

Momentum Grade Check – Chapter 7 (Conceptual Physics)

I. Review Questions.

1. Distinguish between mass and momentum. Which is inertia and which is inertia in motion?
2. There is a heavy truck at rest and a rolling skate board...
 - a. Which one has greater mass?
 - b. Which one has greater momentum?
3. If the time of impact in a collision is extended by FOUR TIMES, how much does the force of impact change?
4. What does it mean to say “momentum is conserved”?
5. What is the difference between an elastic and inelastic collision?

II. Plug and Chug.

1. A 75-kg freshman is walking through the halls of the North Building at 0.65 m/s...
 - a. What is the momentum of this freshman?
 - b. If he runs into a locker and stops in 0.25 s, calculate the average force he exerts on the locker.
2. An average force of 25 N is exerted on a 2-kg shopping cart for 4.3 seconds...
 - a. What impulse occurs on the shopping cart?
 - b. What change in momentum does the cart undergo?
 - c. If the cart is initially at rest, calculate the final speed of the shopping cart.
3. A 2-kg blob of putty moving at 3 m/s slams into a 4-kg blob of putty at rest...
 - a. Calculate the speed of the two stuck-together blobs of putty after colliding.
 - b. Calculate the speed of the two stuck-together blobs if the one at rest was 2-kg.

III. Think – Explain – Solve.

1. In terms of impulse and momentum, why are air bags in automobiles a good idea?

2. You can't throw a raw egg against a wall without breaking it, but you can throw it at the same speed into a sagging sheet without breaking it. Explain.

3. What difference in recoil would you expect in firing a solid ball versus firing a hollow ball from the same cannon? Explain.

4. A car with a mass of 1000-kg moves at 20 m/s. What braking force is needed to bring the car to a stop in 10 seconds?

5. A railroad diesel engine weighs four times as much as a freight car. If the diesel engine coasts at 3.5 m/s into a freight car at rest, how fast do the two coast after the couple?

6. A 5-kg fish swimming at 1 m/s swallows an absent-minded 1-kg fish at rest...
 - a. What is the speed of the large fish immediately after lunch?

 - b. What would its speed be if the small fish were swimming toward it at 4 m/s?