Ch. 8 HW

4. $\tau = r \times F = |r||F| \sin\theta =$

$0° \rightarrow \tau = rF\sin(0°) = 0$

$30° \rightarrow \tau = (.4m)(10kg)(9.8)\sin 30° = 19.6\ N\cdot m$

$60° \rightarrow \tau = (.4)(10)(9.8)\sin 60° = 33.9\ N\cdot m$

$90° \rightarrow \tau = (.4)(10)(9.8) = 39.2\ N\cdot m$

9. $F_{By} = F_g$

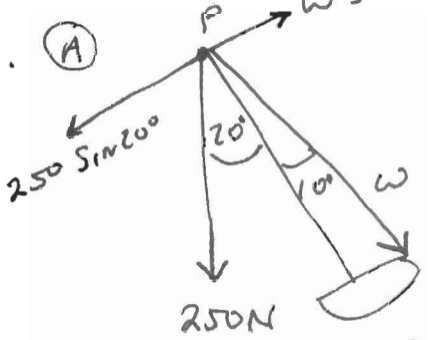
$\Sigma\tau = \tau_g + \tau_B = 0$

$(mg)(.33m) - (F_B)(.08)\sin 75° = 0$

$\frac{(2)(9.8)(.33)}{.08\sin 75°} = F_B$

$312.4N = F_B$

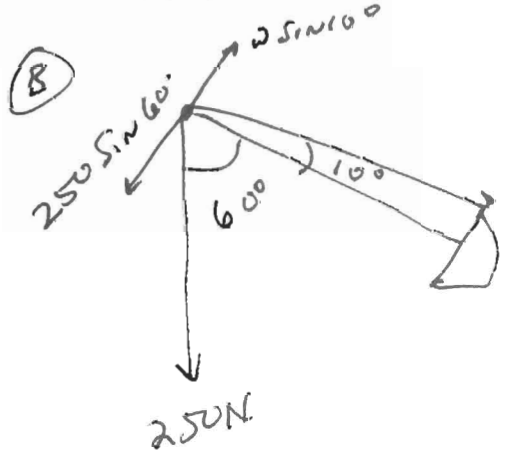
11. (A)



$\Sigma\tau$ ABOUT $P = (.4m)(250\sin 20°) - .4W\sin 10° = 0$

$W = \frac{(250\sin 20°)}{\sin 10°} = \underline{492.4N}$

(B)



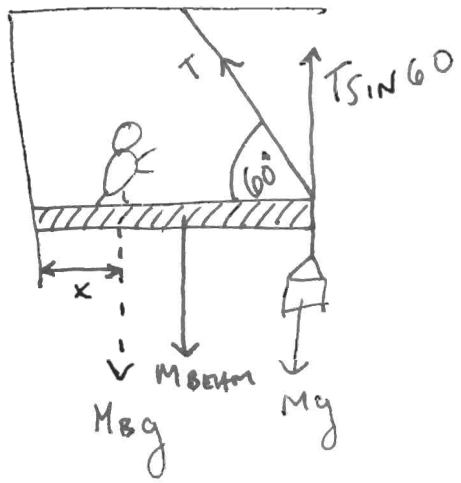
$\Sigma\tau = (.4)(250\sin 60°) - .4W\sin 10° = 0$

$W = \frac{250\sin 60}{\sin 10°} = \underline{1246\ N}$

LIFT W/ YOUR LEGS!

NOT W/ YOUR BACK!

20



(B) $\Sigma \tau = (T\sin 60)(6m) - mg(6m) - M_B g(1m) - M_{BEAM} g(3m) = 0$

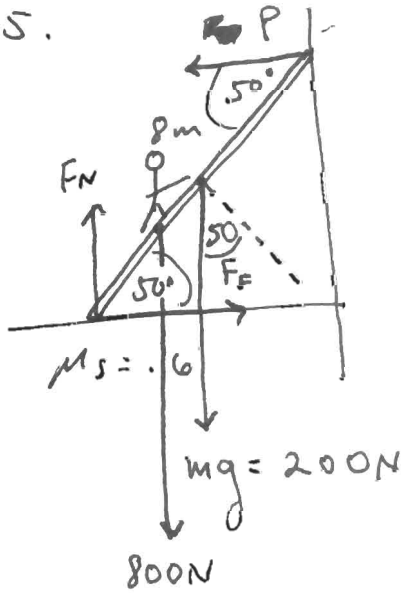
$T(6\sin 60) = (80)(6) + (200)(3) + (700)(1)$

$\boxed{T = 342\ N.}$

(C) $(900)(6\sin 60) - (80)(6) - (200)(3) = (700)(x)$

$\boxed{x = 5.14\ m}$

25.



2- CONDITIONS FOR EQUILIBRIUM

(1) $\Sigma F_x = F_F - P = 0 \Rightarrow F_F = P = \mu F_N = (.6)(1000) = 600N$

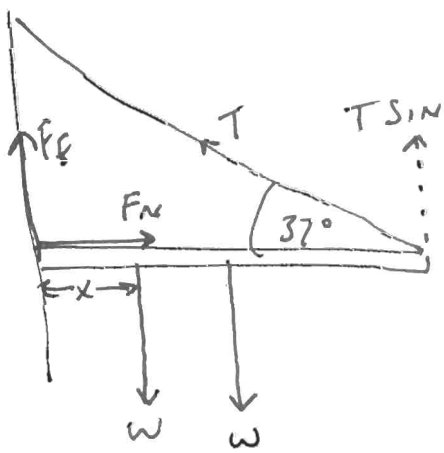
$\Sigma F_y = F_N - 800 - mg = 0 \Rightarrow F_N = 1000N$

(2) $\Sigma \tau = 8P\sin 50° - 200N\sin 50°(4) - 800x\sin 40° = 0$

$= 8(600)\sin 50° - 800\sin 40° - x(800\sin 40) = 0$

$\boxed{x = 6.15\ m}$

28.



(1) $\Sigma F_x = F_N - T\cos\theta = 0 \Rightarrow F_N = T\cos\theta$

(2) $\Sigma F_y = T\sin\theta + F_f - 2W = 0$

(3) $\Sigma \tau = 2T\sin\theta + (2-x)W - F_f(2m) = 0$

FROM (2): $T\sin\theta = 2W - F_f$

$2(2W - F_f) + (2-x)W - 2F_f = 0$

$4W - 4F_f + 2W - Wx = 0$

$x = 4 - \frac{4}{W}F_f + 2 = 6 - \frac{4}{W}F_f$

BUT $F_f = \mu F_N = (.5)T\cos(37°)$

$F_f = .4T$

$x = 6 - \frac{4}{W}(.4T)$

$= 6 - \frac{4}{W}(.4)(2W)$

$= 6 - 8(.4)$

$\boxed{x = 2.8m}$

$T\sin\theta + F_f - 2W = 0$

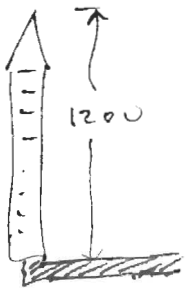
$.6T + .4T = 2W$

$T = 2W$

Ch. 9 H.W.

4. $P = \frac{F}{A} \Longrightarrow F = PA = (2\times10^5\ Pa)(4)(.024\ m^2) = \underline{19200\ N}$

6. $P = \frac{F}{A} = \frac{(70kg + 5kg)}{2(\pi(.01)^2} = \underline{1.2\times10^5\ Pa}$

8. 

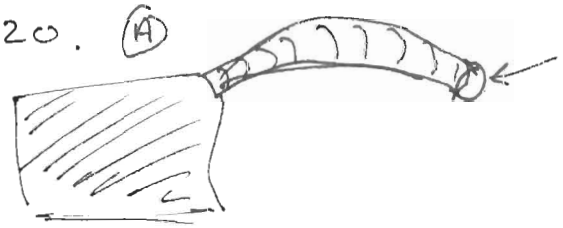
$P_g = P - P_0 = \rho g h$

$= \left(1\frac{g}{cm^3}\right)\left(\frac{1kg}{1000g}\right)\left(\frac{100cm}{m}\right)\left(\frac{100cm}{m}\right)\left(\frac{100cm}{m}\right) g h$

$= \left(10^3\frac{kg}{m^3}\right)(9.8)(1200\,ft)\left(\frac{1\,m}{3.28\,ft}\right)$

$\boxed{P - P_0 = 3.5\times10^6\ Pa}$

20. (A)



(A) $F = PA = (1.013\times10^5\ Pa)(\pi)(1.43\,cm)^2$

$= .0143$

$\boxed{F = 65\,N}$

(B) $F = (PA)2 = 2(P_0 + \rho g h)(\pi)(.0143)^2$

$= 2(1\times10^5 + \left(10^3\frac{kg}{m^3}\right)(9.8)(32.3)(\pi)(.0143)^2$

$\boxed{F = 132.55\,N}$

22. $P_0 = \rho g h$

$h = \frac{(1.013\times10^5\ Pa)}{(9.8)(994)} = \underline{10.5\,m}$