

Homework Solutions
9/24/2007

Conceptual

15. The ball will travel farther because the time of impact is slightly increased, therefore making the impulse larger. Larger impulses result in larger changes in momentum, which correspond to larger final velocities. Shots near the green require less follow thru because the ball does not need to travel as far.
16. The change in momentum of the passenger is the same regardless of how the person comes to rest. By impacting the airbag rather than the dash or windshield, the passenger experiences less force through a longer time period, resulting in the same impulse.
18. The sheet applies a small force through a longer period of time thus achieving the same impulse and change in momentum compared to the same egg striking a wall.

Problems

5. a.

$$p = mv$$

$$p = (0.003kg) \left(1.5 \cdot 10^3 \frac{m}{s} \right)$$

$$p = 45kg \frac{m}{s}$$

$$45kg \frac{m}{s} = (0.145kg)v$$

$$v = 310 \frac{m}{s}$$

- b. The bullet would have more kinetic energy because kinetic energy is proportional to velocity squared, so the object with a higher velocity will have a greater kinetic energy.

9.

$$Ft = m\Delta v$$

$$Ft = (70.0\text{kg})\left(5.20\frac{\text{m}}{\text{s}}\right)$$

$$Ft = 364\text{kg}\frac{\text{m}}{\text{s}}$$

$$F(0.832\text{s}) = 364\text{kg}\frac{\text{m}}{\text{s}}$$

$$F = 438\text{N}$$