Friction

We can determine the amount of friction that exists between two surfaces that are in contact. This can be done by defining the force of friction and the weight of an object as a ratio. This is called the coefficient of friction

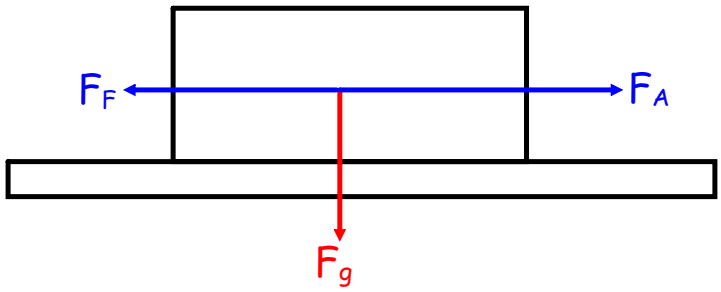
$$\mu = \frac{F_F}{F_N}$$

μ_s and μ_k

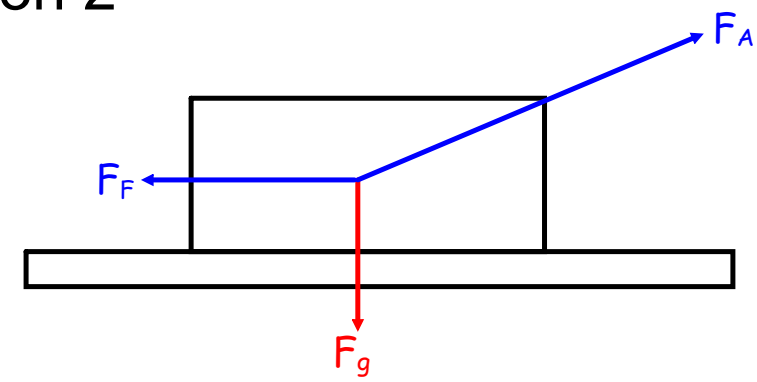
$$\mu_s = \frac{F_S}{F_N} \qquad \mu_K = \frac{F_K}{F_N}$$

Material	Kinetic Friction	Static Friction
oak on oak, dry	0.30	0.40
waxed hickory on dry snow	0.18	0.22
steel on steel, dry	0.41	0.60
steel on steel, greasy	0.12	
steel on ice	0.010	
rubber on asphalt, dry	1.07	
rubber on asphalt, wet	0.95	
rubber on concrete, dry	1.02	
rubber on concrete, wet	0.97	
rubber on ice	0.005	
leather on oak, dry	0.50	

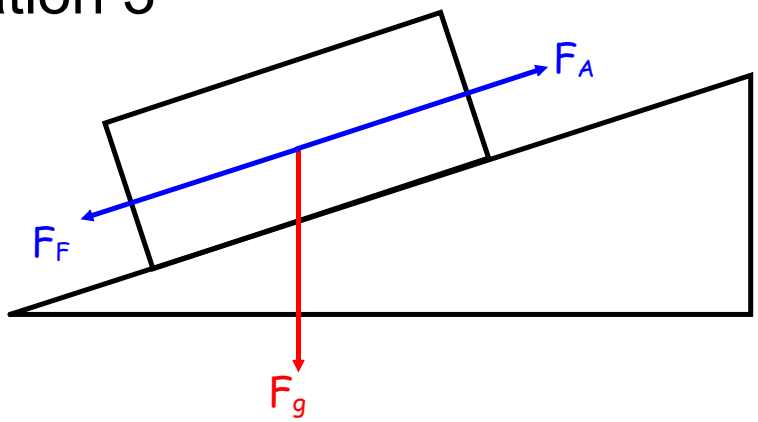
Situation 1



Situation 2



Situation 3



Example 1

In the horizontal starting area of a four-person bobsled race, the four athletes, with a combined mass including outfits of 295 kg, exert a minimum horizontal force of 41 N [fwd] to get the 315-kg sled to begin moving.

After the sled has travelled for almost 15 meters, all four people jump into the sled, and the sled then experiences a kinetic friction of magnitude 66 N.

Determine the coefficient of
a) static friction, and
b) kinetic friction.

Example 2

A truck's brakes are applied so hard that the truck goes into a skid on the dry asphalt road. If the truck and its contents have a mass of 4.2×10^3 kg, determine the force of kinetic friction on the truck.

Determining Coefficients of Friction Worksheet