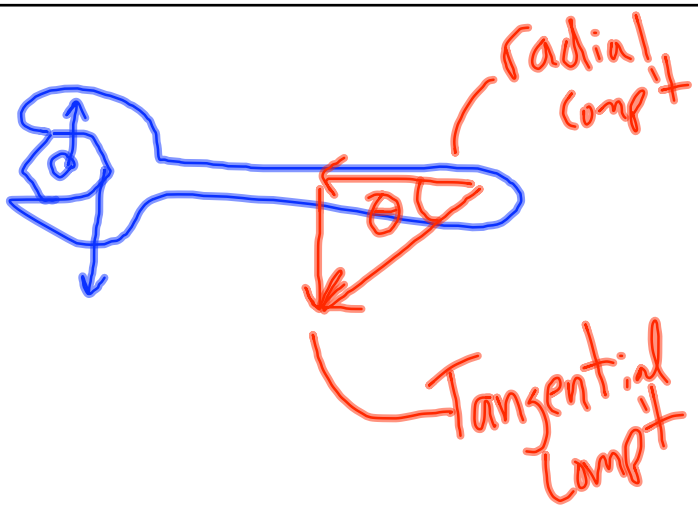
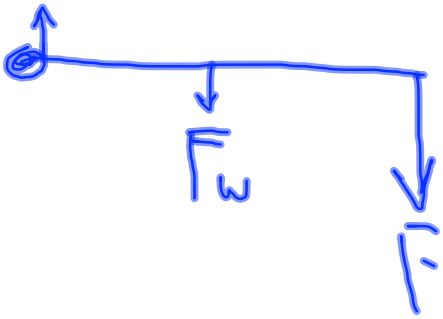
Torque =

$\tau = F \cdot r \cdot \sin\theta$

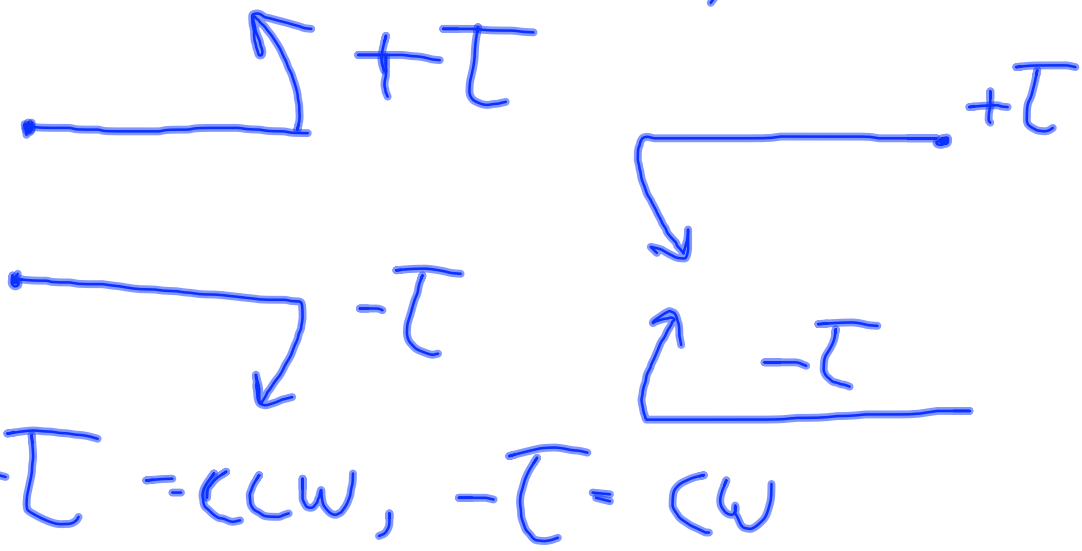
$\tau = F_{\perp} \cdot r$





$F \sin\theta$

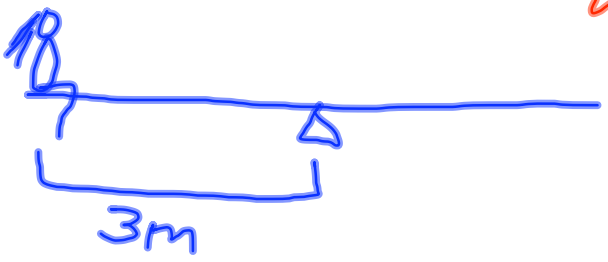
Equilibrium : $\Sigma F_x = 0$, $\Sigma F_y = 0$, $\Sigma \tau = 0$

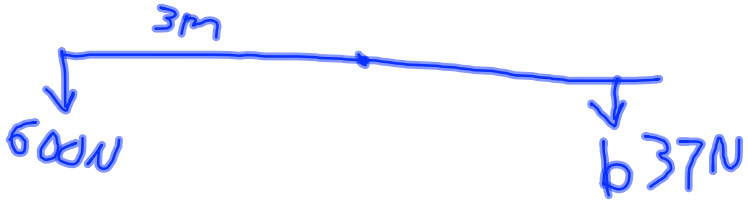


$+\tau$ - ccw, $-\tau$ - cw

Adrian weighs 637N.

Michaela weighs 600N.





$$\Sigma\tau = 0$$

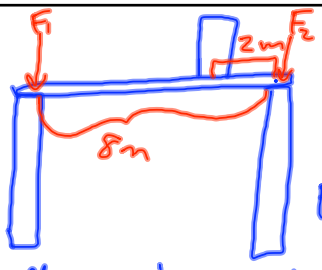
$$\tau_m - \tau_A = 0$$

$$F_m \cdot r_m - F_A \cdot r_A = 0$$

$$r_A = \frac{F_m \cdot r_m}{F_A}$$

$$r_A = \frac{600N \cdot 3m}{637N}$$

$$\boxed{r_A = 2.82\,m}$$



$\Sigma \tau = 0$

$\tau_m + \tau_1 + \tau_2 = 0$

$F_m r_m + \cancel{F_1 r_1} + F_2 r_2 = 0$

$-F_m r_m + F_2 r_2 = 0$

$F_2 = \frac{F_m r_2}{r_2} = \frac{1000\,N \cdot 6m}{8m}$

$F_2 = 750\,N$

$\Sigma F_y = 0$

$F_1 + F_2 - F_3 = 0$

$F = F_3 - F_2$

$= 1000 - 750$

$F_1 = 250\,N$