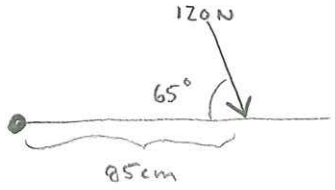
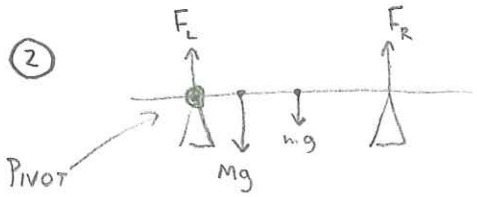
Physics 12: Torque and Rotational Equilibrium

ϕ, τ, Σ

① 

$\tau = F_L d = 120 \sin 65 (0.85) = 92\ Nm$

② 

$\Sigma \vec{F} = 0$

$F_L + F_R = (M+m)g$

$\Sigma \vec{\tau} = 0$ (PIVOT AT LEFT SUPPORT)

$\tau_{cw} = \tau_{ccw}$

$\tau_M + \tau_m = \tau_R$

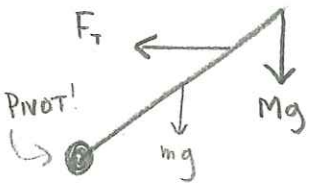
$Mg(0.7) + mg(1.1) = F_R(1.5)$

$F_R = 205.15\ N$

$F_L = 167.25$

$\vec{F}_L = 170N$ UP

$F_R = 210N$ UP

③ 

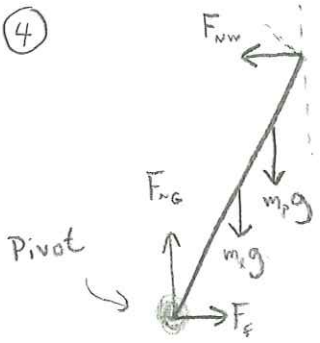
$\Sigma \vec{\tau} = 0$

$\tau_{cw} = \tau_{ccw}$

$\tau_m + \tau_M = \tau_T$

$mg\cos 28°(0.6) + Mg\cos 28(1.2) = F_T \sin 28°(0.8)$

$M = 35kg$

④ 

① $\Sigma \vec{F}_x = 0$

$F_f = F_{NW}$

2 unknowns can't solve!

② $\Sigma F_y = 0$

$F_{NG} = (m_s + m_p)g$

$F_{NG} = 715.4N$

③ $\Sigma \vec{\tau} = 0$

$\tau_s + \tau_p = \tau_w$

$m_s g\cos 65(1.8) + m_p g\cos 65(2.4) = F_{NW}\cos 25(3.6)$

$F_{NW} = 218.589\ N$

④ $F_f = \mu F_N$

$\mu = \frac{F_f}{F_N} = \frac{218.589}{715.4} = 0.31$

⑤ a. b. c. d. e. f.

	a	b	c	d	e	f
Trans:	X	✓	X	✓	✓	X
Rot:	✓	✓	✓	X	✓	✓