3a - 13 pts) You got to sleep to wake up groggy and disoriented. You find your motorcycle and decide to ride it home. Unfortunately, you and your motorcycle (combined mass = 150 kg) moving at a velocity of 8 m/s crash into a stationary metal trash can (mass=50 kg) that you failed to see in your disoriented state. You, your motorcycle and the trash can stick together after the collision. What is your velocity right after the collision?

Totally Inelastic Collision

$$m_1 v_1 + m_2 \cancel{v_2}^{\,0} = (m_1 + m_2) v_f$$

$$\text{So} \quad v_f = \frac{m_1 v_1}{m_1 + m_2} = \frac{150\,\text{kg}}{200\,\text{kg}} \cdot 8\,\text{m/s}$$

$$= \boxed{6\ \text{m/s}}$$

3 for cons of p

5 for eqn

5 for

3b -- 12 pts) Luckily your are not hurt and arrive safely home when you open the door to see your younger brother (who is looking kind of tasty). You are surprised when your dog suddenly attacks you. Your brother picks up his nerf gun and fires rubber bullets at your dog to slow down his attack. If each bullet has a mass of 10 grams and travels at 20 m/s, what total impulse does your brother's gun deliver to your dog if he fires 5 bullets per second for 5 seconds.

$$J = \Delta p = N_{\text{bullets}}\, m_b v_b$$

$$= 5\ \text{bullets/s} \cdot 5\ \text{s} \cdot 0.01\ \text{kg} \cdot 20\ \text{m/s}$$

$$= \boxed{5\ \text{kg m/s}}$$

8 if don't

+25

N·s

$mv^2 = \text{kg}\,\frac{\text{m}^2}{\text{s}^2}$

N·m

factor

10 if x 5

not 25