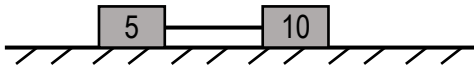


CONCEPT: CONNECTED SYSTEMS OF OBJECTS WITH FRICTION

- If 2+ objects are connected and friction is NOT negligible, you'll have to consider the friction on _____ object.

- **Remember:** Connected objects have the same $\vec{v}$ and $\vec{a}$!

EXAMPLE: A 10kg block is tied via a string to a 5kg block on a rough table where $\mu_s = 0.5$ and $\mu_k = 0.3$. If you pull on the 10kg block with 90N, and the objects start moving, **a)** Draw FBDs for both blocks; **b)** find the acceleration of the blocks.



CONNECTED OBJECTS + FRICTION

- 1) Draw FBD for all obj's, choose direction of +
- 2) Determine if $f = f_s$ or f_k from text or:
If ΣF_s on axis of motion $> f_{s,max}$, $f = f_k$
- 3) Write $\Sigma F = ma$, start with simplest (fewest Fs)
- 4) Solve a (EQ Addition / Substitution)
- 5) Plug a into eq's, solve other targets if needed

PROBLEM: Two blocks are connected by a cord over a pulley. Block A rests on a rough tabletop. Block B has mass $m_B=2\text{kg}$ and hangs over the edge of the table. The coefficients of friction between Block A and the tabletop are $\mu_s=0.6$ and $\mu_k=0.4$. What is the minimum mass Block A can have to keep the system from starting to move?

- A) 3.33 kg
- B) 5 kg
- C) 32.7 kg

CONNECTED OBJECTS + FRICTION

- 1) Draw FBD for all obj's, choose direction of +
- 2) Determine if $f = f_s$ or f_k from text or:
If ΣF_s on axis of motion $> f_{s,\text{max}}$, $f = f_k$
- 3) Write $\Sigma F = ma$, start with simplest (fewest Fs)
- 4) Solve a (EQ Addition / Substitution)
- 5) Plug a into eq's, solve other targets if needed