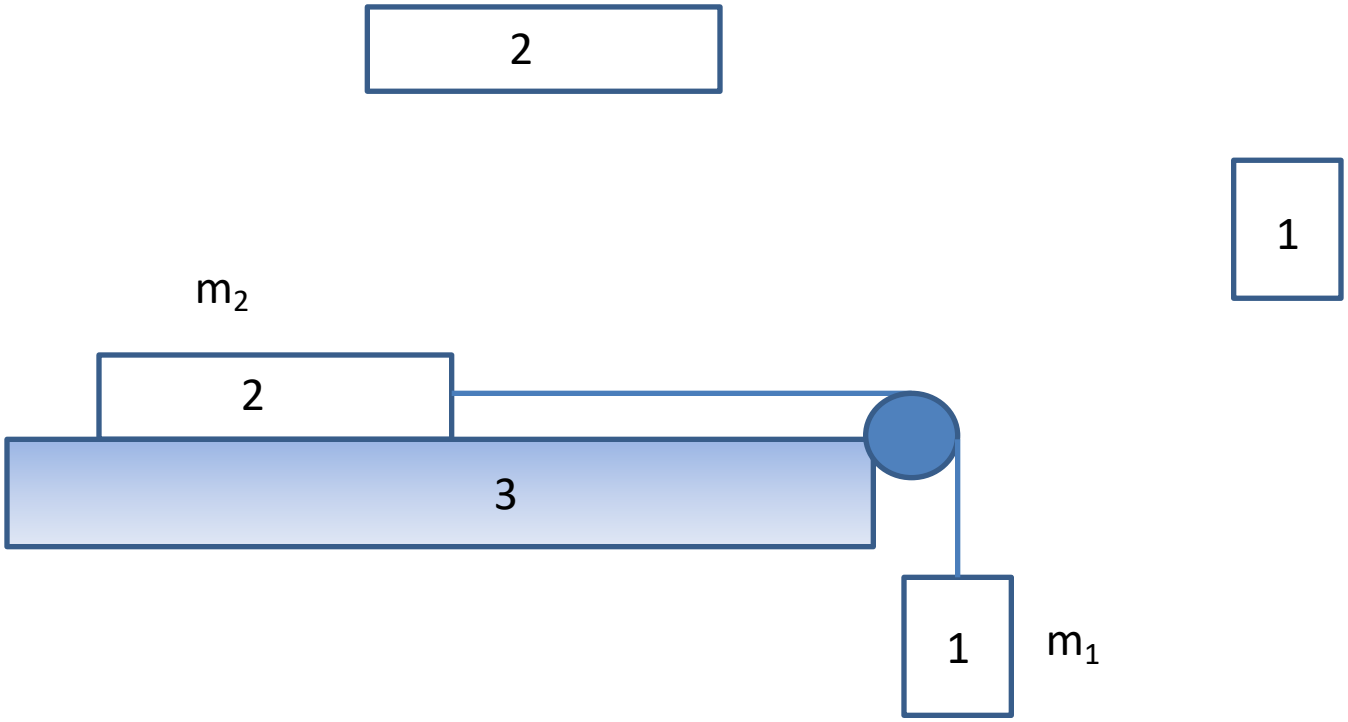
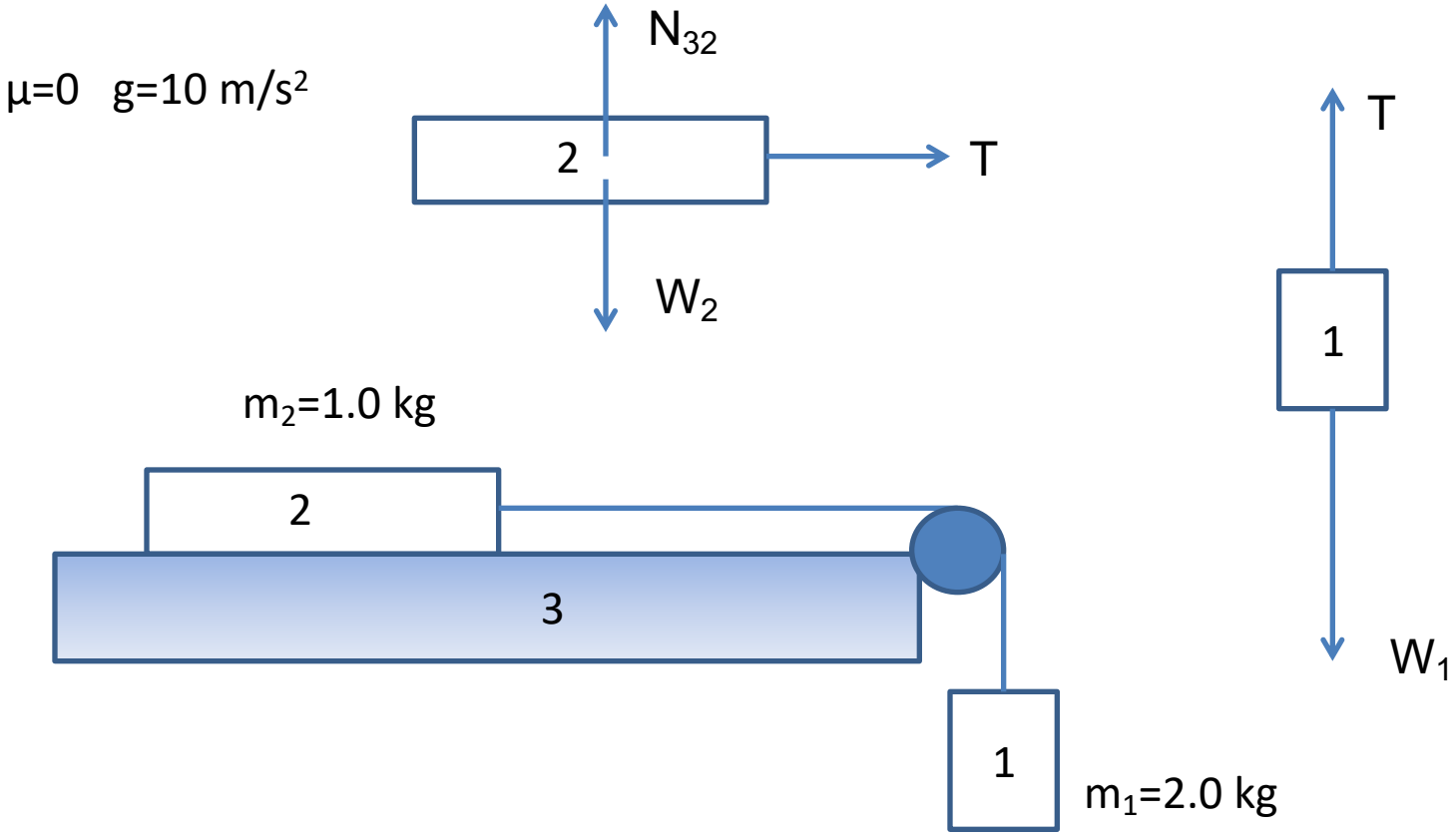
Draw Free Body Diagrams

$\mu=0 \quad g=10\ m/s^2$



Free Body Diagram

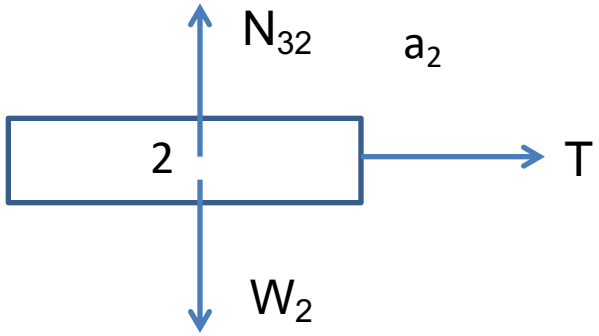
Find the acceleration and Tension
a=? T=?

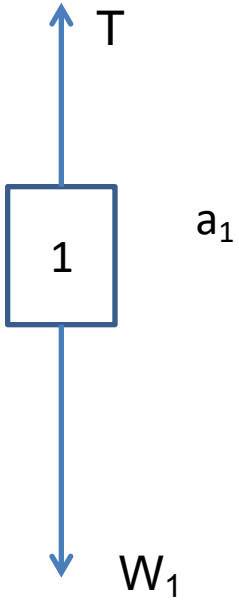


Finding acceleration and tension

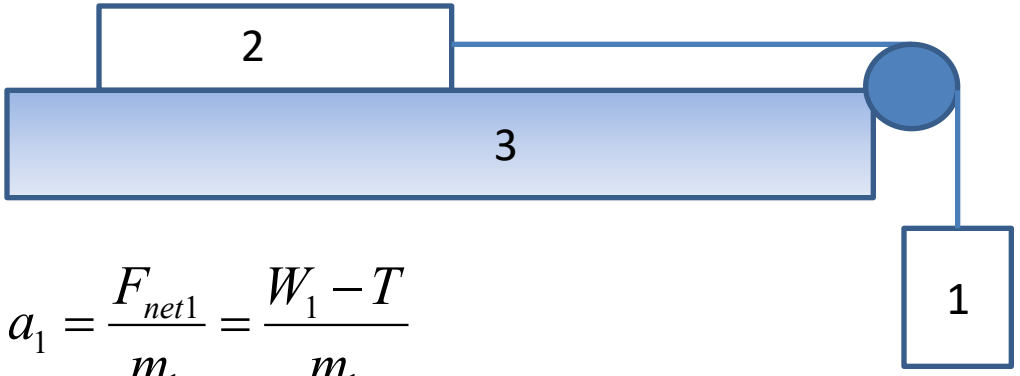
$a_1=a_2$

μ=0 g=10 m/s²





m_2=1.0 kg



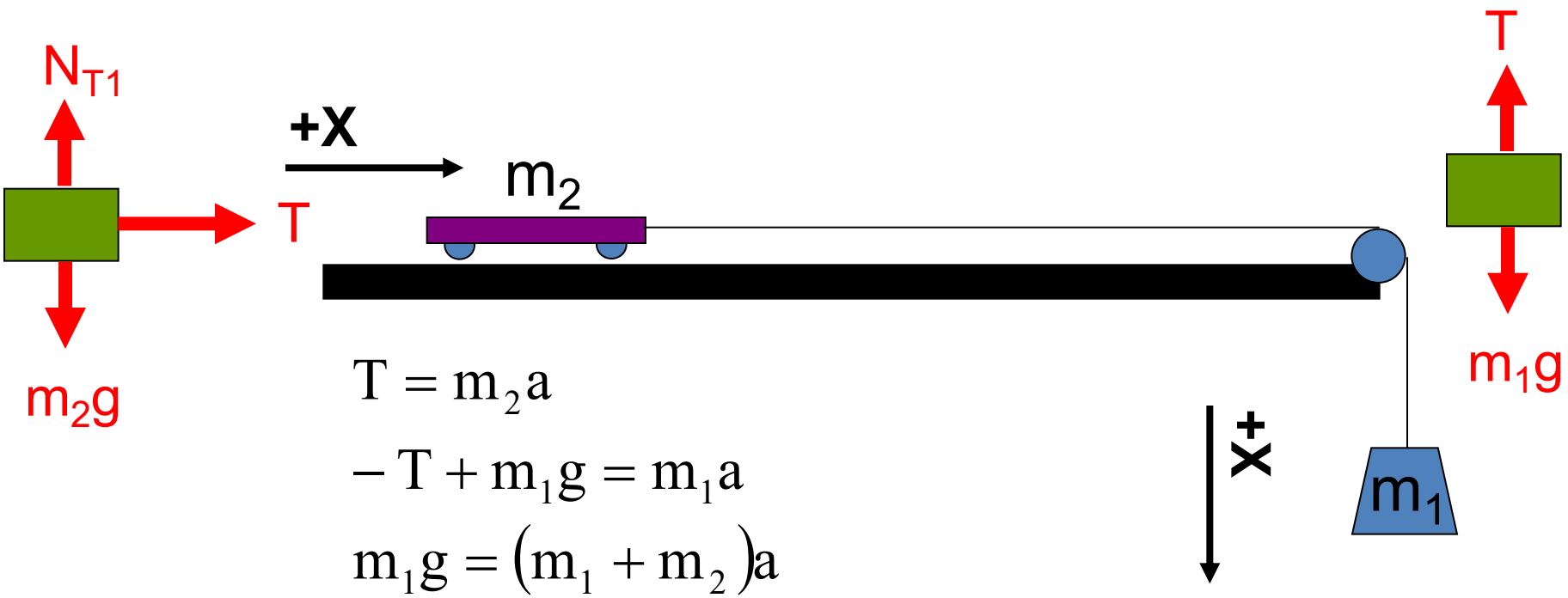
m_1=2.0 kg

$$a_1 = \frac{F_{net1}}{m_1} = \frac{W_1 - T}{m_1}$$

$$a_2 = \frac{F_{net2}}{m_2} = \frac{T}{m_2}$$

$$a_1 = a_2$$

A cart with mass m_2 is connected to a mass m_1 using a string that passes over a frictionless pulley, as shown below. Initially, the cart is held motionless. After the cart is released, the tension in the string is:



$$T = m_2 a$$

$$-T + m_1 g = m_1 a$$

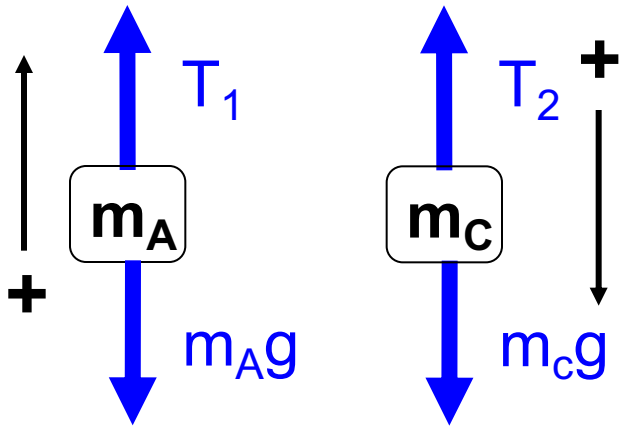
$$m_1 g = (m_1 + m_2) a$$

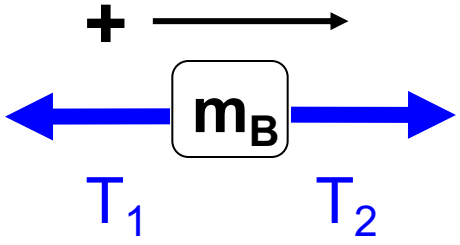
$$a = \left(\frac{m_1 g}{m_1 + m_2} \right)$$

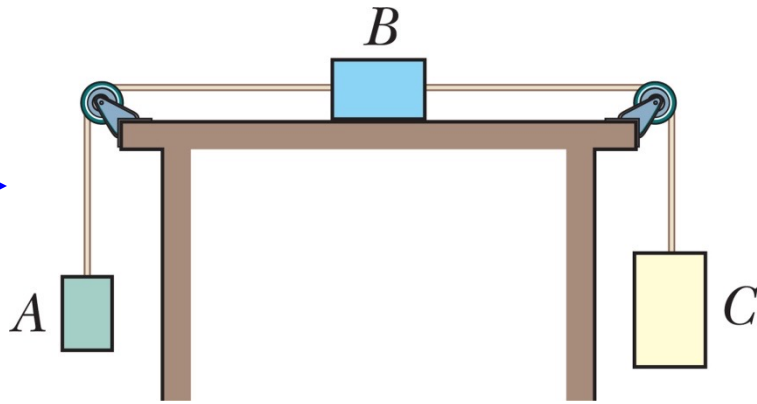
$$T = \left(\frac{m_1 m_2 g}{m_1 + m_2} \right)$$

This is a 1D problem. Make sure that the + direction of acceleration is the same for both objects

Three blocks are attached by cords that loop over frictionless pulleys. Block B lies on a frictionless table. The A, B and C masses are 6.00 Kg, 8.00 kg and 10.0 kg, respectively. When the blocks are released, what are the acceleration of the system and the tensions in the cables?







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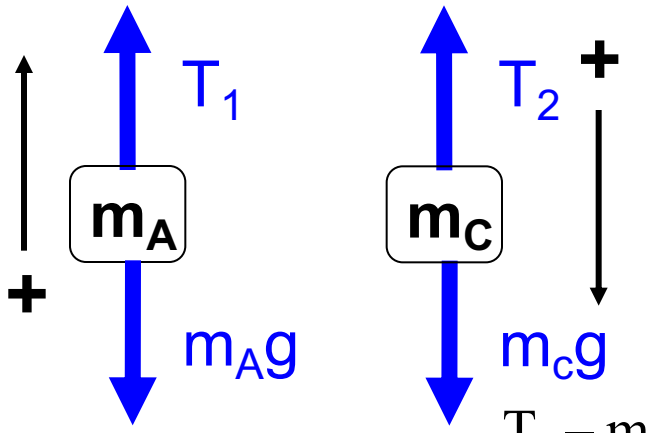
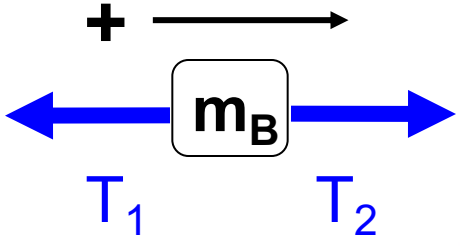
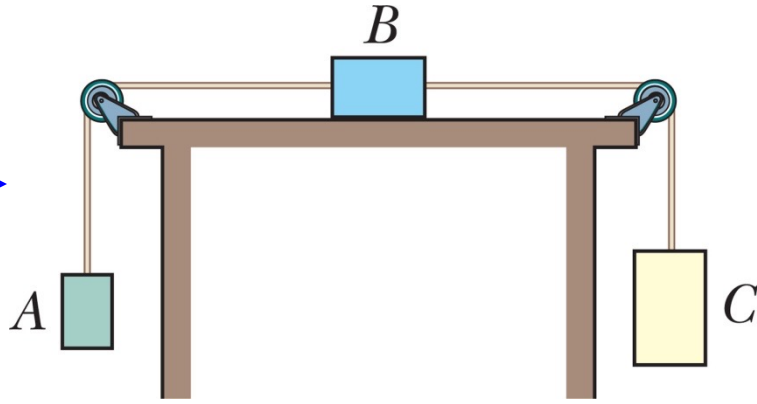






$$T_1 - m_A g = m_A a$$

$$T_2 - T_1 = m_B a$$

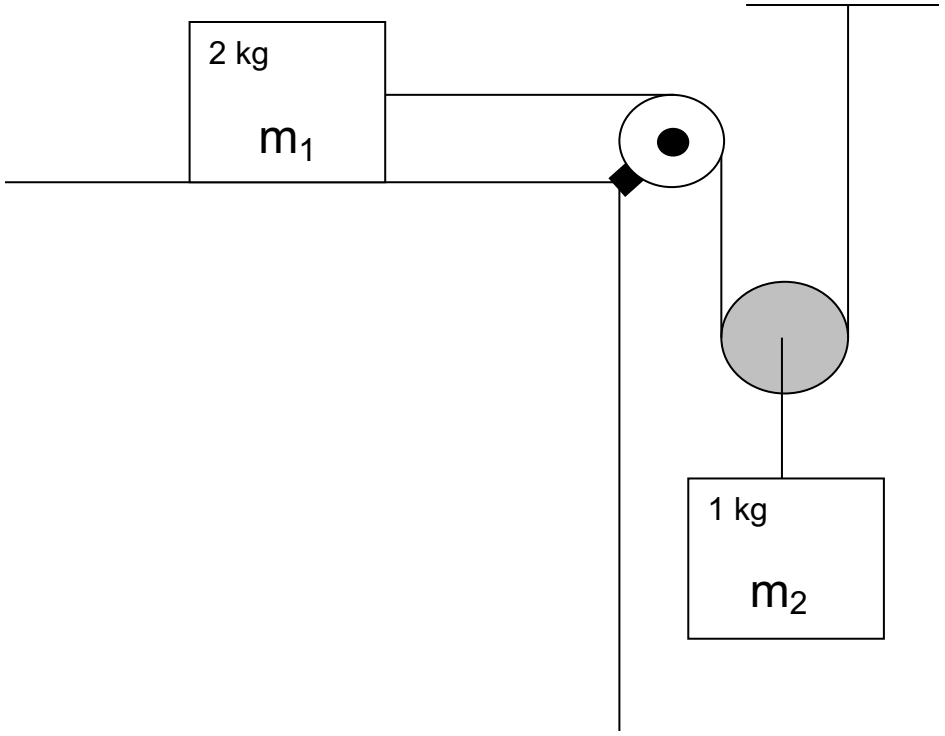
$$m_C g - T_2 = m_C a$$

$$a = \left(\frac{(m_C - m_A)g}{m_A + m_B + m_C} \right) = \left(\frac{(10\,\text{kg} - 6\,\text{kg})9.8\,\text{m/s}^2}{(6\,\text{kg} + 8\,\text{kg} + 10\,\text{kg})} \right) = +1.63\,\text{m/s}^2$$

$$T_1 = m_A(g + a) = (6\,\text{kg})(9.8 + 1.63)\,\text{m/s}^2 = 68.6\,\text{N}$$

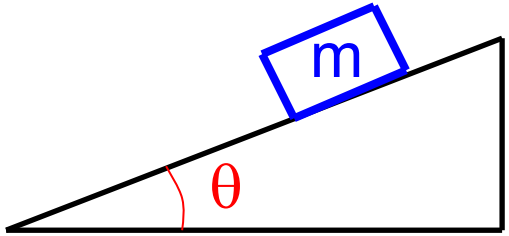
$$T_2 = m_C(g - a) = (10\,\text{kg})(9.8 - 1.663)\,\text{m/s}^2 = 81.7\,\text{N}$$

What is the acceleration of the 2.0 kg block across the frictionless table?



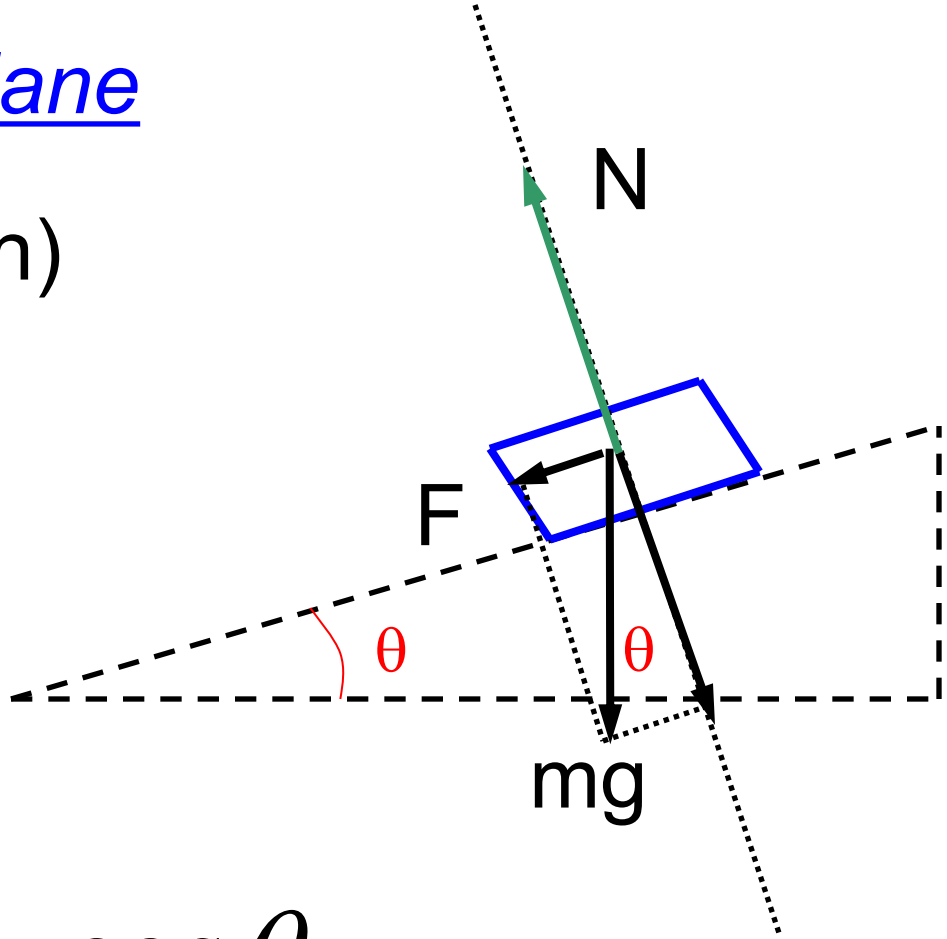
($a=2.18\ m/s^2$)

Inclined Plane (no friction)



Inclined Plane

(no friction)



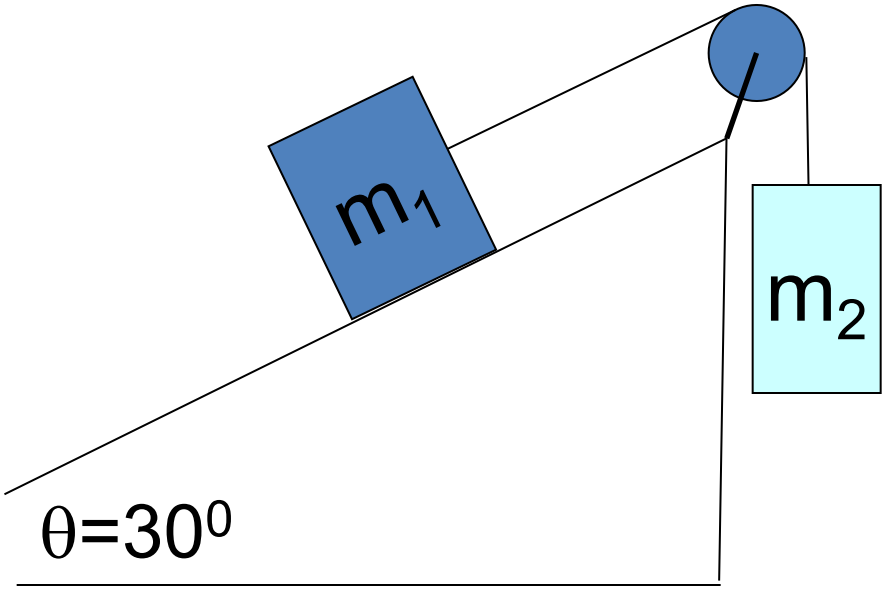
$$N = mg\cos\theta$$

$$F = mg\sin\theta$$

m=2.1 kg, θ=40^0

Find: a

Ex:



m_1=3.3 kg

m_2=2.2 kg

Find: a, T