Forces on two boxes connected around a frictionless pulley

$F_{m1nety} = F_n - F_{m1g} = 0$

$F_n = F_{m1g}$

+Y

+X

a_1 →

Frictionless pulley

F_n

F_k m₁ F_t

F_{m1g}

F_t

a_2

$a_2 = -a_1$
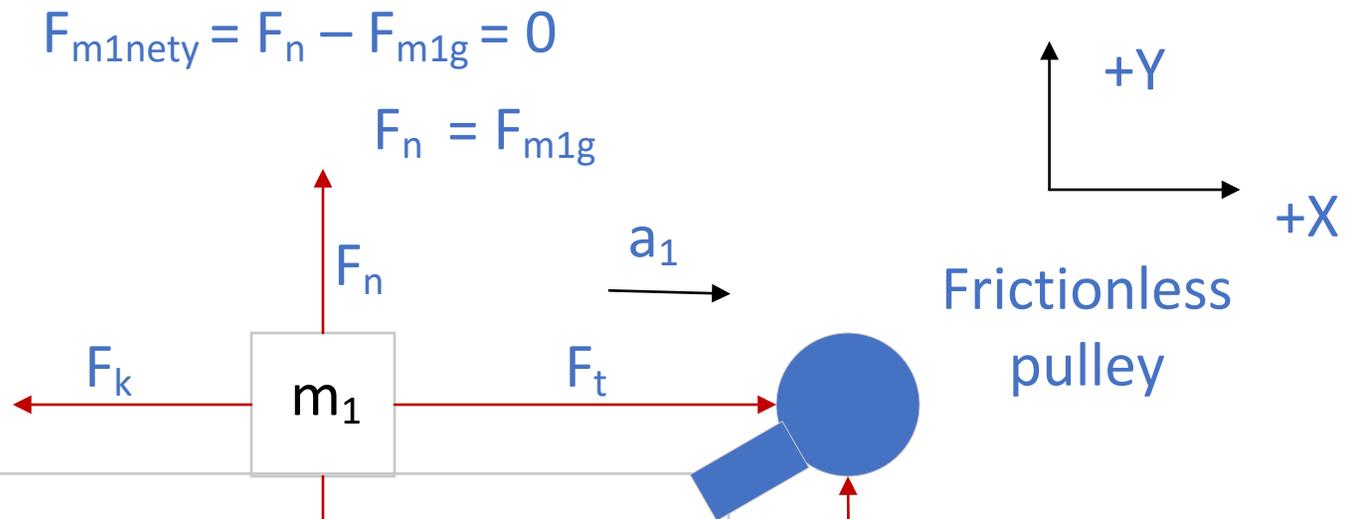
$F_{net} = ma$
$F_k = uF_n$
$F_{m1g} = m_1g$
$F_{m2g} = m_2g$
$F_t = ?$
$a_1 = ?$

$F_{m1netx} = F_t - F_k = m_1a_1$

$F_t - F_k = m_1a_1$

$F_t = m_1a_1 + F_k$

$m_1a_1 + F_k = - m_2a_1 + F_{m2g}$

$m_1a_1 + m_2a_1 = F_{m2g} - F_k$

$a_1 = (F_{m2g} - F_k)/(m_1+m_2)$

m₂

F_{m2g}

$F_{m2nety} = F_t - F_{m2g} = m_2a_2$

$F_t - F_{m2g} = m_2a_2$

$F_t - F_{m2g} = - m_2a_1$

$F_t = - m_2a_1 + F_{m2g}$