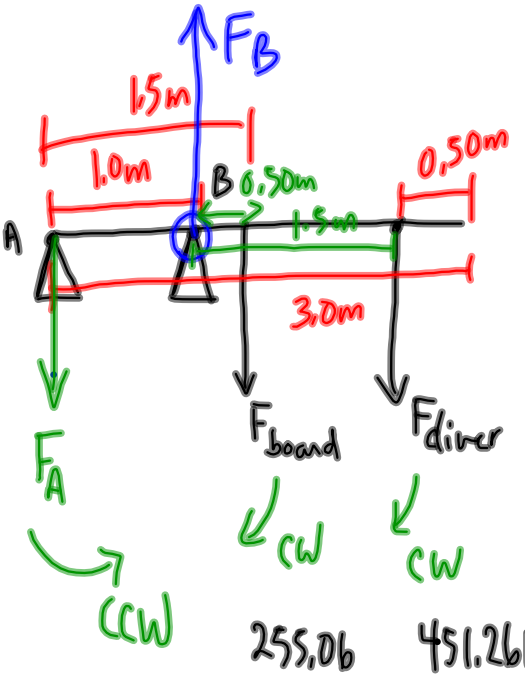
Static Equilibrium

Two conditions: $\vec{F}_{net} = 0$

$\vec{\tau}_{net} = 0 \quad (\Sigma \tau_{ccw} = \Sigma \tau_{cw})$

FoP/PP/6-3

6.



Using B as the pivot:

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

$\tau_A = \tau_{board} + \tau_{diver}$

$(1.0m)(F_A) = (0.50m)(255.06N) + (1.5m)(451.26N)$

$F_A = \frac{127.53 N \cdot m + 676.89 N \cdot m}{1.0m}$

$F_A = 8.0 \times 10^2 N$ [down]

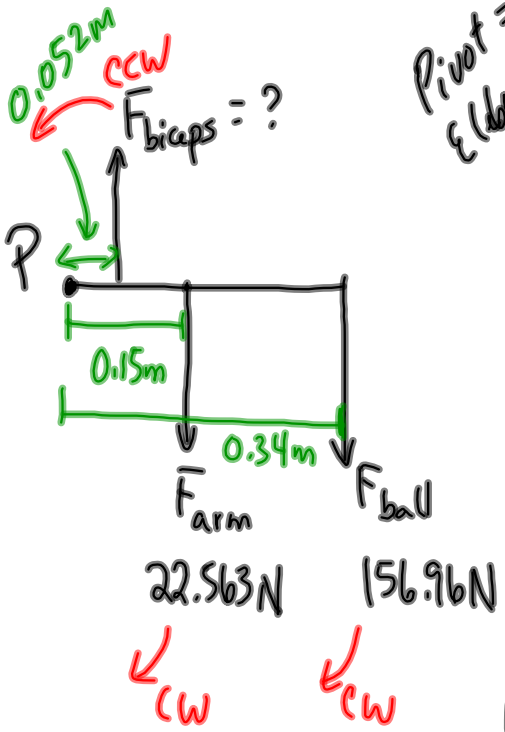
$F_B = F_A + F_{diver} + F_{board}$

$F_B = 8.0 \times 10^2 N + 255.06N + 451.26N$

$F_B = 1.51 \times 10^3 N$ [up]

PP|501

32



Pivot = elbow (P)

$\sum \tau_{CCW} = \sum \tau_{CW}$

$\tau_{biceps} = \tau_{arm} + \tau_{ball}$

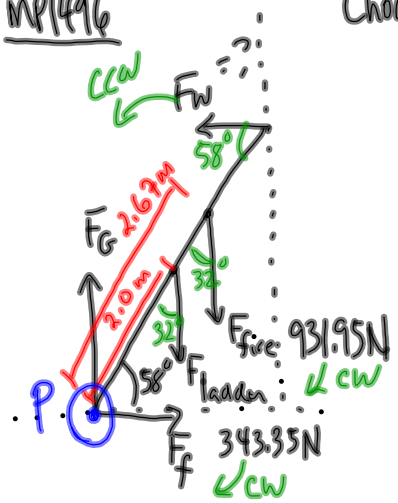
$(0.052m)F_{biceps} = (0.15m)(22.563N) + (0.34m)(156.96N)$

$(0.052m)F_{biceps} = 3.38445N \cdot m + 53.3664N \cdot m$

$(0.052m)F_{biceps} = 56.75085N \cdot m$

$\vec{F}_{biceps} = 1.1 \times 10^{3} N \ [up]$

MP/496



$\tau = rF\sin\theta$

Choose the end at the ground as the pivot:

$\Sigma\tau_{CCW} = \Sigma\tau_{CW}$

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

$(4.0m)(F_w)\sin 58° = (2.0m)(343.35N)\sin 32°$

$+ (2.67m)(931.95N)\sin$

$(4.0m)(F_w)\sin 58° = 363.8955587N$

$+ 1318.6D155$

$(4.0m)F_w\sin 58° = 1682.497N\cdot m$ N·m

$F_w = 496N$

Horizontally: $F_f = F_w$

$F_f = 496N$

Vertically: $F_G = F_{ladder} + F_{fire}$

$F_G = 343.35N + 931.95N$

$F_G = 1275.3N$ ← the normal force at the ground.

$F_f = \mu F_N$

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

$\mu = \frac{496N}{1275.3N}$

$\mu = 0.39$