

# Static and Kinetic Friction

Nerik Yakubov  
Robert Magee  
David Chen



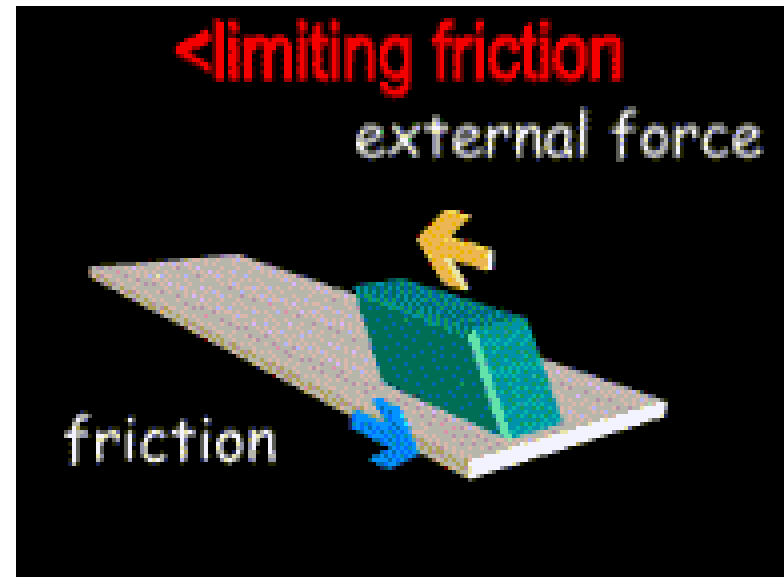
# Instructional Objectives

- Distinguish the Difference Between Static & Kinetic Friction
- Solve Problems Involving Friction Effects

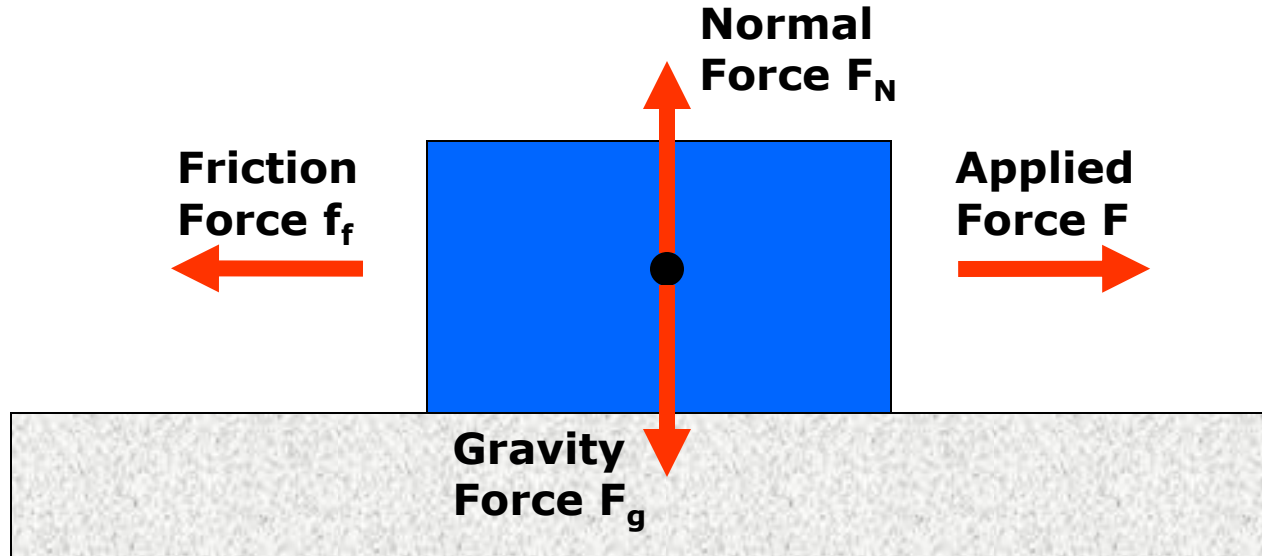


# What is Friction?

- Force that acts oppose the relative motion of two surfaces
- High for dry and rough surfaces
- Low for smooth and wet surfaces



# Free Body Diagram



$$F_g = mg$$

$$F_N = F_g$$

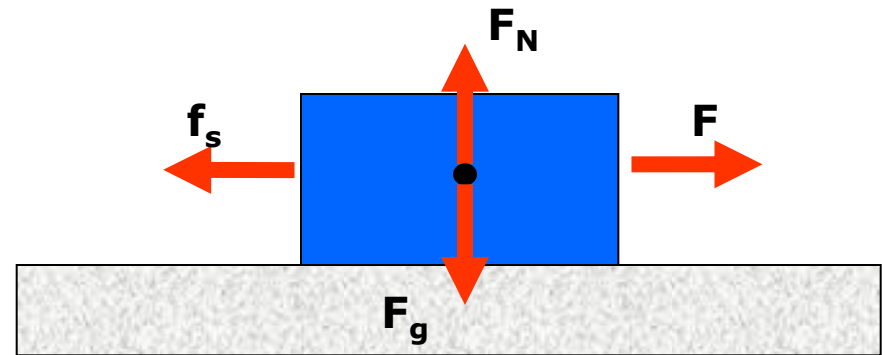
$$f_f = F$$

# Static Friction

**The Force of Static Friction keeps a stationary object at rest!**

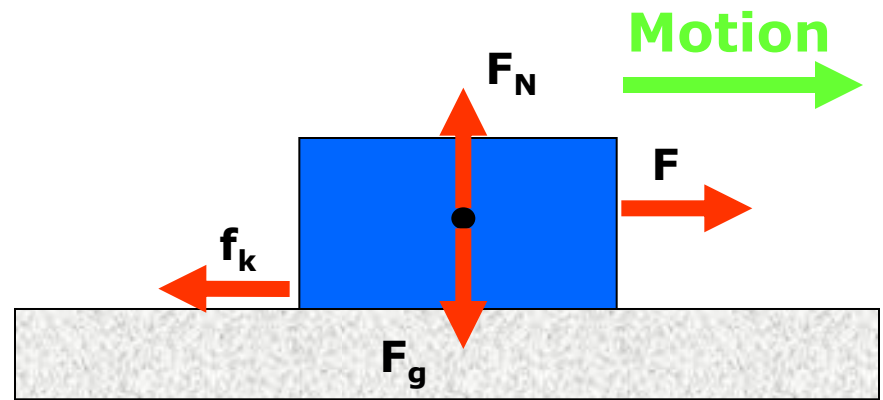
$$f_s = F_N \times \mu_s$$

$\mu_s$  = coefficient of static friction



# Kinetic Friction

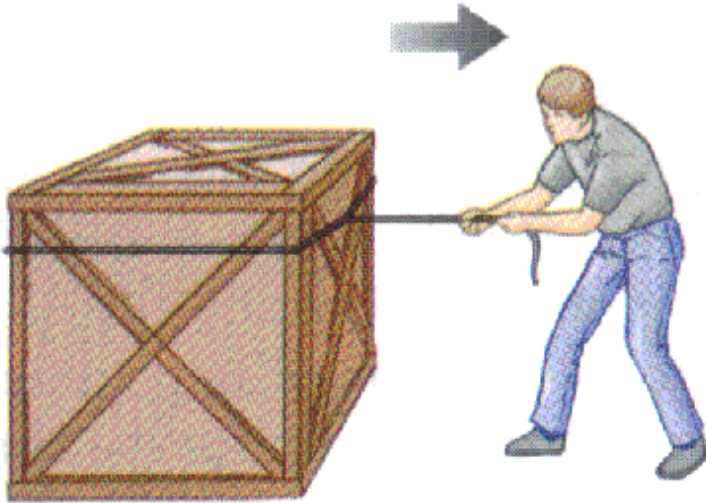
Once the Force of Static Friction is overcome, the Force of Kinetic Friction is what slows down a moving object!



$$f_k = F_N \times \mu_k$$

$\mu_k$  = coefficient of kinetic friction

# Types of Friction



To initiate motion of the box the man must overcome the Force of *Static Friction*

I better be safe Ump!!



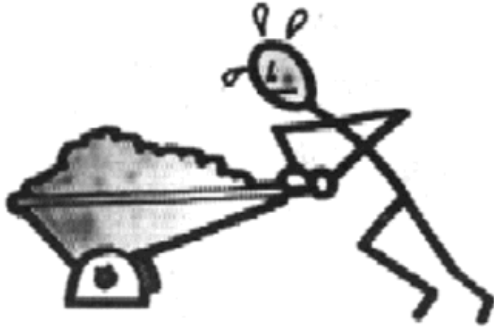
Upon sliding, the baseball player will come to a complete stop due to the Force of *Kinetic Friction*

# Static & Kinetic Friction Coefficients

Material	Coefficient of Static Friction $\mu_S$	Coefficient of Kinetic Friction $\mu_K$
Rubber on Glass	2.0+	2.0
Rubber on Concrete	1.0	0.8
Steel on Steel	0.74	0.57
Wood on Wood	0.25 – 0.5	0.2
Metal on Metal	0.15	0.06
Ice on Ice	0.1	0.03
<i>Synovial</i> Joints in Humans	0.01	0.003



# Static VS. Kinetic Friction



Only flat on the bottom! Ha Ha!



# Questions?

