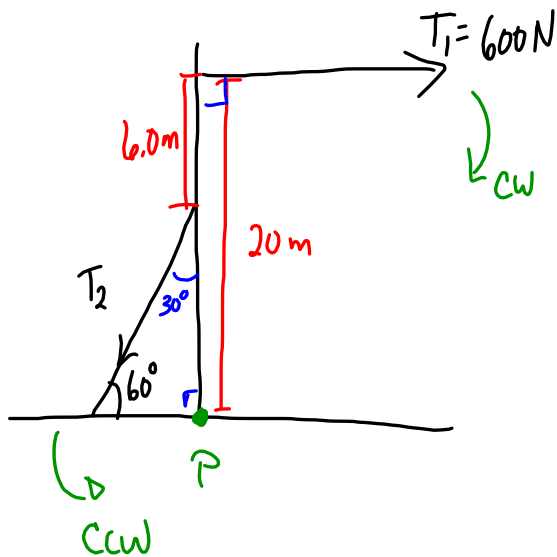


FoP / 6-3

3.



$$\tau = rF\sin\theta$$

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

$$\tau_2 = \tau_1$$

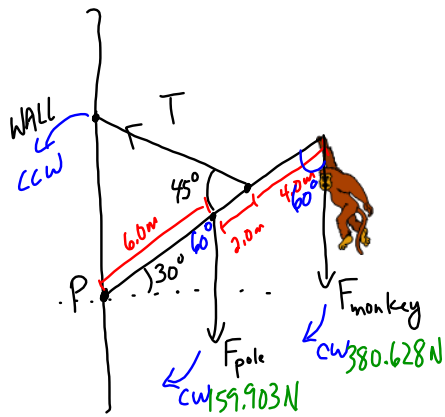
$$(14\text{ m})T_2(\sin 30^\circ) = (20\text{ m})(600\text{ N})$$

$$T_2 = \frac{(20\text{ m})(600\text{ N})}{(14\text{ m})(\sin 30^\circ)}$$

$$T_2 = 1.7 \times 10^3\text{ N}$$

Torque + Static Equilibrium

Example - Monkey hanging from end of flag pole



$m(\text{monkey}) = 38.8 \text{ kg}$
 $m(\text{pole}) = 16.3 \text{ kg}$
 $\tau = rF\sin\theta$

What is the tension in the cable?
 What are the horizontal and vertical forces at P?

$\sum \tau_{\text{ccw}} = \sum \tau_{\text{cw}}$
 $\tau_T = \tau_{\text{pole}} + \tau_{\text{monkey}}$

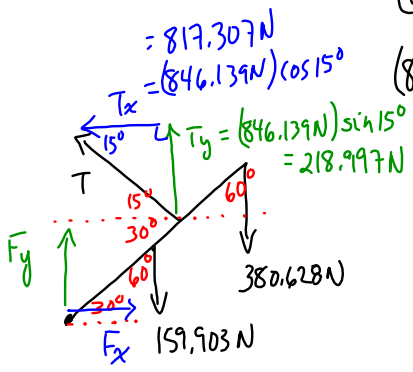
$(8.0\text{m})T(\sin 45^\circ) = (6.0\text{m})(159.903\text{N})\sin 60^\circ + (12.0\text{m})(380.628\text{N})\sin 60^\circ$

$(8.0\text{m})T(\sin 45^\circ) = 830.880\text{Nm} + 3955.602\text{Nm}$

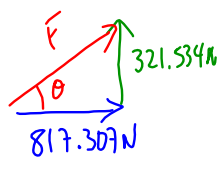
$(8.0\text{m})T(\sin 45^\circ) = 4786.482\text{Nm}$

$T = \frac{4786.482\text{Nm}}{(8.0\text{m})(\sin 45^\circ)}$

$T = 846.139\text{N}$
 $T = 8.5 \times 10^2 \text{ N}$

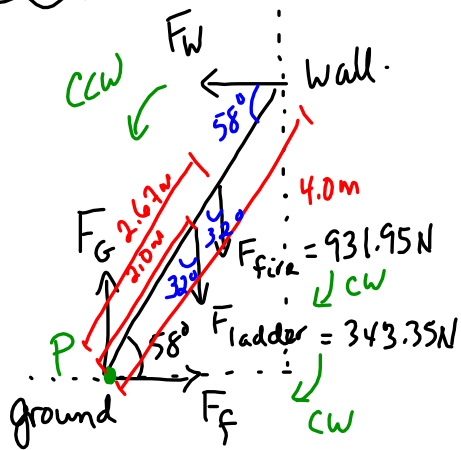


Horizontally: $F_x = T_x$
 $F_x = 817.307\text{N}$
 $F_x = 8.2 \times 10^2 \text{ N}$



Vertically
 $F_y + T_y = F_{\text{pole}} + F_{\text{monkey}}$
 $F_y + 218.997\text{N} = 159.903\text{N} + 380.628\text{N}$
 $F_y = 321.534\text{N} \Rightarrow 3.2 \times 10^2 \text{ N}$

MP/496



$\mu = ?$
 F_f and F_N ?

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

$$\tau_{Wall} = \tau_{ladder} + \tau_{fire}$$

$$(4.0m) F_w (\sin 58^\circ) = (2.0m)(343.35N) \sin 32^\circ + (2.67m)(931.95N) \sin 32^\circ$$

$$(4.0m) F_w (\sin 58^\circ) = 363.896 N \cdot m + 1318.601 N \cdot m$$

$$(4.0m) F_w (\sin 58^\circ) = 1682.498 N \cdot m$$

$$F_w = 495.99 N$$

Horizontally: $F_f = F_w$
 $F_f = 495.99 N$

Vertically: $F_G = F_{ladder} + F_{fire}$
 $F_G = 343.35 N + 931.95 N$

$F_G = 1275.3 N$ ← normal force at bottom on ladder

$$F_f = \mu F_N$$

$$\mu = \frac{F_f}{F_N}$$

$$\mu = \frac{495.99 N}{1275.3 N}$$

$$\mu = 0.39$$

TO DO

① PP/501

② FOP/86-3/5-7