

Show all physics equations, etc. If doing a Conservation of Momentum question you must include: 1-Draw a sketch of the before and after scenario 2- show the correct equation, 3-substitution, 4-Solution, 5-units (5pts)

1. In terms of momentum change, explain why it is best to "give" when catching a baseball. Provide other examples of situations in which you want to lengthen the impact time in a collision.
2. Why would a .22 rifle bullet travel farther than a .22 pistol bullet shot at the same angle? (This question refers directly to one of your study guide questions. Use the concept of Impulse in your explanation!)
3. What does it mean to say that momentum is conserved? Give an example where momentum is conserved in a collision.
4. A railroad diesel engine coasting at 12 km/h runs into a stationary flatcar. The diesel weighs 5 times as much as the flatcar. Assuming the cars couple together, how fast are they moving after the collision?
5. A 10-kg cement block moving horizontally at 6 m/s plows into a bank of sand and comes to a stop in 2 s. What is the average impact force on the bank?

6. An 8-kg blob of clay moving horizontally at 2 m/s hits a 3-kg blob of clay at rest. What is the speed of the two blobs stuck together immediately after the collision?

7. A 40-kg football player leaps through the air to collide with and tackle a 50-kg player heading toward him, also in the air. If the 40-kg player is heading to the right at 9 m/s and the 50-kg player is heading toward the left at 2 m/s, if the larger player stops his momentum as they hit and all the momentum is transferred to the smaller player, how fast will the smaller player be sent backwards?

8. A 50-kg cart moving at 100 km/h collides head-on with an approaching 50-kg cart moving at 10 km/h (in the opposite direction). If the two carts stick together, what will be their speed?

9. A 30-kg girl and a 50-kg boy face each other on friction-free roller skates. The girl pushes the boy, who moves away at a speed of 3 m/s. What is the girl's speed?

10. A 70-kg free-floating astronaut fires 0.10-kg of gas at a speed of 30 m/s from her propulsion pistol. What is the astronaut's recoil speed?