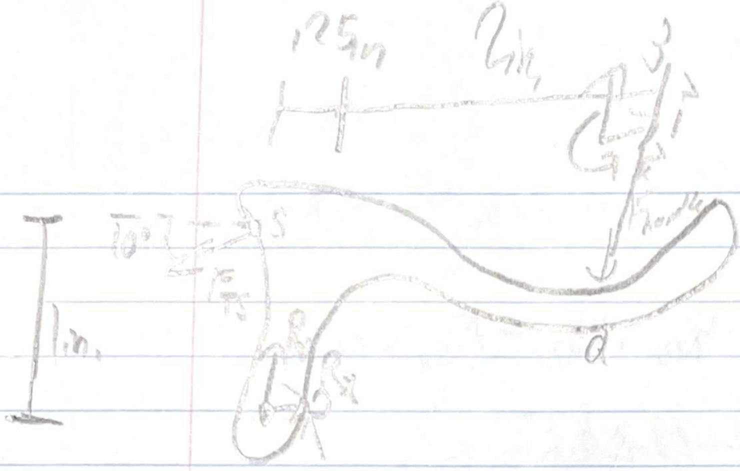


$$\Sigma \vec{M}_E = \vec{0} = (-2in. \cdot F_{handle})\vec{k} + (-.25in.\vec{i} + 1in.\vec{j}) \times F_{TS}(-.98\vec{i} - .17\vec{j})$$

$$\vec{0} = -2F_{handle}\vec{k} + (.043 \cdot 13.17 lbf.in + .98 \cdot 13.17 lbf.in.)\vec{k}$$

$$F_{handle} = 6.77 lbf.$$

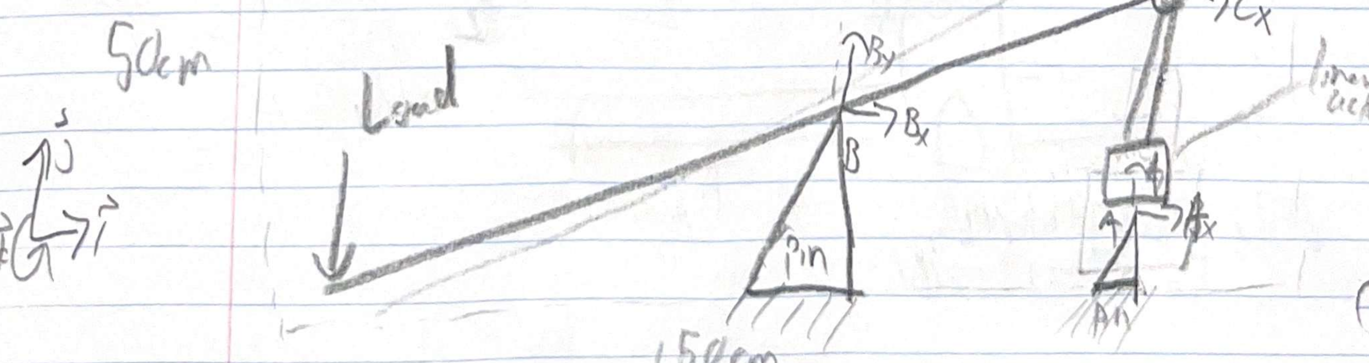
$$\frac{F_{out}}{F_{in}} = \frac{N}{F_{handle}} = \frac{23.2 lbf.}{6.77 lbf.} = 3.43$$

Discuss; This seems to make sense as it is much less force than input in, It makes sense that this force is less than the tension due to moment arms,

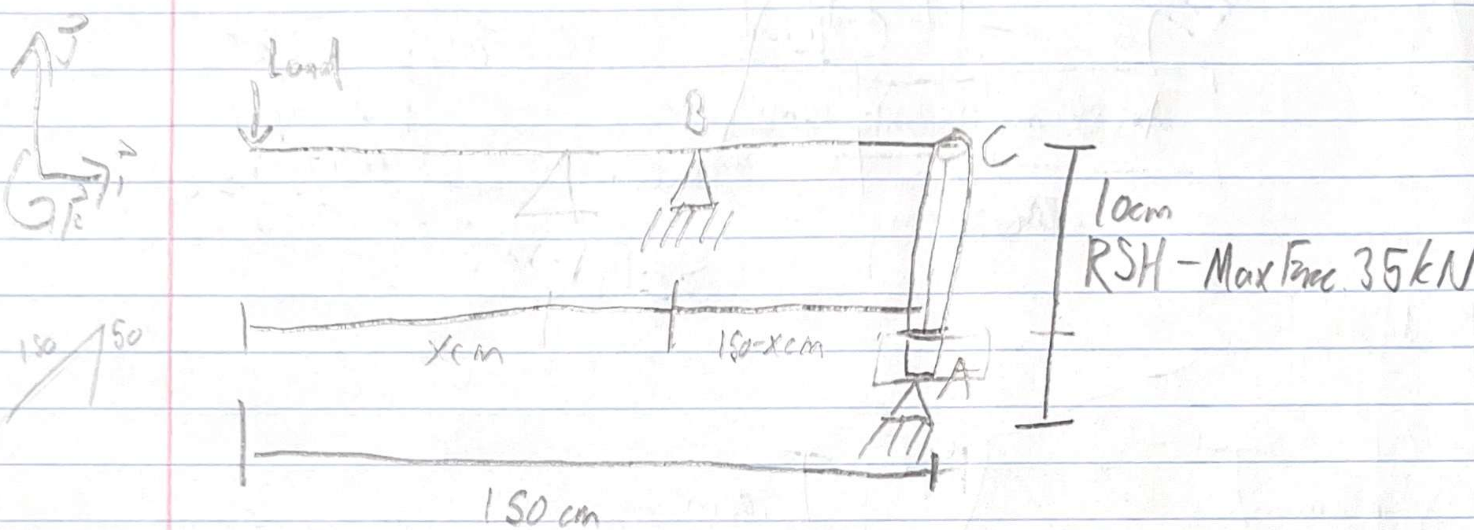
Portfolio

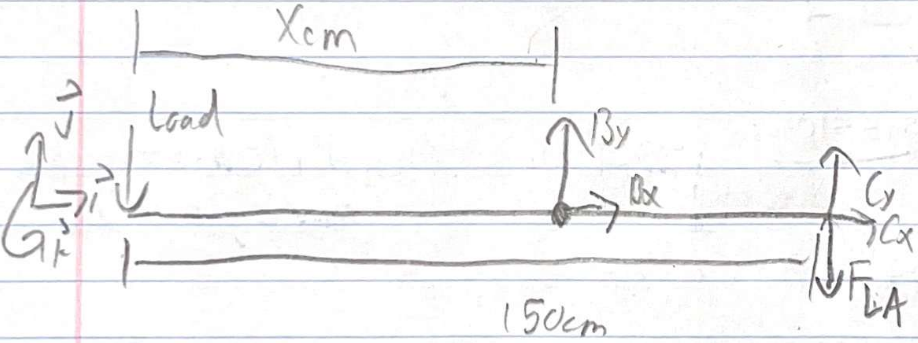
Sketch

50cm



Using the FBD, with a max force of 2kN





$F_{LA} = 35kN$

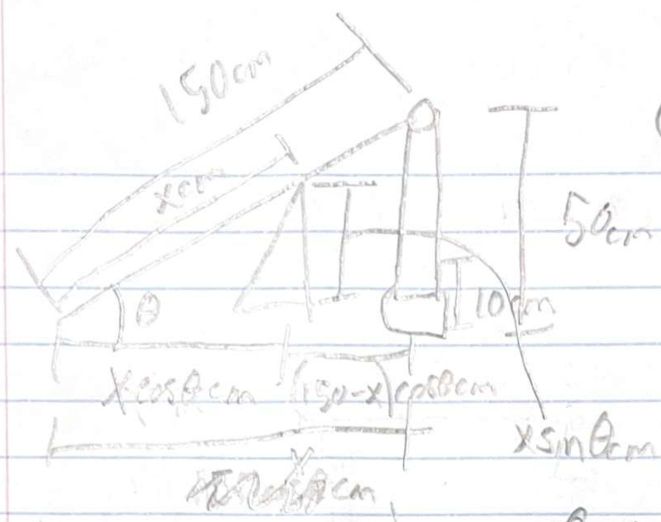
Assume $B_x = C_y = 0kN$ due to no horizontal load

$\Sigma M_B = x\,cm \cdot F_{load} \cdot F_{LA} \cdot (150-x)\,cm$

$5250\,kNcm = X\,cm \cdot F_{load} + 35kN\,X\,cm$

Based on this, when $X = 0$ cm, 00 kN can be lifted, when $X = 150$ cm, 0 kN can be lifted. Assuming a 10 cm retracted, the

Start



$$50^2 + y^2 = 150^2$$

$$y = 141.4\,cm$$

$$\arccos\left(\frac{141.4\,cm}{150\,cm}\right) = \theta$$

$$\theta = 19.5^\circ$$

End

$$\arctan\left(\frac{x\sin\theta\,cm - 10\,cm}{(150-x)\cos\theta\,cm}\right) = \theta'$$

$$150\sin\theta' + 10\,cm = \text{max hight}$$

max hight at 50cm is possible.

$$150\sin\theta' = \text{max height}$$

The max hight of 50cm is achieved at $x =$ 82.7cm, which it can hold a max of 28.50 kN. This gets the max hight of 50cm with the max load, while the max load given least height is 0cm of height but infinite load.

So, given this design, to lift a load 50cm, the pin would need to be 82.7cm from the left of the bar when it is horizontal, allowing this 28.50kN load to be lifted all the way.

This is all given the assumption of a 10cm retracted length of the linear actuator