Friction

Static friction - the force of friction that needs to be overcome in order to start an object moving.

$0 \leq F_a \leq F_f$ (maximum static friction)

Kinetic Friction - the force of friction that the object experiences once the object is moving

$F_a = F_f$ (kinetic) if constant velocity

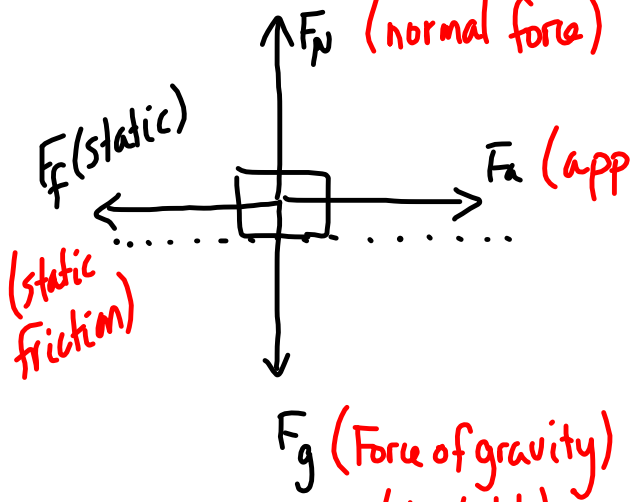
Recall: $F_f = \mu F_N$

μ: coefficient of friction

F_N: the normal force (equal to F_g if everything is horizontal)

MP|141

Draw a FBD (Free Body Diagram)



At the instant that the truck starts to move, the applied force is equal to the maximum static friction force

If the surface is horizontal AND F_a is acting horizontally, then F_N is equal to F_g

$m = 2.00 \times 10^2 \text{ kg}$

$\mu_s = 0.70$

$F_f(\text{static}) = ?$

$F_f = \mu F_N$

$F_f = \mu F_g$

$F_f = \mu mg$

if everything is horizontal.

$\text{kg} \cdot \text{m/s}^2 = \text{N}$

$F_f = (0.70)(2.00 \times 10^2 \text{ kg})(9.81 \text{ m/s}^2)$

$F_f = 1.4 \times 10^3 \text{ N}$

There is an extra 1.4×10^3 N of static friction due to the addition of the sandbags

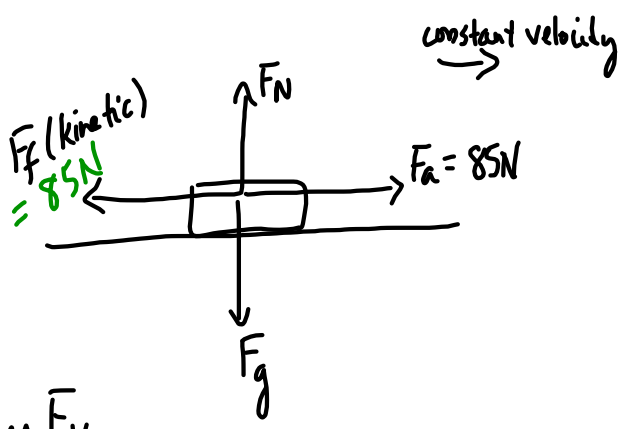
MP|143

$F_a = 85N$

constant velocity

$m = 52\,kg$

$\mu_k = ?$



$$F_f = \mu F_N$$

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

$$\mu = \frac{F_f}{F_g}$$

$$\mu = \frac{F_f}{(mg)}$$

$$\mu = \frac{85N}{(52kg)(9.81 m/s^2)} \qquad \frac{N}{N} = 1$$

$$\mu \doteq 0.17$$

TO DO: PP|144 ← HW Probe on Thurs.

Assignment: p151 | 26-35 (due Tues, Oct 29)

Note: #35 → draw a FBD for each scenario showing the relative size of the vectors.