

Physics 1
Motion/Force/Momentum Unit
Momentum Problem Set

Complete the following Problems.

1. Why is it hard for a firefighter to hold a hose that ejects large amounts of water at a high speed?
2. You can't throw a raw egg against the wall without breaking it, but you can throw it at the same speed into a sagging sheet without breaking it. Explain why.
3. A group of playful astronauts, each with a bag full of balls, form a circle as they free fall in space. Describe what happens when they begin tossing balls simultaneously to one another?
4. A proton from an accelerator strikes an atom. An electron is observed flying forward in the same direction the proton was moving and at a speed much greater than the speed of the proton. What conclusion can you draw about the relative mass of the proton and the electron?

5. Give an example of an elastic collision and an inelastic collision. Describe the difference.

6. What is the momentum of an 8-kg bowling ball rolling at 2 m/s?

7. What is the momentum of a 50 kg carton that slides at 4 m/s across an icy surface? If the sliding carton skids onto a rough surface and stops in 3 sec, calculate the force of friction it encounters?

8. A 1000 – kg car moving at 20 m/s slams into a building and comes to a halt. What impulse acts on the car?

9. A car with a mass of 1000 kg moves at 20 m/s what braking force is needed to bring the car to a halt in 10 sec?

10. A 5 kg fish swimming at 1 m/s swallows an absent minded 1 kg fish at rest. What is the speed of the larger fish immediately after lunch? (Challenge: what would its speed be if the small fish were swimming toward it at 4 m/s?)
11. Comic strip hero Superman meets an asteroid in outer space and hurls it at 100 m/s. If the asteroid is 1000 times as massive as Superman, what would be his recoil speed?