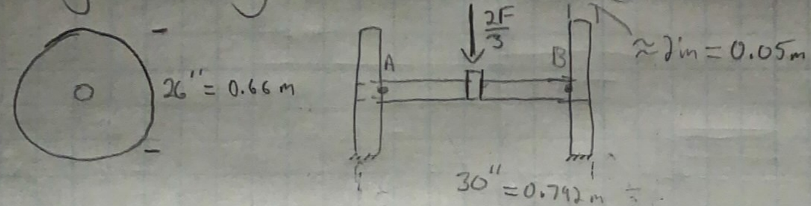
Engineering Analysis 2 (Rear Axial):



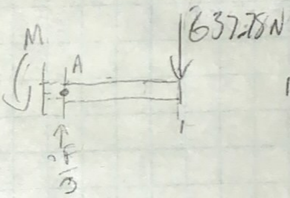
$m_p = 150\ lb = 68.04\ kg$
$m_t \approx 65\ lb = 29.48\ kg$ $\Rightarrow F = 9.81\ m/s^2 (68.04\ kg + 29.48\ kg) =$
$= 956.67\ N$

so $\frac{2F}{3} = 637.78\ N$

Assumptions: Weight is distributed evenly through tires
Back axial is treated as a single bar

So $M_A = M_B$

$\Sigma M_A = 0 \Rightarrow -0.346 (637.78\ N) + M_A = 0$



2in = 0.05m
O (Assumed diameter of bar)

$\Rightarrow M = 220.67\ N \cdot m$

$\tau_{max} = \frac{4}{3} \cdot \frac{V}{A} = \frac{4 \cdot 318.89}{3 \cdot \pi (0.025^2)} = 0.22\ MPa$

$\sigma_{y\,max} = \frac{32 M}{\pi D^3} = \frac{32 (220.67)}{\pi (0.05^3)} = 17.98\ MPa$

Assumed A36 Steel

$\sigma'_{tot} = (\sigma_{y\,max}^2 + 3 \tau_{max}^2)^{1/2} = 17.98\ MPa$

$S_y = 250\ MPa$

$n = \frac{S_y}{\sigma_{tot}} = \frac{250}{17.98} = 13.9$

FOS = 13.9