Impulse-Momentum Conceptual and Calculation Practice

1. Does an object with a larger mass always have more momentum? Explain your answer.
2. An object's velocity doubles. How does this affect the object's momentum?
3. An object's velocity is 10 m/s to the right, then it hits a wall and bounces back at 10 m/s. Has the object's momentum changed? Explain your answer.
4. When a force is exerted on an object, does a large force always produce a larger change in the object's momentum than a smaller force does? Explain.
5. How does one maximize the impulse given to an object?
6. An object moves to the right with a positive velocity. An impulse that opposes the motion is applied to the object. Describe the object's acceleration, force acting on the object, and the object's change in momentum.
7. Guard rails on the interstate are designed to bend and flex during a collision. Why are guard rails designed this way?
8. How can a small force create a large change in momentum for an object?
9. A car strikes a stationary object at 30 mph and comes to rest over 2.0 seconds. The time interval during this collision is shortened. Check all the variables that are affected by this change.

   ___ force on car ___ acceleration of car ___ car's change in momentum ___ impulse on car

10. For all those checked, explain how they would change and a brief description of why they change.
11. For all those unchecked, explain why there is no change for that variable.
12. A 0.50 kg football is thrown with a velocity of 15 m/s to the right. A stationary receiver catches the ball and brings it to rest in 0.020s. What is the force exerted on the ball by the receiver?
13. A 0.40 kg soccer ball to moving to the left at 18 m/s. Luel Waktola kicks the ball and causes it to move in the **opposite** direction at 22 m/s. What impulse did Luel apply to the soccer ball?
14. A 0.50 kg object is at rest. A 3.00 N force to the right acts on the object during a time period of 1.50s. What is the final velocity of the object?
15. A 2500 kg car traveling to the north is slowed from an initial velocity of 20.0 m/s by a constant braking force of 6250 N.
    a) How much momentum does the car have initially?

    b) What is the cars velocity after 2.50 s?

    c) How far does the car travel during this 2.50 s?

    d) How long would it take for the car to come to a complete stop?