

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

- 1) What is the magnitude of the momentum of a 0.140 kg baseball traveling at 45.0 m/s? 1) _____
- 2) A batter applies an average force of 8000 N to a baseball for 1.10 ms. What is the magnitude of the impulse delivered to the baseball? 2) _____
- 3) A batter hits a 0.140-kg baseball that was approaching him at 30.0 m/s and, as a result, the ball leaves the bat at 40.0 m/s in the direction of the pitcher. The ball remains in contact with the bat for 2.0 ms. What is the average force exerted by the bat? 3) _____
- 4) A 60-kg swimmer dives from a 150-kg raft with a horizontal speed of 1.5 m/s. The raft is initially at rest. What is the speed of the raft immediately after the diver jumps? 4) _____
- 5) A 14,000-kg boxcar is coasting at 1.50 m/s along a horizontal track when it hits and couples with a stationary 10,000-kg boxcar. What is the speed of the cars after the collision? 5) _____
- 6) A 2.00-g bullet traveling at 700 m/s hits and becomes embedded in a stationary 5.00-kg wood block. What is the speed of the block immediately after the bullet has stopped moving relative to the block? 6) _____
- 7) Two air track carts move along an air track towards each other. Cart A has a mass of 450 g and moves toward the right with a speed of 0.850 m/s and air track cart B has a mass of 300 g and moves toward the left with a speed of 1.12 m/s. What is the total momentum of the system? 7) _____
- 8) A golf club exerts an average force of 1000 N on a 0.045-kg golf ball which is initially at rest. The club is in contact with the ball for 1.8 ms. What is the speed of the golf ball as it leaves the tee? 8) _____
- 9) A 0.140-kg baseball is dropped from rest from a height of 2.00 m above the ground. What is the magnitude of its momentum just before it hits the ground? 9) _____
- 10) A 0.140-kg baseball is dropped and reaches a speed of 1.20 m/s just before it hits the ground. It rebounds with a speed of 1.00 m/s. What is the change of the ball's momentum? 10) _____
- 11) A 0.330-kg volleyball is dropped from rest. It takes it 1.30 s to reach the ground. What is the magnitude of its momentum just before it hits the ground? 11) _____
- 12) A 0.330-kg volleyball is thrown vertically downward with a speed of 0.150 m/s. It takes it 0.0655 s to reach the ground. What is the magnitude of its momentum just before it hits the ground? 12) _____
- 13) A batter hits a 0.140-kg baseball that was approaching him at 40.0 m/s and, as a result, the ball leaves the bat at 30.0 m/s in the direction of the pitcher. What is the magnitude of the impulse delivered to the baseball? 13) _____
- 14) A 500-kg cannon fires a 4.0-kg projectile with a velocity of 500 m/s relative to the ground. What is the recoil speed of the cannon? 14) _____

- 15) What is the momentum of a 2000-kg truck traveling at 35 m/s? 15) _____
- 16) A 1200-kg ferryboat is moving south at 20 m/s. What is the magnitude of its momentum? 16) _____
- 17) A ball of mass 0.10 kg is dropped from a height of 12 m. Its momentum when it strikes the ground is 17) _____
- 18) A handball of mass 0.10 kg, traveling horizontally at 30 m/s, strikes a wall and rebounds at 24 m/s. What is the change in the momentum of the ball? 18) _____
- 19) 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.) 19) _____
- 20) 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? 20) _____
- 21) A 70-kg astronaut is space-walking outside the space capsule and is stationary when the tether line breaks. As a means of returning to the capsule he throws his 2.0-kg space hammer at a speed of 14 m/s away from the capsule. At what speed does the astronaut move toward the capsule? 21) _____
- 22) 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? 22) _____
- 23) 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? 23) _____
- 24) 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? 24) _____
- 25) 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? 25) _____
- 26) 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? 26) _____
- 27) 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? 27) _____
- 28) A machine gun, of mass 35.0 kg, fires 50.0-gram bullets, with a muzzle velocity of 750 m/s, at the rate of 300 rounds per minute. What is the average force exerted on the machine gun mount? 28) _____

29) 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? 29) _____

30) 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? 30) _____

Answer Key

Testname: UNTITLED5

- 1) 6.30 kg·m/s
- 2) 8.80 Ns
- 3) 4900 N
- 4) 0.60 m/s
- 5) 0.875 m/s
- 6) 0.280 m/s
- 7) 0.047 kg·m/s toward the right
- 8) 40 m/s
- 9) 0.877 kg·m/s
- 10) 0.308 kg·m/s upwards
- 11) 4.21 kg·m/s
- 12) 0.262 kg·m/s
- 13) 9.80 Ns
- 14) 4.0 m/s
- 15) 7.0×10^4 kg·m/s
- 16) 2.4×10^4 kg·m/s
- 17) 1.5 kg·m/s.
- 18) 5.4 kg·m/s
- 19) 0.28 m/s
- 20) 1.8 kg·m/s
- 21) 0.40 m/s
- 22) 2.2 m/s
- 23) 6000 kg·m/s to the right
- 24) 10 m/s
- 25) 0.46 m/s
- 26) 3.0 m/s
- 27) 300,000 N to the right
- 28) 188 N
- 29) 1.50 m/s
- 30) 2.0 m/s