Delta L_B = \underline{2.7*10^{-4}\,m}$

10.12.) Punch holes of radius $r = 1.00*10^{-2}\,m$

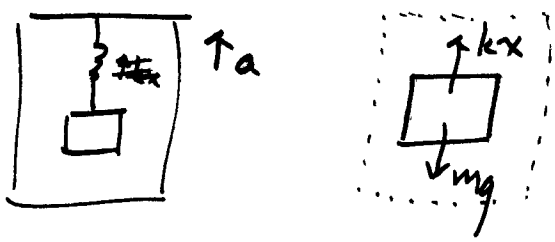
sheet has thickness $t = 3.0*10^{-3}\,m$

Shearing stress $3.5*10^{8}\,Pa$

$F?$ $\quad F = PA$ $\quad A = 2\pi r t$

$F = (3.5*10^{8})(2\pi(1.00*10^{-2})(3.00*10^{-3})) \Rightarrow \underline{F = 6.6*10^{4}\,N}$

10.28.)



$k = 830\,N/m$ $\quad m = 5\,kg$

$a = 0.6\,m/s^2$

$x?$

$ma = kx - mg$ $\quad m(a+g) = kx$ $\quad x = \dfrac{m}{k}(a+g)$

$x = \dfrac{5}{830}(0.6 + 9.8) \Rightarrow \underline{x = 6.3\,cm}$

HW #9 (pg 2)

10.38.) a.) Amplitude = 0.080

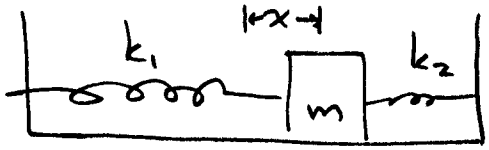
b.) $T = 4\,s$ $\omega = \frac{2\pi}{T}$ $\omega = 1.6\ rad/s$

c.) $\omega = \sqrt{\frac{k}{m}}$ $(1.6)^2 m = k$ $k = 2.0\ N/m$

d.) at $t = 0\,s$ $V = 0$

e.) at $t = 1\,s$ $a = a_{max} = A\omega^2 = (0.080)(1.6)^2 = 0.20\ m/s^2$

10.58.)



$k_1 = 450\ N/m$

$k_2 = 650\ N/m$

$x = 0.070\ m$

$m = 3.0\ kg$

a.) V through equilibrium = $V_{max} = A\omega$

$A = 0.070\ m$ $\omega = \sqrt{\frac{k_e}{m}}$

$F = -k_1 x - k_2 x = -(k_1 + k_2)x$ $k_1 + k_2 = k_e$

(b.) $\omega = \sqrt{\frac{k_1 + k_2}{m}} = 19\ rad/s$

$V = (0.07)(19) = 1.3\ m/s$