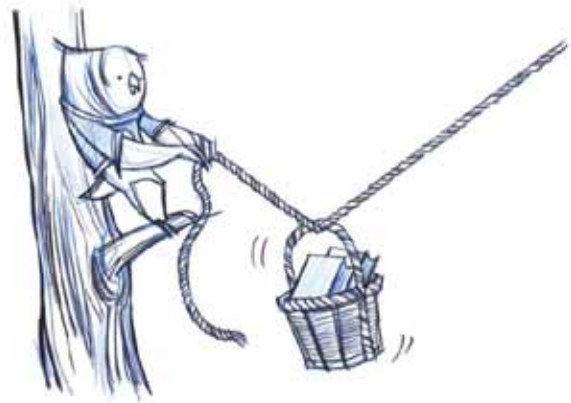


Funicular Form Example: Owl's Basket, Number of Books

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:

$$\sum F_x = T_2 \cos 35^\circ - T_1 \cos 35^\circ = 0$$

$$T_1 = T_2$$

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:

$$\sum F_y = T \sin 35^\circ + T \sin 35^\circ - P = 0$$

$$T = \frac{P}{2 \sin 35^\circ}$$

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 :

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

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

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 $150 \text{ N} / 25 \text{ N per book} = \mathbf{6 \text{ books in the basket}}$.