

10. [ pts] A crate of mass  $m=50$  kg sits at rest in the back of a pick-up truck which is moving at a constant  $12.5$  m/s.

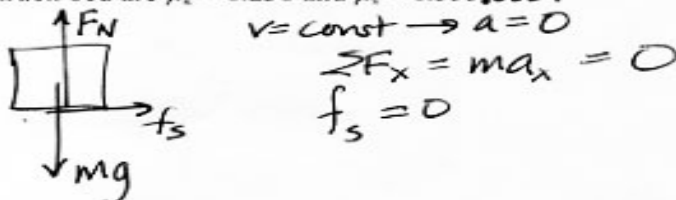
(a) Write, in **words**, in a **sentence**, for the **weight** of the crate: what object exerts the force, what object the force is exerted on, and the direction of the force: e.g., "Object A pushes up on Object B."

the Earth pulls down on the crate

(b) Now write in words, in a sentence, the Newton's Third Law reaction force for the weight of the crate.

the crate pulls up on the Earth

(c) Draw a force diagram for the crate sitting in the truck and calculate the static frictional force on the block. The mass of the crate is  $50.0$  kg, the coefficients of friction between the crate and the truck bed are  $\mu_k = 0.250$  and  $\mu_s = 0.333$ .



(d) Now the truck driver slams on his brakes and stops in  $3.2$  sec. What is the acceleration of the truck?

$$v = v_0 + at$$
$$a = \frac{v - v_0}{t} = \frac{0 - 12.5 \text{ m/s}}{3.2 \text{ s}} = -3.91 \text{ m/s}^2$$

(e) Assume that the crate does **not** slide and calculate the static frictional force on the crate.

$$\sum F_x = ma_x$$
$$f_s = -50 \text{ kg} (3.91 \frac{\text{m}}{\text{s}^2}) = 195 \text{ N}$$