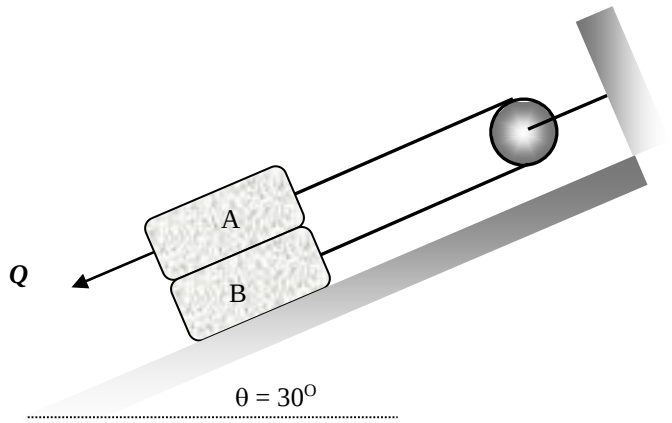
Example

A system of two blocks sits on an incline as shown in the figure.

(a) Do the blocks move?

(b) If the blocks do move, what are the accelerations of *A* and *B*, and what is the tension in the cable?



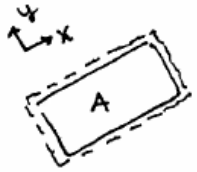
m_A = 25 kg
m_B = 15 kg

Q = 250 N

For all surfaces:
μ_s = 0.2
μ_k = 0.15

ASSUME _____ _____ → SOLVE FOR _____

SYSTEM A:



y-DIR COLM:

$$\frac{d}{dt}(P_{y,sys}) = \Sigma F_y + \mathcal{L}_o - \mathcal{L}_o$$

$$=$$

$$N_A = \quad = \qquad (1)$$

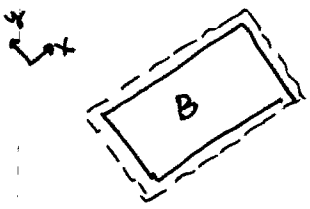
x-DIR COLM:

$$\frac{d}{dt}(P_{x,sys}) = \Sigma F_x + \mathcal{L}_o - \mathcal{L}_o$$

$$=$$

$$Q_{IMP} = \qquad (2)$$

SYSTEM B:



y-DIR CoLM:

$$\frac{d}{dt}(P_{y,sys}) = \Sigma F_y + \mathcal{L}_o - \mathcal{L}_o$$

$$=$$

$$N_B = \qquad = \qquad (5)$$

x-DIR CoLM:

$$\frac{d}{dt}(P_{x,sys}) = \Sigma F_x + \mathcal{L}_o \quad - \mathcal{L}_o$$

$$=$$

$$=$$

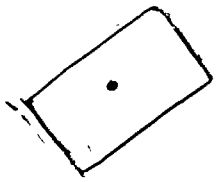
$$T = \qquad =$$

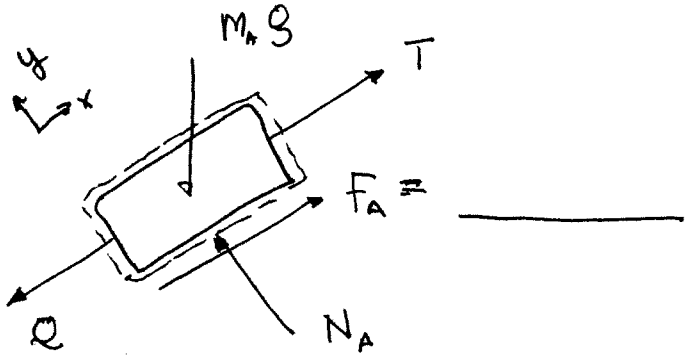
From (3)

$$Q = \qquad >, <, = R \ ?$$
$$_{IMP}$$

$\Rightarrow$ MOTION / NO MOTION ?

SYSTEM A:





HERE, y-COLM IS THE SAME. WHY?

(CAUTION!! NOT ALWAYS THE CASE!)

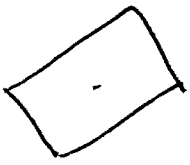
X-DIR COLM:

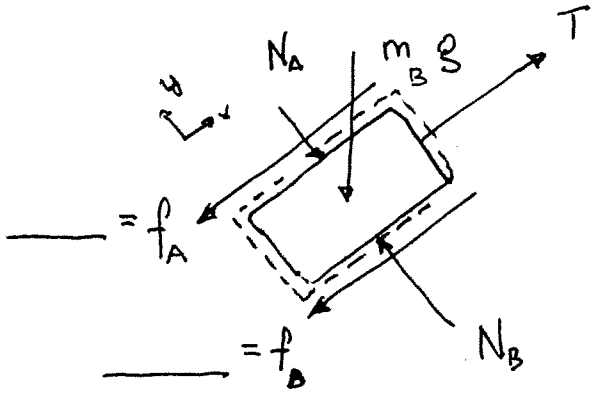
$$\frac{d}{dt}(P_{x,sys}) = \sum F_x + \angle \quad - \angle$$

$$\frac{d}{dt}(\quad) =$$

$$m_A \frac{dV_A}{dt} = m_A(\quad) = \qquad (1)$$

SYSTEM B:





y-DIR COLM SAME. (AGAIN! CAREFUL!)

X-DIR COLM:

$$\frac{d}{dt}(\quad) =$$

$$m_B \frac{dV_B}{dt} = m_B a_B =$$

$$m_B a_B = \qquad (2)$$

TWO EQNS, THREE UNKNOWNS.

THIRD EQN?

(3)

SOLVE...

$a_A =$ _____

$a_B =$ _____

$T =$ _____