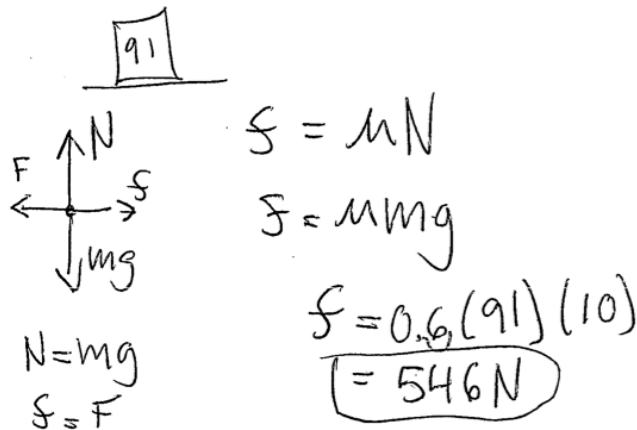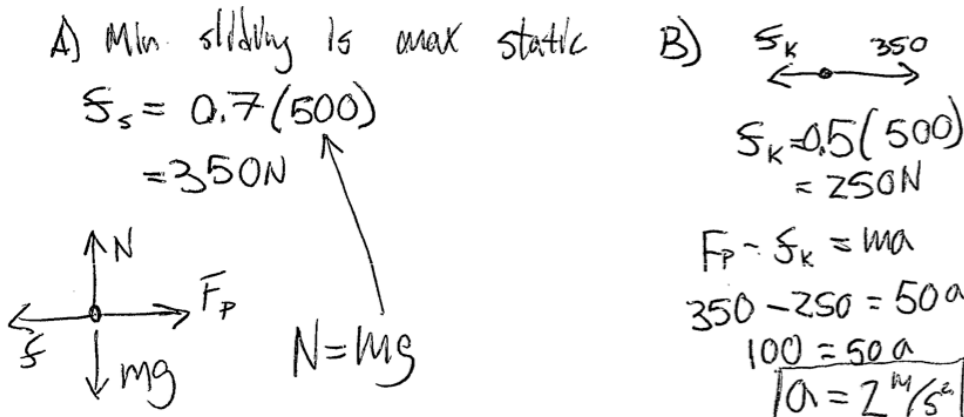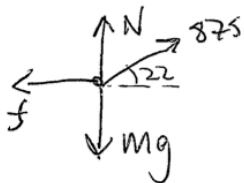5. A 91kg refrigerator sits on the floor. The coefficient of static friction between the fridge and the floor is 0.60. What is the minimum force that one needs to exert on the fridge to make it slide?

$f = \mu N$

$f = \mu m g$

$f = 0.6 (91)(10)$

$= 546 N$

$N = mg$

$f = F$

11. A 50kg box rest on the floor. The coefficent of static friction is 0.7 and the coefficient of kinetic friction is 0.5. A) What is the minimum force a person needs to exert to start the box sliding? B) After the box is sliding, the person continues to push it with the same force. What is the acceleration of the box?

A) Min sliding is max static

$S_s = 0.7(500)$

$= 350 N$

$N = mg$

B) S_k 350

$S_k = 0.5(500)$

$= 250 N$

$F_p - S_k = ma$

$350 - 250 = 50a$

$100 = 50a$

$a = 2 \, m/s^2$

No accel in X or Y

3. A 250.0 kg crate is being pulled across the floor with a rope that makes an angle of 22.0° to the horizontal. If the force applied is equal to 875 N and the block is moving at a constant velocity, what is the coefficient of kinetic friction?

875 N

250.0 kg   22.0°

X) $875 \cos 22 - f = 0$

$875 \cos 22 - \mu N = 0$

$875 \cos 22 - \mu(2172) = 0$

$\dfrac{811.3}{2172} = \mu$

$\mu = 0.37$

Y)

$N + 875 \sin 22 - mg = 0$

$N = mg - 875 \sin 22$

$N = 250(10) - 875 \sin 22$

$= 2172 N$

16. A woman is applying a horizontal force on a 100 N box to the right (positive *x*-direction) to hold it in place against a rough vertical surface. The coefficient of static friction between the box and the surface is 0.6 and the coefficient of kinetic friction is 0.4. Several students are discussing the frictional force on the box 1 second after she first applies a constant horizontal force of 200 N:
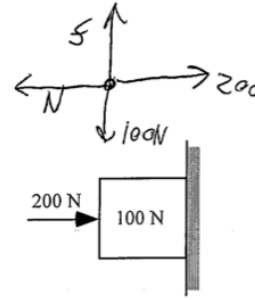
Ari: "The frictional force is 60 N since the box will not be moving and the coefficient of static friction is 0.6."

Bratislav: "The frictional force is 100 N upward since the box has a weight of 100 N downward."

Celeste: "The frictional force will be 120 N since the box will not be moving and the normal force will be 200 N."

Deshi: "The frictional force will be 40 N for the kinetic frictional force and 60 N for the static frictional force. The weight is 100 N and the coefficient of kinetic friction is 0.4 giving 40 N for the kinetic friction. Likewise, for the static frictional force it has a coefficient of static friction of 0.6 giving a static frictional force of 60 N."

Which, if any, of these students do you think is right?

Ari _____ *Bratislav* __X__ *Celeste* _____ *Deshi* _____ None of them _____

Explain your reasoning.

The force of friction opposes the weight.
(see FBD)