Funicular Form Example:
Owl's Basket, Number of Books

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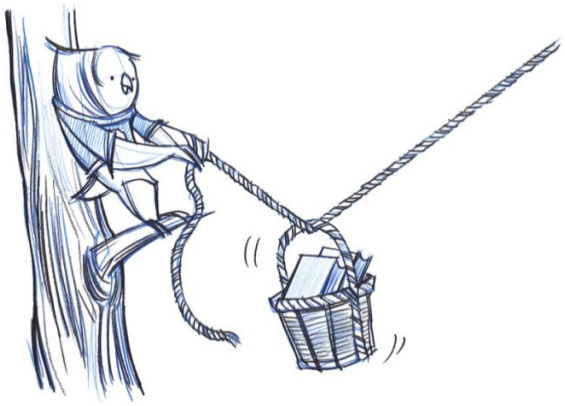
Owl uses a basket and rope to transport books to the library. We can model the basket and rope system as a funicular form.



Our goal is to determine how many books Owl can safely put in the basket.

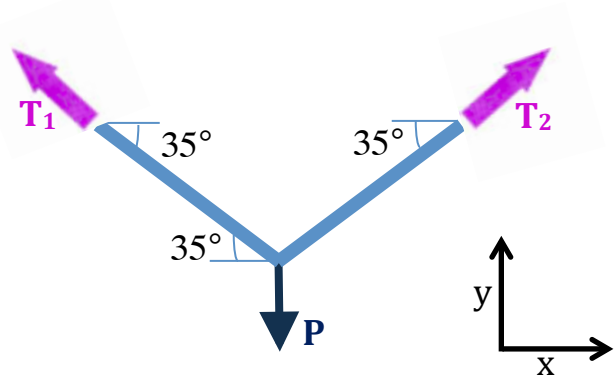
First let's determine the force in the rope as a function of the vertical load. I'm assuming that the angle of Owl's rope is 35 degrees from horizontal as shown.

I'll start with equilibrium in the horizontal direction:

$$\Sigma F_x = T_2\cos 35° - T_1\cos 35° = 0$$

$$T_1 = T_2$$

Since $T_1 = T_2$, moving forward
let's just call both T_1 and T_2 simply T.



Now let's apply equilibrium in the vertical direction:

$$\Sigma F_y = T\sin 35° + T\sin 35° - P = 0$$

$$T = \frac{P}{2\sin 35°}$$

Owl's rope has a breaking strength of 150 Newtons. Knowing the breaking strength of the rope will allow us to calculate the load P:

$$T = 150\text{Newtons} = \frac{P}{2\sin 35°}$$

$$P = 150N(2\sin 35°) = 172.1 \text{ Newtons}$$

Let's assume Owl's basket weighs 22.1N when it is empty, leaving 150N for books. Assuming each book weighs 25N that means the Owl can safely carry 150N / 25N per book = **6 books in the basket**.