Honors Physics Momentum - Problem Set 2 Mr. McMullen

Name _____ Date _____ Period _____

1. A force of 8.00 N acts on a 4.00 kg object for 12.0 s.
   a) What is the change in velocity?
   b) What is the object's change in momentum?

2. A snowmobile has a mass of 420 kg. A constant force acts upon it for 72.0 s. The snowmobile's initial velocity is 11.00 m/s and its final velocity is 38.0 m/s.
   a) What is its change in momentum?
   b) What is the magnitude of the force that acts upon it?

3. A net force of 2.56×10^3 N acts on a rocket of mass 1.50×10^3 kg. How long does it take this force to increase the rocket's velocity from 0.0 m/s to 3.00×10^2 m/s?

4. A car weighing 16850 N and is moving 18.0 m/s is acted upon by a 720 N force until it is brought to a halt.
   a) What is the car's mass?
   b) What is its initial momentum?
   c) What is the change in the car's momentum?
   d) How long does the braking force act on the car to bring it to a halt?

5. What is the final velocity of a rocket of mass 2.4×10^4 kg, starting from rest, if a net force of 2.1×10^5 N acts upon it for 18.0 s?

6. A 4.00 kg object traveling at 22 m/s hits a 15 kg object traveling at 12 m/s. After the collision, the 4.00 kg object is moving at 9.0 m/s. What is the speed of the 15 kg object?

7. A 42.0 g bullet strikes a 9.0 kg stationary wooden black and embeds itself in the block. The block and bullet fly off together at 9.2 m/s. What was the original velocity of the bullet?

8. A 65 kg man, riding on a 12 kg skateboard, is moving east at 6.0 m/s. The man jumps off the skateboard and hits the ground at 7.5 m/s eastward, relative to the ground. Calculate the velocity of the skateboard after he jumps off.

9. A 38.0 g bullet moving at 495 m/s strikes a 3.0 kg wooden block. The bullet passes through the block, leaving at 260 m/s. The block was at rest when it was hit. How fast is it moving when the bullet leaves?

10. A 0.320 kg plastic ball moves with a velocity of 0.27 m/s. It collides with a second plastic ball of mass 0.150 kg, moving along the same line at a velocity of 0.13 m/s. After the collision, the velocity of the 0.150 kg ball is 0.24 m/s. What is the new velocity of the first ball?

11. A hockey player makes a slap shot, exerting a force of 35.0 N on the hockey puck for 0.21 s. What impulse is given to the puck?

12. A 0.30 kg soccer ball is rolling at 5.8 m/s toward a player. The player kicks the ball back in the opposite direction and gives it a velocity of -16 m/s. What is the average force during the interaction between the player's foot and the ball if the interaction lasts 2.3×10^{-2} s?

13. A compact car, mass 800 kg, is moving at 95 km/hr.
   a) Find its momentum.
   b) At what velocity is the momentum of a larger car, mass 2385 kg, equal to that of the smaller car?

14. The velocity of a 550 kg auto is changed from 8.0 m/s to 38.0 m/s in 62.0 s by an applied, constant force.
   a) What change in momentum does this force produce?
   b) What is the magnitude of the force?