Answers to selected questions
Chapter 7

Q6
a. Yes. Momentum is a vector pointing in the direction of the velocity, so a change in direction implies a change in momentum.
b. Yes. The force exerted by the wall on the ball first slows the ball down and continues to act on the ball as it starts to speed up in the opposite direction until it clears the wall. The impulse is the average force on the ball times the time it acts.

Q12 More likely. If you move your hand forward, you will reduce the time it takes to bring the egg to a full stop. If the time decreases, the force increases, according to the definition of impulse. Therefore you are more likely to break the egg if you do anything to shorten the time it takes to bring it to a stop.

Q18
a. The magnitude of the average force on each vehicle will be the same.
b. Since the force on each vehicle and the time the force acts are the same, each has the same impulse in magnitude.
c. Both vehicles experience the same magnitude of change of momentum, since each experiences the same impulse.
d. The compact car will suffer the greater acceleration. The acceleration is force divided by mass. Both vehicles will be acted upon by the same magnitude of force, but the mass of the compact car is much less than that of the truck.

Q24 Throw the bag of oranges away thus propelling you in the opposite direction. This would be equivalent to "pushing off'' against the bag of oranges. One might also toss away the oranges singly for a more controlled mode of travel.

Q30 No. Momentum is conserved in all collisions, elastic or inelastic, as long as there is no net external force.

Q36 If the velocities had been equal, the direction of motion after the perfectly inelastic collision would have been at a 45^{o} angle with respect to the direction of A. Since the angle is smaller, A must have had a larger momentum and thus was traveling faster.