CONCEPT: STACKED BLOCKS

● When objects are stacked on top of each other, the force that causes the top objects to move is _____.

- Unlike for previous problems, friction acts in the **[SAME | OPPOSITE]** direction as the direction of motion!
- Friction is **[KINETIC | STATIC]** when the ***relative* velocity** between 2 surfaces is **[NOT ZERO | ZERO].**
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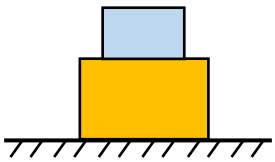
EXAMPLE**:** A 10kg box rests on a frictionless floor, with a 5kg box on top of it**.** The coefficients of friction **between the boxes** are $\mu_s = 0.7$ and $\mu_k = 0.3$**.** You pull the bottom box with a force **F.** What is the maximum acceleration the bottom box can have so that the 2 boxes remain moving together, i.e. the top box does *not* slide on the bottom box?



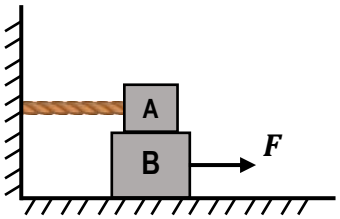
CONNECTED OBJECTS + FRICTION

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

● The friction *between* the stacked blocks always depends on the _____ between the blocks**.**

PROBLEM**:** A 5kg block **A** is placed on a 10kg block **B.** Block A is tied to a wall, while Block B is pulled with a Force of 45N and moves to the right**.** The coefficient of kinetic friction between all surfaces is $\mu_k = 0.2$**.** What is the Tension on Block A?

A) 45 N
B) 9.8 N
C) 49 N
D) 1.8 N



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PROBLEM: A 4kg block sits on top of a 6kg block which is on a frictionless surface. The coefficients of friction between the two blocks are μ_s=0.5 and μ_k=0.3. Calculate the maximum force you can pull on the bottom block with so that the objects move together.

E) 49 N
F) 19.6 N
G) 3.27 N
H) 4.9 N

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