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Learning some physics with a notebook

Teaching Sciences & Engineering with Jupyter Notebooks
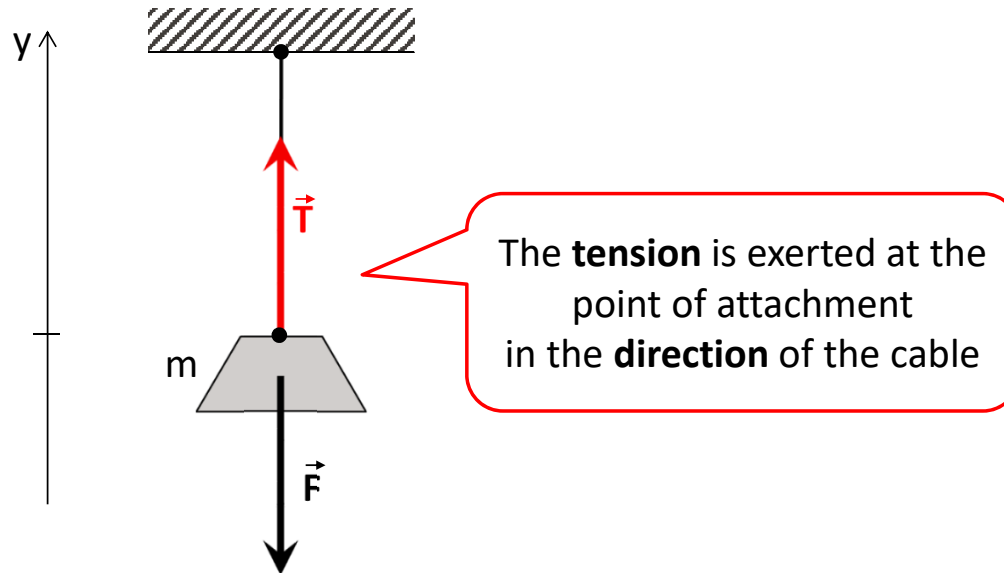
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16 June 2022

A mini-lecture about suspending objects

‣ Weight and tension forces
‣ Static equilibrium
‣ Fixed pulley

Suspending with one cable

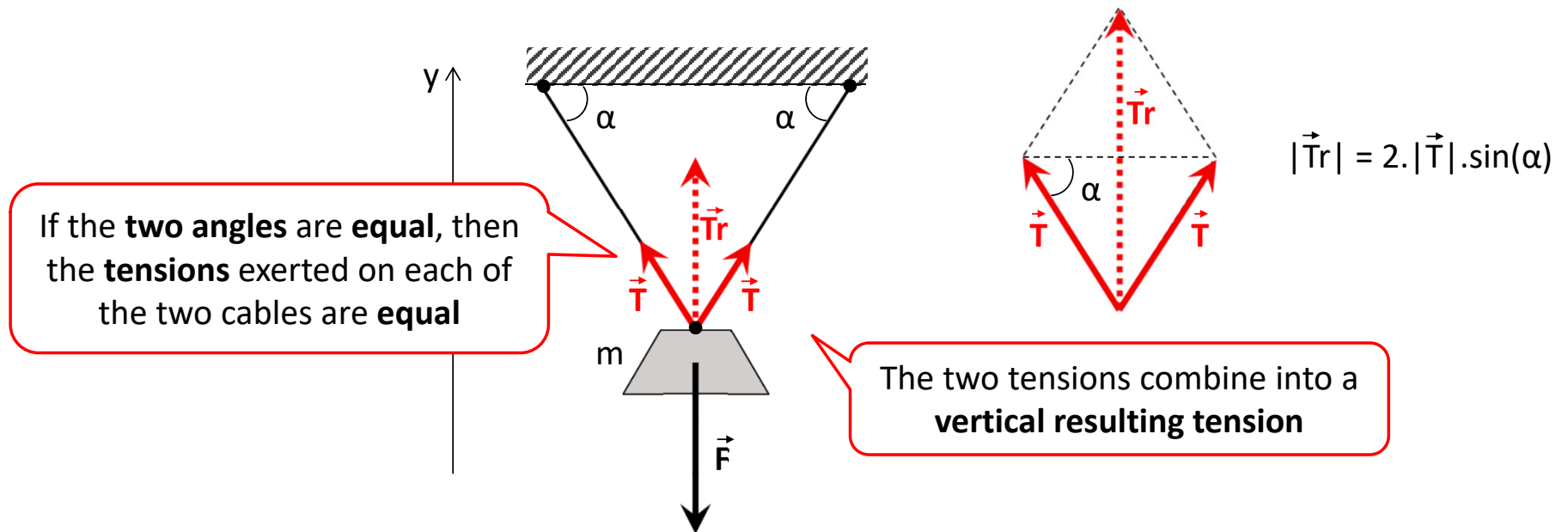If the object is not moving, then it is in **static equilibrium** and the tension in the cable is :

$$|\vec{T}| = |\vec{F}|$$
$$|\vec{T}| = m.g$$

Suspending with two cables

y

α   α

$\vec{Tr}$

$\vec{T}$ $\vec{T}$

m

$\vec{F}$

$|\vec{Tr}| = 2.|\vec{T}|.\sin(\alpha)$

$\vec{Tr}$

α

$\vec{T}$ $\vec{T}$

If the **two angles** are **equal**, then the **tensions** exerted on each of the two cables are **equal**

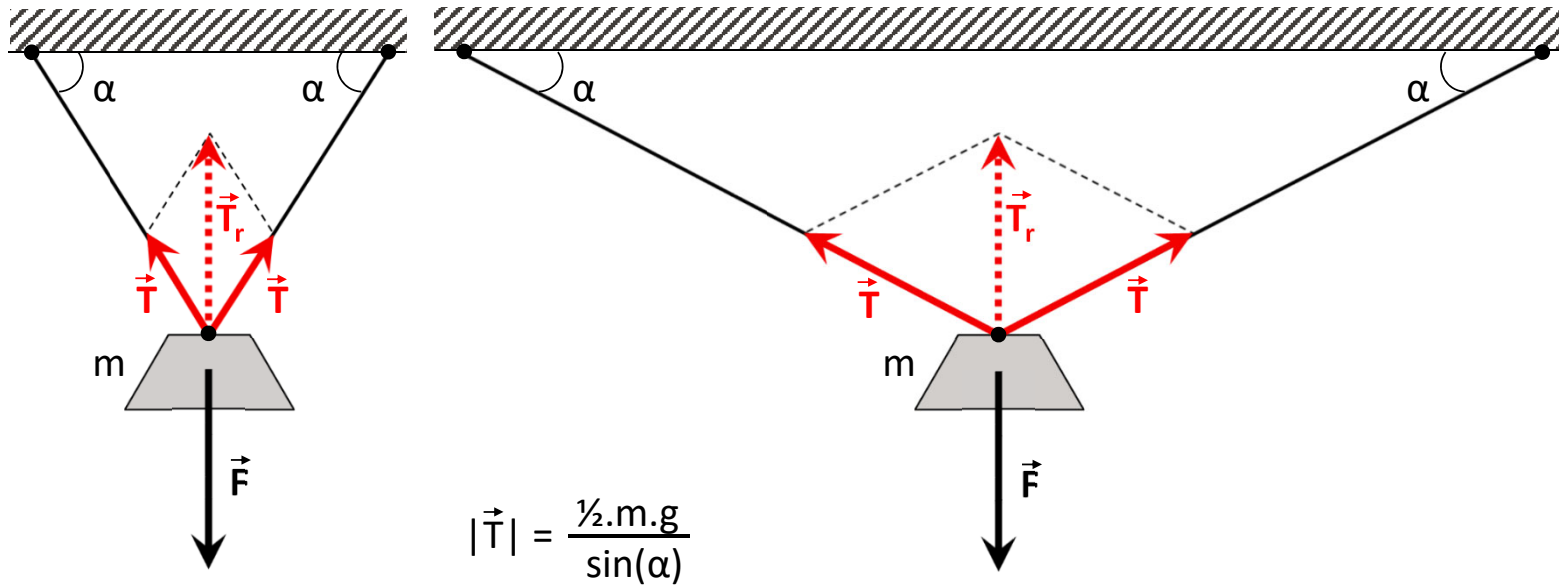The two tensions combine into a **vertical resulting tension**

If the object is not moving, then it is in **static equilibrium** and the tension in **each one of the cables** is :

$$|\vec{T}| = \frac{\frac{1}{2}.m.g}{\sin(\alpha)}$$

The tension *in each cable* compensates **half** the weight

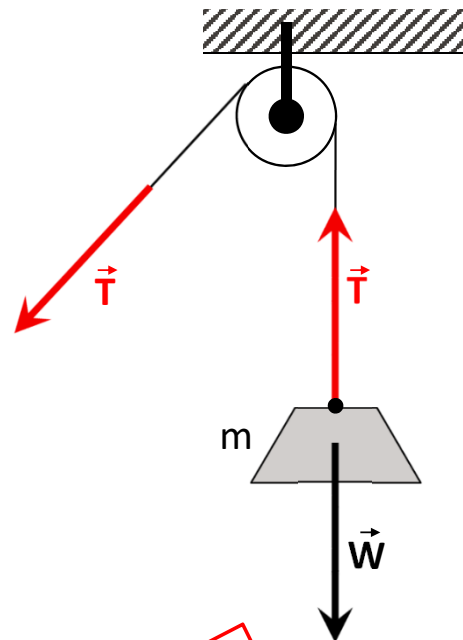The tension *in each cable* depends on the **angle**

Zoom on the influence of the angle

$$|\vec{T}| = \frac{\frac{1}{2}.m.g}{\sin(\alpha)}$$

smaller angle = higher tension in each cable to compensate the same weight

Suspending with a fixed pulley

A **fixed pulley** simply changes the **direction** of the tension

Now what?

Application problem in the notebook!