1) When a cannon fires a cannonball, the cannon will recoil backward because the
A) energy of the cannonball and cannon is conserved.
B) momentum of the cannonball and cannon is conserved.
C) energy of the cannon is greater than the energy of the cannonball.
D) momentum of the cannon is greater than the energy of the cannonball.

2) A freight car moves along a frictionless level railroad track at constant speed. The car is open on top. A large load of coal is suddenly dumped into the car. What happens to the velocity of the car?
A) It increases.
B) It remains the same.
C) It decreases.
D) cannot be determined from the information given

3) A rubber ball and a lump of putty have equal mass. They are thrown with equal speed against a wall. The ball bounces back with nearly the same speed with which it hit. The putty sticks to the wall. Which objects experiences the greater momentum change?
A) the ball
B) the putty
C) Both experience the same momentum change.
D) cannot be determined from the information given

4) A small car meshes with a large truck in a head-on collision. Which of the following statements concerning the magnitude of the average collision force is correct?
A) The truck experiences the greater average force.
B) The small car experiences the greater average force.
C) The small car and the truck experience the same average force.
D) It is impossible to tell since the masses and velocities are not given.

5) Two equal mass balls (one red and the other blue) are dropped from the same height, and rebound off the floor. The red ball rebounds to a higher position. Which ball is subjected to the greater magnitude of impulse during its collision with the floor?
A) It's impossible to tell since the time intervals and forces are unknown.
B) Both balls were subjected to the same magnitude impulse.
C) the blue ball
D) the red ball

6) A 3.0-kg object moves to the right at 4.0 m/s. It collides head-on with a 6.0-kg object moving to the left at 2.0 m/s. Which statement is correct?
A) The total momentum both before and after the collision is 24 kg·m/s.
B) The total momentum before the collision is 24 kg·m/s, and after the collision is 0 kg·m/s.
C) The total momentum both before and after the collision is zero.
D) None of the above is true.

7) A 1200-kg ferryboat is moving south at 20 m/s. What is the magnitude of its momentum?
2.4 × 10^4 kg·m/s

8) A ball of mass 0.10 kg is dropped from a height of 12 m. Its momentum when it strikes the ground is 1.5 kg·m/s.

9) Two identical 1500-kg cars are moving perpendicular to each other. One moves with a speed of 25 m/s due north and the other moves at 15 m/s due east. What is the total momentum of the system?
4.4 × 10^4 kg·m/s at 59° N of E
10) A 0.060-kg tennis ball, initially moving at a speed of 12 m/s, is struck by a racket causing it to rebound in the opposite direction at a speed of 18 m/s. What is the change in momentum of the ball?

1.8 kg⋅m/s

11) A 50-kg pitching machine (excluding the baseball) is placed on a frozen pond. The machine fires a 0.40-kg baseball with a speed of 35 m/s in the horizontal direction. What is the recoil speed of the pitching machine? (Assume negligible friction.)

0.28 m/s

12) You (50-kg mass) skate on ice at 4.0 m/s to greet your friend (40-kg mass), who is standing still, with open arms. As you collide, while holding each other, with what speed do you both move off together?

2.2 m/s

13) A car of mass 1000 kg moves to the right along a level, straight road at a speed of 6.0 m/s. It collides directly with a stopped motorcycle of mass 200 kg. What is the total momentum after the collision?

6000 kg⋅m/s to the right

14) A 1000-kg car traveling at 25 m/s runs into the rear of a stopped car that has a mass of 1500 kg and they stick together. What is the speed of the cars after the collision?

10 m/s

15) A 4.0-N force acts for 3.0 s on an object. The force suddenly increases to 15 N and acts for one more second. What impulse was imparted by these forces to the object?

27 N⋅s

16) A constant 9.0-N net force acts for 2.0 s on a 6.0-kg object. What is the object's change of velocity?

3.0 m/s

17) A 2000-kg car, traveling to the right at 30 m/s, collides with a brick wall and comes to rest in 0.20 s. What is the average force the car exerts on the wall?

300,000 N to the right

18) A fire hose is turned on the door of a burning building in order to knock the door down. This requires a force of 1000 N. If the hose delivers 40 kg per second, what is the minimum velocity of the stream needed, assuming the water doesn't bounce back?

25 m/s

19) A toy rocket, of mass 0.12 kg, achieves a velocity of 40 m/s after 3.0 s, when fired straight up. What average thrust force does the rocket engine exert?

2.8 N

20) A railroad freight car, mass 15,000 kg, is allowed to coast along a level track at a speed of 2.0 m/s. It collides and couples with a 50,000-kg second car, initially at rest and with brakes released. What is the speed of the two cars after coupling?

v = .46 m/s

30) A 50-gram ball moving +10 m/s collides head-on with a stationary ball of mass 100 g. The collision is elastic. What is the speed of each ball immediately after the collision?

v100 = 6.67 m/s, v50= -3.3 m/s