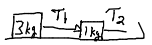


$\Rightarrow a$

frictionless

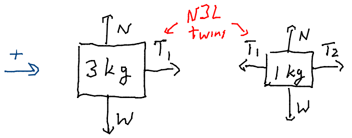
$\mu_k = 0$

Which is greater?

A) T_1

B) T_2

C) Both same



$T_1 = (3kg)a$

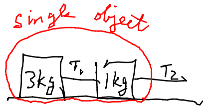
$T_2 - T_1 = (1kg)a$

$T_2 = T_1 + (1kg)a$

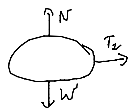
$T_2 = (3kg)a + (1kg)a$

$= (4kg)a$

single object



$\Rightarrow a$



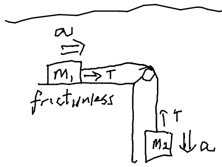
$F_{net} = T_2$

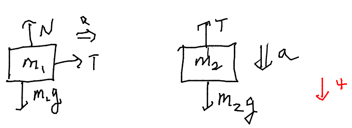
T_1 is an internal force and doesn't affect object as a whole

$F_{net} = ma$

$T_2 = (4kg)\,a$

Only external forces affect object's overall motion.





$T = m_1 a$

$m_2 g - T = m_2 a$

$m_2 g - m_1 a = m_2 a$

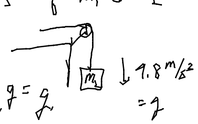
$m_2 g = (m_1 + m_2) a$

$a = \frac{m_2}{m_1 + m_2} g$

Try certain "limits" of m_1 & m_2

e.g. suppose $m_1 = 0$

$a = \frac{m_2}{0 + m_2} g = \frac{m_2}{m_2} g = g$



Suppose $m_2 = 0$

Try certain "limits" of m_1 & m_2

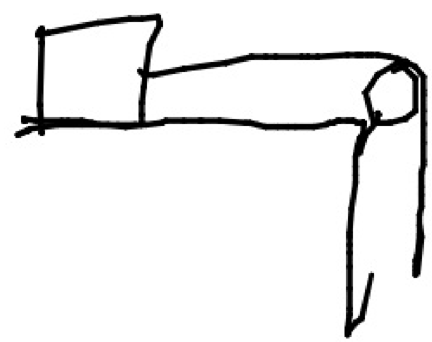
e.g. suppose $m_1 = 0$

$\downarrow 9.8\,m/s^2$

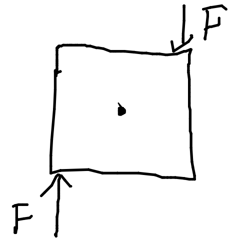
$= g$

$$a = \frac{m_2}{0 + m_2} g = \frac{m_2}{m_2} g = g$$

Suppose $m_2 = 0$



$$a = \frac{0}{m_1 + 0} g = 0$$



$F_{net} = 0$

but block spins!

$F_{net} = ma$

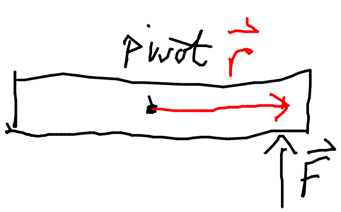
$a = 0$?

Here, a means acceleration of the center of mass

center is stationary but block moves

Torque

- tendency of a force to cause rotation around an axis (3D) or a pivot (2D)



$\vec{r}$: "lever arm" vector from pivot to where the force is applied

if $\vec{r} \perp \vec{F}$,

torque: $\tau = rF$ (tau)