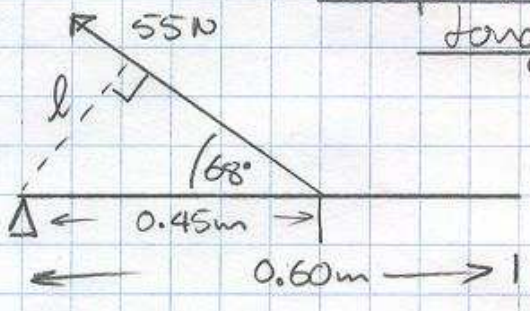
Torque Practice Questions
long Answers.

PH12/2006

1)



$\Sigma T = 0$

l = lever arm distance

$l = 0.45\text{m} \sin 68°$

$T = F \times d$

$= 55\text{N} \times (0.45 \sin 68°)$

$= 22.9\ \text{Nm}$

$\boxed{\simeq 23\ \text{Nm}}$

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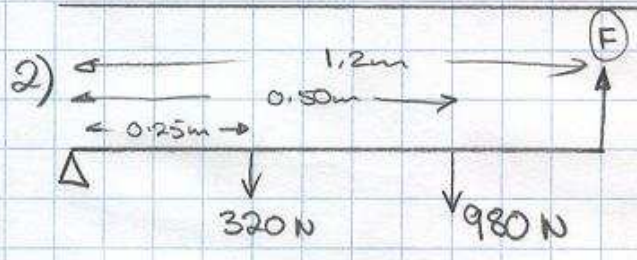
2)



$\Sigma T = 0$

$\Sigma T_{cw} = \Sigma T_{ccw}$

$(320\text{N} \times 0.25\text{m}) + (980\text{N} \times 0.50\text{m}) = F(1.20\text{m})$

$80\ \text{Nm} + 490\ \text{Nm} = 1.20F$

$F = 475\text{m}$

$\boxed{F \simeq 480\ \text{N}}$

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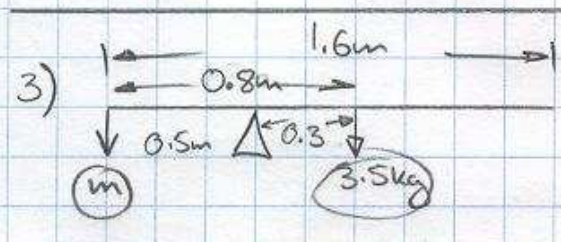
3)



$\Sigma T = 0$

$(0.3\text{m})(3.5\text{kg})(9.80) = (0.5\text{m})(m)(9.80)$

$\therefore \boxed{m = 2.1\text{kg}}$

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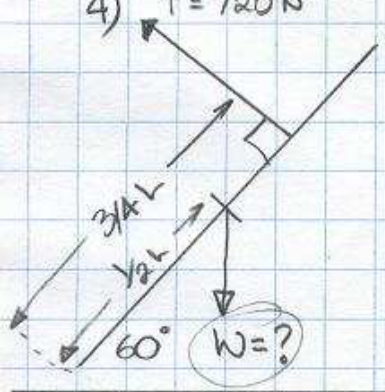
4)



$\Sigma T = 0$

$\therefore \Sigma T_{cw} = \Sigma T_{ccw}$.

$(720\text{N})(3/4\,L) = W \times (1/2\,L \cos 60°)$

$(720)(0.75\,L) = W \times (0.5\,L)(0.5)$

$540 = 0.25W$

$\boxed{W = 2160\ \text{N}}$

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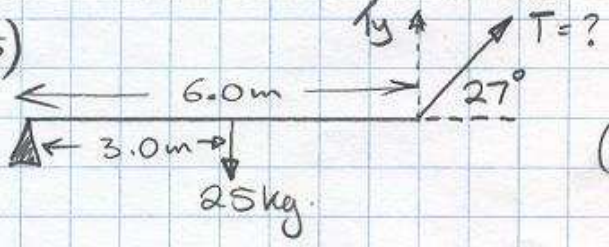
5)



$\Sigma T = 0$

$\Sigma T_{ccw} = \Sigma T_{cw}$.

$(25\text{kg})(9.80)(3.0\text{m}) = (6.0\text{m})(T \sin 27°)$

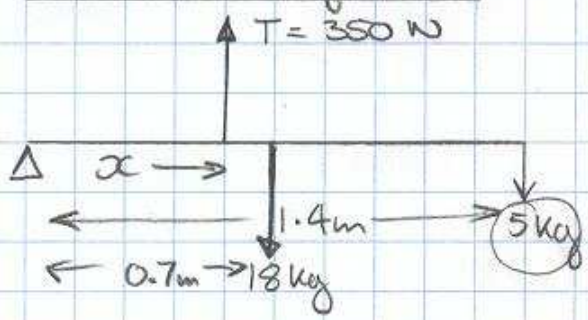
$735\ \text{Nm} = 2.72\,T$

$T = 269.83\ \text{N}$

$\boxed{T \simeq 2.7 \times 10^2\ \text{N}}$

Answers Page 2 ...

6)



$\Sigma T = 0$

$\Sigma T_{ccw} = \Sigma T_{cw}$.

$T \times x_m = (0.7m)(18kg)(9.80) + (1.4m)(49)$

$350N \times x_m = 123.48 Nm + 68.6 Nm$

$= 192.08$

$x = 0.5488 m$

$\boxed{x \simeq 0.55 m}$

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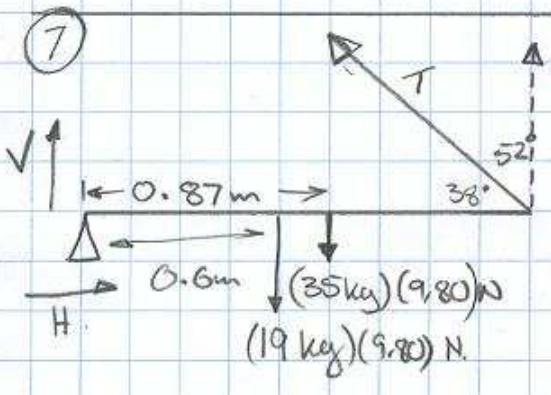
7)



$\Sigma T = 0$

$\Sigma T_{cw} = \Sigma T_{ccw}$.

$T(\sin 38°)(1.2m) = (19)(9.8)(0.6m) + (35 \times 9.8)(0.87m)$

$0.738T = 410.13$

$T = 555.14 N$

$\boxed{\simeq 555 N}$

$\Sigma F_x = 0$

$H = T_x$

$\therefore H = T \cos 38°$

$= 555N \cos 38°$

$= 437.4 N$

$\boxed{\simeq 437 N}$

$\Sigma F_y = 0$

$V + T_y = (19)(9.80) + (35 \times 9.80)$

$V = 186.2N + 343N - (555)(\sin 38°)$

$= 187.5N$

$\boxed{V \simeq 188 N}$

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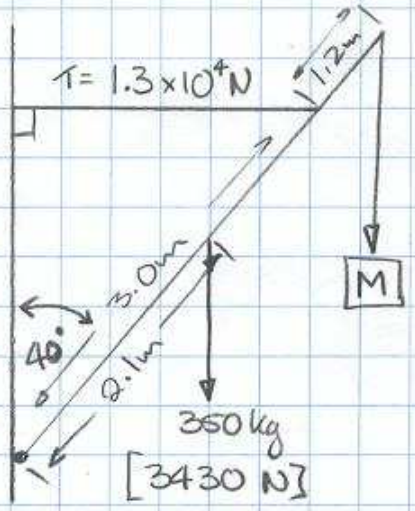
8)



a)

$\Sigma T = 0$

$(1.3 \times 10^4 N)(3.0 \cos 40°) = (3430N)(2.1m \sin 40°) + (M \times 9.80)(4.2m \sin 40°)$

b)

$29875.7 = 4629.9 + M(26.457)$

$M = 954.22 kg$

$\boxed{M \simeq 950 kg}$

Torque Practice - Long Answers page 3/3.

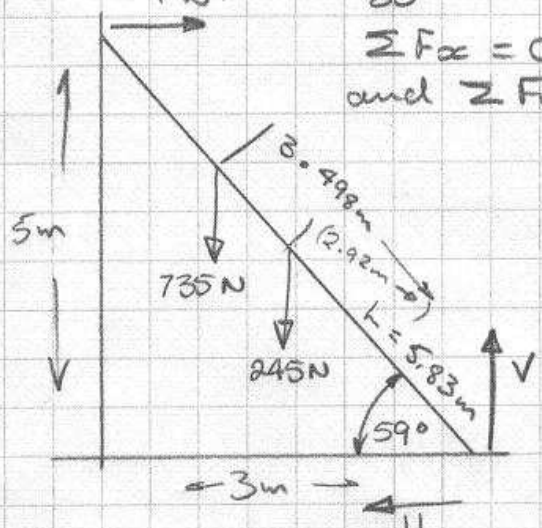
#9) $\Sigma F = 0$ and $\Sigma T = 0$

$\therefore \Sigma T_{cw} = \Sigma T_{ccw}$.

so

$\Sigma F_x = 0$

and $\Sigma F_y = 0$.



ΣF_x : $H - F_w = 0$

$\therefore H = F_w$

ΣF_y : $V - 245N - 735N = 0$.

$V = 245N + 735N$

$\boxed{V = 980N.}$

ΣT :

$F_w(5.83m \sin 59°) = (735N)(2.498 \cos 59°) + (245N)(2.92m \cos 59°)$

$4.99\, F_w = 945.63Nm + 368.46N$

$\boxed{F_w = 263.3N}$

b) $F_f = \mu F_N$

$F_w = \mu V$

$\mu = \frac{F_w}{V} = \frac{263.3N}{980N}$

$= 0.268$

$\boxed{\mu \simeq 0.27}$