Friction Force (F_F)

We determined that a net force acting on an object will cause it to accelerate!

Consider a situation where you apply a small force to a MASSIVE block!

Friction Force (F_F)

Even though the block is massive, it should acceleration by the rate that is the Net Force divided by its mass (Fnet/m = a).

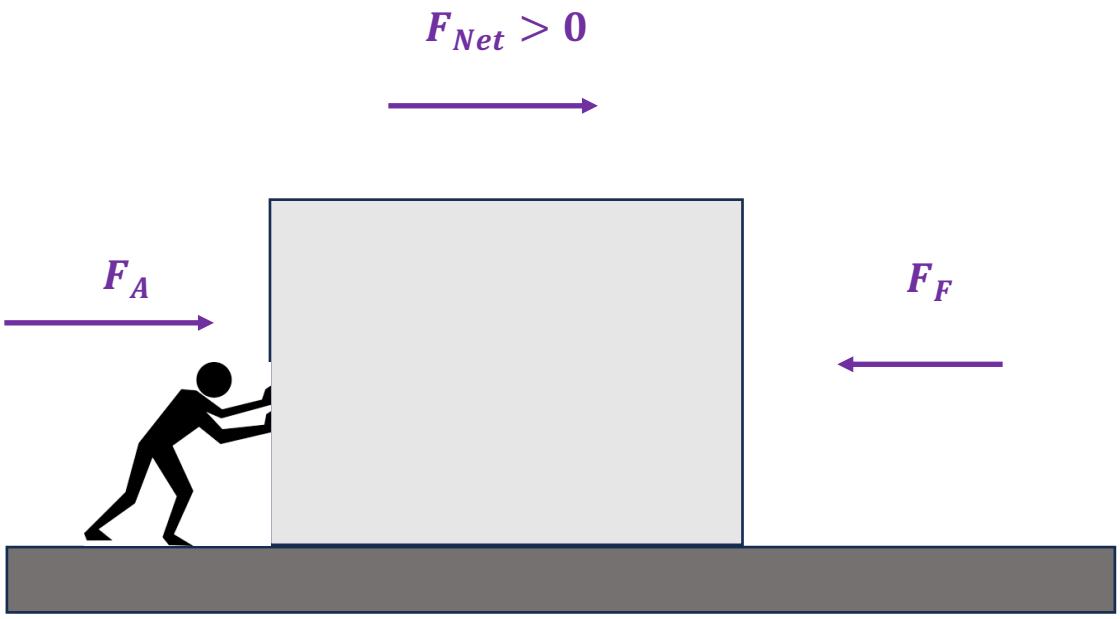
Why doesn't this happen?

According to Second Law, since it's not accelerating, you MUST CONCLUDE that there is a force that is acting in the opposite direction that is the same magnitude as the force that you're pushing!

$$F_{Net} = 0$$

This force is the force of friction! This force balances out your applied force and is why the object does not accelerate!

For this massive block to accelerate, you're applied force must be GREATER than the Frictional Force!



Friction comes in two forms! Let's consider the first situation!

1. THE OBJECT IS STATIONARY (NOT MOVING)

If the object is stationary, friction points in the direction OPPOSITE that the object "WANTS" to move.

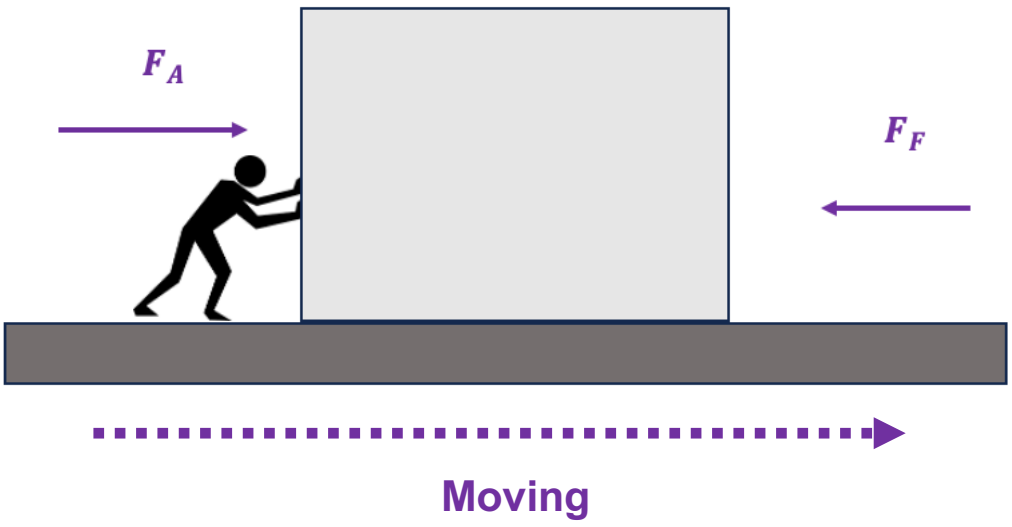
Force pointing → so object "wants" to move →.

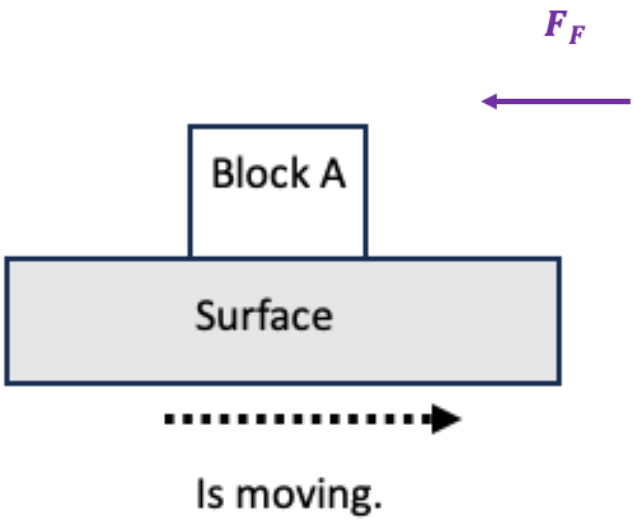
Therefore, friction points ←

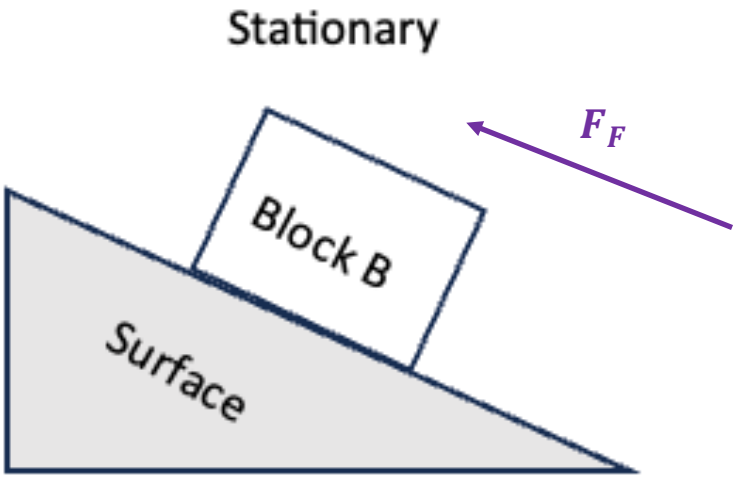
The other situation is…

2. THE OBJECT IS MOVING

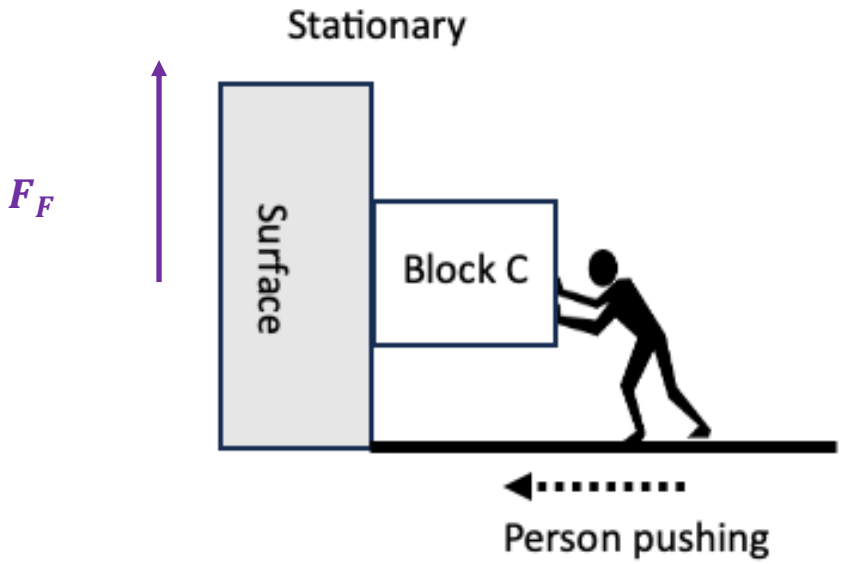
If the object is moving, friction points in the direction OPPOSITE that the object is moving.




F_F
Block A
Surface
Is moving.



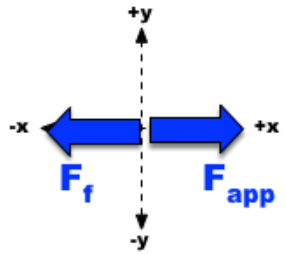
Object “wants” to slide down the ramp due to gravity!



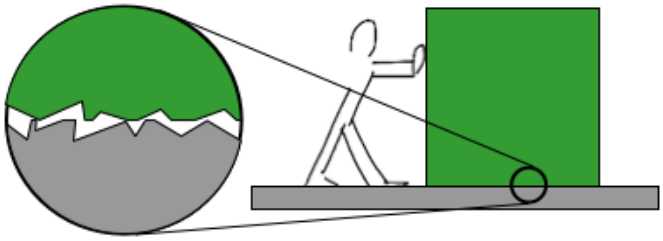
Object "wants" to slide down the surface due to gravity!

Friction Forces arise as interactions between surfaces and objects that slide across them.

Friction Forces are ALWAYS parallel to the surface.



Friction forces happen because surfaces are rough on a microscopic level. Also the surfaces may be adhering to one another.



Static Friction = Friction force holding an object still while you push it. It equals your push up to a maximum value.

Static Friction opposes the push

Kinetic Friction = After you have exceeded max. Static Friction, the object breaks free and slides across the surface, and Kinetic Friction takes over. It equals your push only if the object moves at a constant speed.

Kinetic Friction opposes the motion