AP 1 Momentum Review

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question

1) When a cannon fires a cannonball, the cannon will recoil backward because the 1) _____

2) A child falls sideways off a sled while sledding on frictionless ice. What happens to the velocity of the sled? 2) _____

3) 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? 3) _____

4) 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? 4) _____

5) 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? 5) _____

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? 6) _____

7) A 100-kg football linebacker moving at 2.0 m/s tackles head-on an 80-kg halfback running 3.0 m/s. Neglecting the effects due to digging in of cleats, 7) _____

8) When is kinetic energy conserved? 8) _____

9) What is the momentum of a 2000-kg truck traveling at 35 m/s? 9) _____

10) 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? 10) _____

11) 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? 11) _____

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? 12) _____

13) 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? 13) _____

14) 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? 14) _____

15) 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? 15) _____

16) 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? 16) _____

17) A 2.0-kg softball is pitched to you at 20 m/s. You hit the ball back along the same path and at the same speed. If the bat was in contact with the ball for 0.10 s, what is the magnitude of the average force the bat exerted? 17) _____

18) A 10.0-g bullet moving at 300 m/s is fired into a 1.00-kg block at rest. The bullet emerges (the bullet does not get embedded in the block) with half of its original speed. What is the velocity of the block right after the collision? 18) _____

19) A 1200-kg ferryboat is moving south at 20 m/s. What is the magnitude of its momentum? 19) _____

20) A ball of mass 0.10 kg is dropped from a height of 12 m. Its momentum when it strikes the ground is 20) _____

21) A 15-g bullet traveling 213 m/s in a vertical direction buries itself in a 2.4-kg block of wood at rest directly above it. As a result, the bullet/block combination moves vertically upward. 21) _____
(a) Determine the velocity of the bullet/block combination at the point of impact.
(b) Determine the maximum height reached by the bullet/block combination.
(c) Is kinetic energy conserved in this collision?

22) A small bomb, of mass 10 kg, is moving toward the North with a velocity of 4.0 m/s. It explodes into three fragments: a 5.0-kg fragment moving west with a speed of 8.0 m/s; a 4.0-kg fragment moving east with a speed of 10 m/s; and a third fragment with a mass of 1.0 kg. What is the velocity of the third fragment? (Neglect air friction.) 22) _____

23) A 2.0-kg mass moves with a speed of 5.0 m/s. It collides head-on with a 3.0 kg mass at rest. If the collision is perfectly inelastic, what is the speed of the masses after the collision? 23) _____

24) A 2.0-kg mass moving to the east at a speed of 4.0 m/s collides head-on in a perfectly inelastic collision with a stationary 2.0-kg mass. How much kinetic energy is lost during this collision? 24) _____

1) momentum of the cannonball and cannon is conserved.
2) It remains the same.
3) It decreases.
4) the ball
5) The small car and the truck experience the same average force.
6) The total momentum both before and after the collision is zero.
7) the halfback will drive the linebacker backward.
8) in elastic collisions
9) 7.0×10^4 kg•m/s
10) 4.4×10^4 kg•m/s at 59° N of E
11) 1.8 kg•m/s
12) 2.2 m/s
13) 10 m/s
14) 0.46 m/s
15) 3.0 m/s
16) 300,000 N to the right
17) 800 N
18) 1.50 m/s
19) 2.4×10^4 kg•m/s
20) 1.5 kg•m/s.
21) (a) 1.3 m/s
    (b) 0.089 m
    (c) No, this is an inelastic collision.
22) 40 m/s north
23) 2.0 m/s
24) 8.0 J