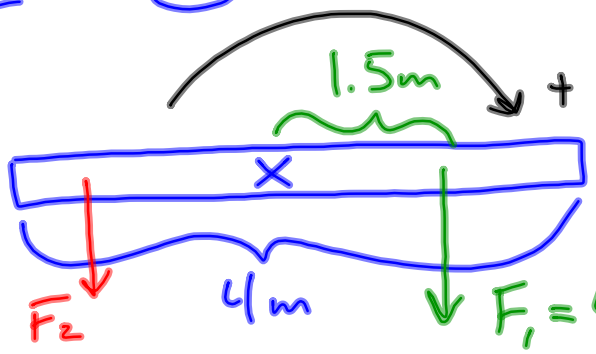
Solving Balanced Torque Probs

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

θ = The angle between F & r

$\Sigma \tau = 0$

Ex 1



If I apply a 10N force where should I apply it? $r_2 = ?$

$\Sigma \tau = 0$

$F_1 \cdot r_1 - F_2 \cdot r_2 = 0$

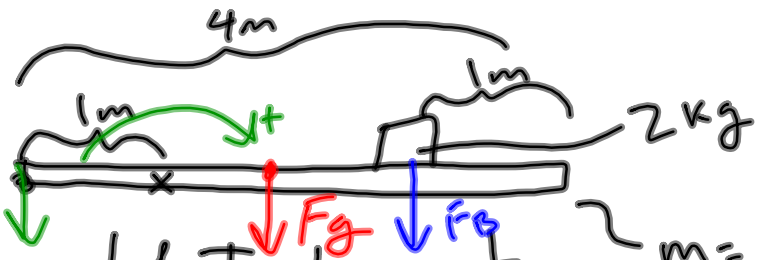
$4N(1.5m) - 10N \cdot r_2 = 0$

$6N \cdot m = 10N \cdot r_2$

$0.6m = r_2$

Units for Torque $[N \cdot m]$

Ex 2



What force would I have to apply at the very end to keep it balanced?

Gravity acts as if it is only pulling at the center of a symetric object. (CM)

$F_g = mg$

$= 5kg\,(10\,N/kg) = 50N$

for r: Distance from the pivot is what we care about

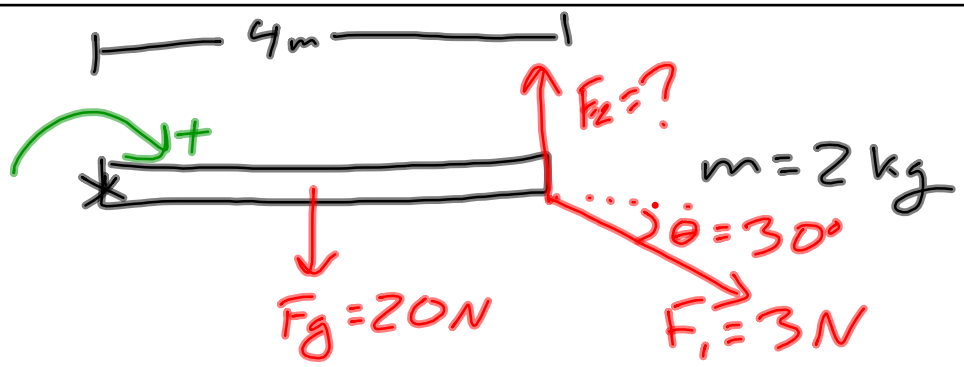
$$\Sigma \tau = 0$$

$$50N\,(1m) + (20N)(2m) - F_? \cdot 1m = 0$$

$$50N\cdot m + 40N\cdot m = F_? \cdot 1m$$

$$90N = F_?$$

Ex 3



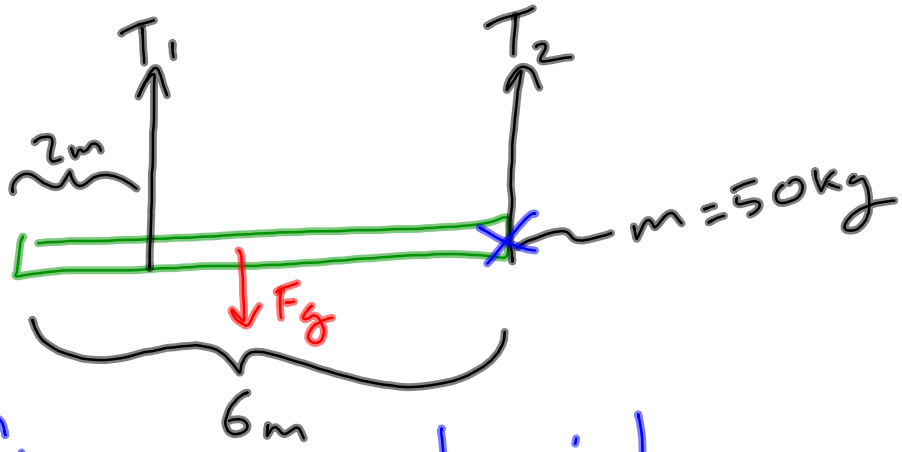
$$\Sigma\tau = 0$$

$$20N(2m) + 3N(4m)\sin(30) - F_? \cdot (4m) = 0$$

$$40N\cdot m + 6N\cdot m = 4m \cdot F_?$$

$$\frac{46}{4}N = F_?$$

Ex 4



- you define your pivot point
  - → choose it wisely so that you can eliminate a TORQUE