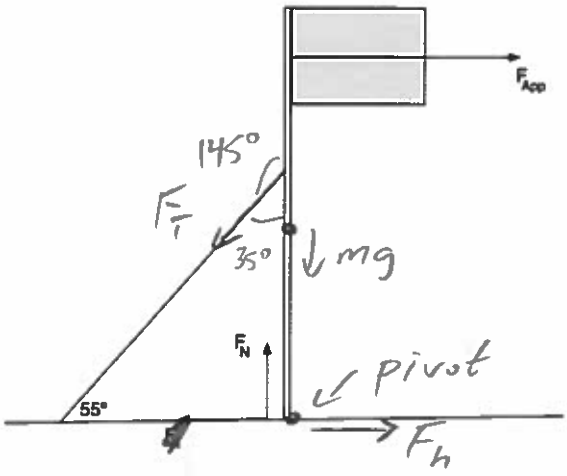
Physics 10154 - Quiz 8A

A vertical 7.2-kg flag pole of length 3.6 meters is shown below. At the base of the flag pole, there is a reaction force that has a vertical component (the normal force) and a horizontal component that points in the ⊕x direction. 2.2 meters above ground, a thin string is tied to the flagpole, providing a tension force. 3.3 meters above ground, the wind is flapping the flag, providing a horizontally oriented applied force of 38 Newtons.

Determine the magnitude of the tension in the string. , F_N, F_h.



$\tau_N = 0 \quad r_N = 0$

$\tau_h = 0 \quad r_h = 0$

$\tau_{grav} = 0 \quad \theta = 180°$

r_{grav}

mg

$$\Sigma\tau = \tau_N + \tau_h + \tau_{grav} + \tau_T + \tau_{App} = 0$$

$$\tau_T = +(2.2)F_T \sin 145 = 1.262 F_T$$

$$\tau_{App} = -(3.3)F_{App} \sin 90 = -125.4$$

$$1.262 F_T - 125.4 = 0 \Rightarrow \boxed{F_T = 99\,N}$$

$$\Sigma F_y: F_N - mg - F_T \cos 35° = 0$$

$$F_N = (7.2)(9.8) + (99)\cos 35 = \boxed{150\,N}$$

$$\Sigma F_x: -F_h - F_T \sin 35 + F_{App} = 0$$

$$F_h = 38 - 99 \sin 35 = \boxed{19\,N}$$