Name: _____ Period: _____ Date: _____

SHOW <u>ALL</u> WORK FOR <u>ANY</u> CREDIT. Due: _____ (on or before)

Momentum Introductory Concepts – Homework

1. Write the equation for momentum here:
2. What is the unit for momentum?
3. Write the ***<u>two</u>*** equations for Impulse here:
4. Two objects are thrown at a target. A ping-pong ball with a mass of 0.02kg is thrown with a velocity of 25m/s. A brick with a mass of 1.1kg is thrown with a velocity of 0.4m/s.
    a. What is the ping-pong ball's momentum?
    b. What is the brick's momentum?
    c. Which object will do more damage to the target?
    d. **<u>WHY</u>**?

5. An object with a mass of 52kg initially traveling with a velocity of 25m/s comes to a complete stop in 4 seconds.
    a. What is the object's initial momentum?

    b. What is the object's final momentum?

    c. What is the object's Impulse?

    d. How much force does it take to bring the object to a complete stop?

    e. How quickly does the object decelerate?

    f. If the object had come to a stop in only 0.2 seconds, how much force would be needed to stop the object?

6. A race car speeds up from 7m/s to 28m/s during a 4.3 second period. The car has a mass of 1025kg.

   a. What is the car's initial momentum?

   b. What is the car's final momentum?

   c. What is the car's Impulse?

   d. How much force is needed to accelerate the car?

   e. How quickly does the car accelerate?

   f. Instead of using momentum to calculate the car acceleration as you did above, use the Kinematic Equations to solve for the acceleration of the car. Does it match what you calculated in part e?

7. An arrow is shot by Robin Hood. The mass of the arrow is 0.08kg and the arrow's initial velocity is zero before being released. Force is only applied to the arrow while it is in contact with the bow's string. This time is only 0.2 seconds. The tension in the bow string will cause the arrow to accelerate at 31.5m/s^2. Knowing the information above, calculate the arrow's velocity as it leaves the bow's string.

   a. ***Use force, momentum and impulse*** equations to calculate the arrow's initial velocity:

   b. ***Use Kinematic Equations*** to calculate the arrow's initial velocity: