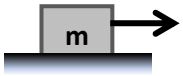
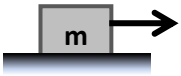
## STATIC AND KINETIC FRICTION PROBLEMS

| | |
|---|---|
| $f_{,K} = \mu_{,K} N$ | $0 \le \mu \le 1$ |
| $f_{,S,MAX} = \mu_{,S} N$ | $\mu_{,K} \le \mu_{,S}$ |

● Remember: If you pull **( F )** on an object, **F** must overcome STATIC friction **( $f_{,S}$ )** for the object to accelerate (and if $v_o = 0$, for the object to begin moving):

- If $F \le f_{,S,MAX}$ → a ___ 0 and $f_{,ACTUAL}$ = _____.
- If $F > f_{,S,MAX}$ → a ___ 0 and $f_{,ACTUAL}$ = _____.




EXAMPLE 1: A 10 kg block is at rest. The coefficients of friction between the block and the floor are $\mu_{,K} = 0.4$, $\mu_{,S} = 0.6$. Use g=10 m/s². Find the: **(a)** max. static friction that can act on the block; **(b)** friction on the block if it was moving.

PRACTICE 1: A 5 kg block is on the floor. You figure out that it takes a horizontal force of 35 N to *get it moving*, and 25 N to *keep it moving*. Use g=10 m/s². Find the coefficients of static & kinetic friction between the block and the surface.

EXAMPLE 2: You pull on the block in EXAMPLE 1 with various horizontal forces F. For each value of F, fill the cells below:

| FORCE | Moves? | Friction Type | $f_{,ACTUAL}$ | Acceleration |
|---|---|---|---|---|
| F = 0 | | | | |
| F = 30 N | | | | |
| F = 50 N | | | | |
| F = 70 N | | | | |

→ If ONE coefficient of friction is given: $\mu_{,S}$ ____ $\mu_{,K}$. → If TWO coefficients are given, but not identified: $\mu_{,S}$ ____ $\mu_{,K}$

PRACTICE 2: You push horizontally on a 10-kg box so that it moves on a flat surface with a constant 2 m/s. The coefficients of friction between the box and the surface are 0.5 and 0.6. **(a)** What force is needed to keep the box at 2 m/s? **(b)** If you stop pushing, what will be the acceleration of the box?