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.

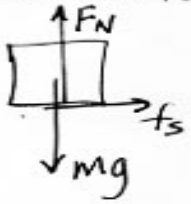
(a) Write, in **words**, in a **sentence**, **for the weight** of the crate: what object exerts the force, what object the force is exerted on, and the direction of the force: e.g., "Object A pushes up on Object B."

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 $\mu_s = 0.250$ and $\mu_s = 0.~~333~~555$.



$v = \text{const} \rightarrow a = 0$

$\Sigma F_x = ma_x = 0$

$f_s = 0$

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

$v = v_0 + at$

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

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

$\Sigma F_x = ma_x$

$f_s = -50\ kg\left(3.91 \frac{m}{s^2}\right) = 195\ N$