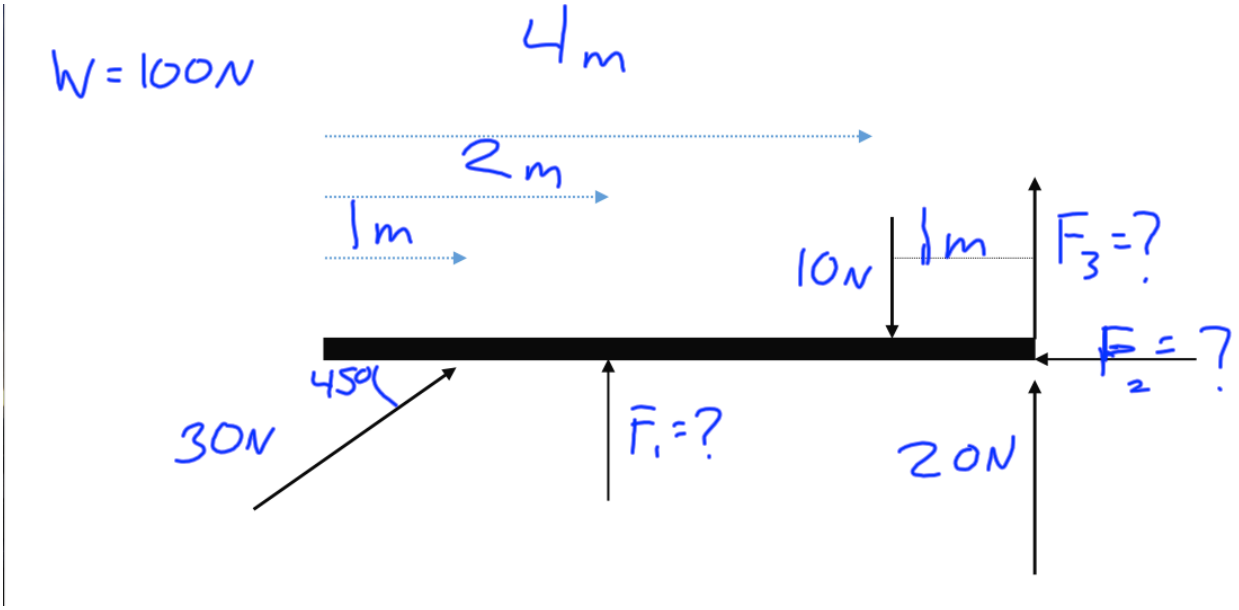
Practice Problem:



Step 1: draw in the force of gravity at the midpoint (it is 100N, 2.5m from the end)
Step 2: Select a Pivot Point (Far to the right is best because it cancels out two forces)
Step 3: Choose positive rotation around the pivot point (draw it in)
Step 4: Write net torque = 0.
Set r as the distance from the pivot point.

Rotational Kinetic Energy

Linear
$K = \frac{1}{2}mv^2$

Rotational
$K_r = \frac{1}{2}I\omega^2$

K_R is just another type of energy that combines with other types of energy to make E_{Total}

$$E_{Total\,i} = E_{Total\,f}$$

Ball vs Block on a ramp

Box: $E_g \Rightarrow E_{KTrans}$

Ball: $E_g \Rightarrow E_{KTrans} + E_{Krotational}$

Rolling without Slipping

When you are rolling without slipping v and ω must be connected

Too much ω = burn out

Too little ω = skidding

Lets say it takes T seconds for 1 rotation

$\omega \cdot T = 2\pi$

$V \cdot T = 2\pi r$

$T = \frac{2\pi}{\omega}$ $\quad \frac{2\pi}{\omega} = \frac{2\pi r}{V}$

$T = \frac{2\pi r}{V}$ $\quad V = \omega r$