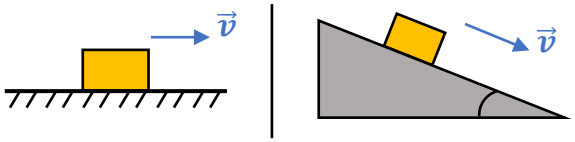
CONCEPT: KINETIC FRICTION

● Kinetic friction (____) is a resisting force that occurs when **rough** surfaces _____ against each other.

- f_k tries to _____ all motion between the surfaces, so its direction is always _____ of $\vec{v}$.

f_k = _____



- μ_k = _____ of kinetic friction: measure of roughness between 2 surfaces, unitless # between __ & __,

Perfectly smooth surfaces: μ_k is **[ZERO | LOW | HIGH]**
Ice rubbing on ice: μ_k is **[ZERO | LOW | HIGH]**
Cinderblock on cinderblock: μ_k is **[ZERO | LOW | HIGH]**

EXAMPLE: A 10-kg box moves on a flat surface at 2 m/s. The coefficient of kinetic friction between the box and the surface is 0.4. Calculate **(a)** the kinetic friction force acting on the box and **(b)** the acceleration of the box.

FORCES
1) Draw FBD
2) Write $\Sigma F = ma$
3) Solve

PROBLEM: Pushing a 10-kg toolbox across the floor, you find that the box moves at a constant speed when you push horizontally with a force of 39 N. What is the coefficient of kinetic friction between the floor and the toolbox?

A) 0.2
B) 0.4
C) 2.5

FORCES
1) Draw FBD
2) Write $\boldsymbol{\Sigma F = ma}$
3) Solve

PROBLEM: You push on a 3-kg box to give it an initial speed of 5 m/s across a floor. If μ_k = 0.3, how far does the box travel before coming to a stop?

A) 8.6 m
B) 2.9 m
C) 7.7 m
D) 4.3 m

FORCES
1) Draw FBD
2) Write $\boldsymbol{\Sigma F = ma}$
3) Solve

EXAMPLE**:** A 20-kg box moving along the floor has a downward force of 30N acting on it**.** How hard must you push the box horizontally to keep the box moving at a constant 2m/s if the coefficient of kinetic friction μ_k is 0.3?

A) 67.8 N
B) 58.8 N
C) 49.8 N
D) 30 N

FORCES
1) Draw FBD **2)** Write $\boldsymbol{\Sigma F = ma}$ **3)** Solve

● Never assume that **N = mg**, therefore $\boldsymbol{f_k = \mu(mg)}$**!** Remember to always calculate N using **ΣF = ma.**