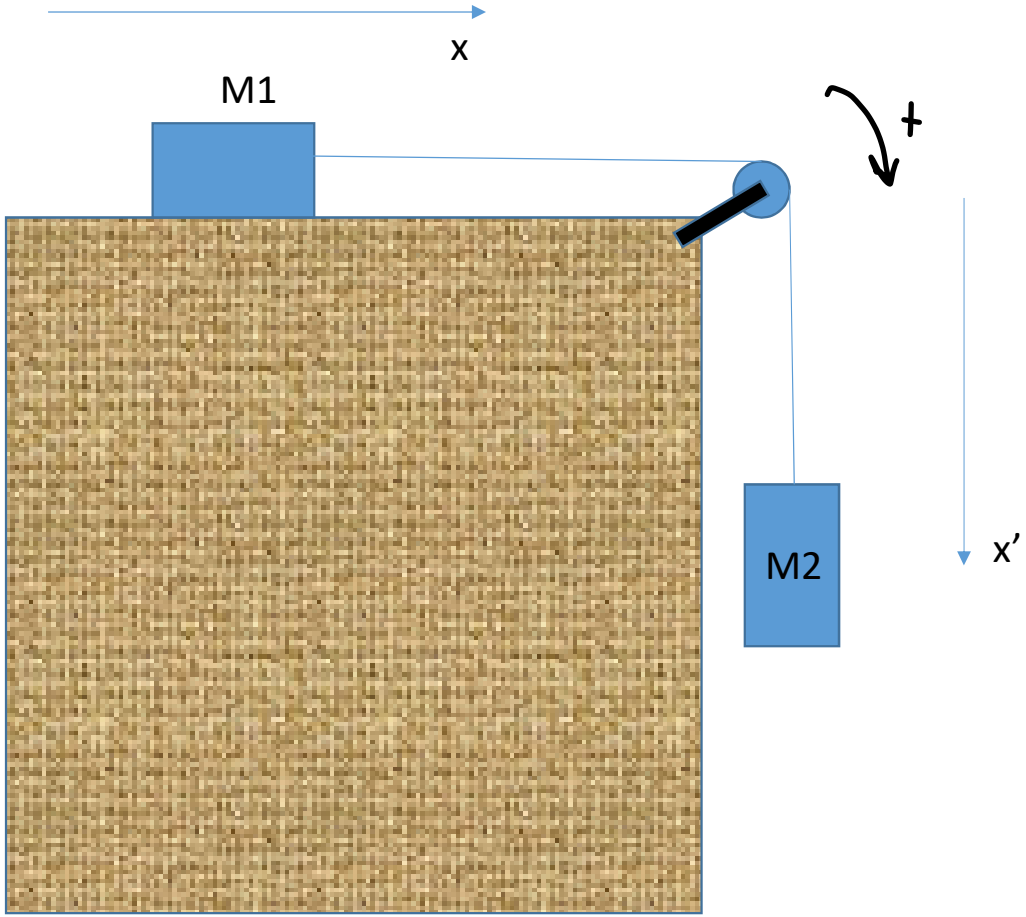
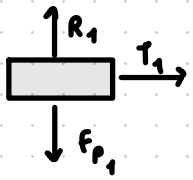


M2 = 4 kg
M1 = 2 kg

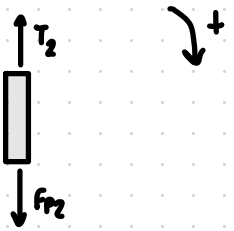
Find the acceleration of the bodies along x or x’ axes

FREE BODY STUDY (AND CHOOSE A FRAME OF REFERENCE)

BLOCK 1:



BLOCK 2:



$F_{P1} = m_1 g = R_1$ $\qquad$ $F_{P2} = mg$

THE TENSION T_1 AND T_2 ARE THE SAME (FOR SEMPLICITY IT WILL NOW BE CALLED JUST T)

GIVING THE SECOND NEWTON'S LAW $F = ma$, WE CAN WRITE

BLOCK 1: $F_{TOT_1} = m_1 a$; $\qquad$ $F_{TOT} = T$

BLOCK 2: $F_{TOT2} = m_2 a$; $\qquad$ $F_{TOT2} = F_{P_2} - T = m_2 g - T$

WE KNOW THAT THE ACCELERATION ON BLOCK 1 AND BLOCK 2 ARE THE SAME

$$\begin{cases} T = m_1 a \\ F_{P_2} - T = m_2 a \end{cases} \Rightarrow \begin{cases} T = m_1 a \\ F_{P_2} - m_1 a = m_2 a \end{cases}$$

ISOLATE a

$$a = \frac{m_2 g}{m_1 + m_2} = \frac{4\,kg \cdot 9.81 \frac{m}{s^2}}{4\,kg + 2\,kg} = 6.54 \frac{m}{s^2}$$

$$\left[\frac{kg}{kg} m/s^2 = \frac{m}{s^2}\right]$$