

Name: _____ Period: _____ Date: _____

SHOW ALL WORK FOR ANY CREDIT.

Momentum / Impulse Classwork

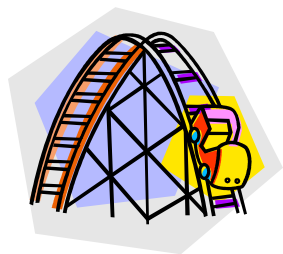
1. A motorcycle with a mass of 162kg initially traveling with a velocity of 14.5m/s comes to a complete stop in 7 seconds.

- What is the motorcycle's initial momentum?
- What is the motorcycle's final momentum?
- What is the motorcycle's Impulse?
- How much force does it take for the brakes to bring the motorcycle to a complete stop?
- How quickly does the motorcycle decelerate?
- If it had come to a stop in only 5.5 seconds, how much force would be needed to stop the motorcycle?



2. A roller coaster entering a curve speeds up from 17m/s to 29m/s during a 0.3 second period. The coaster has a mass of 1253kg.

- What is the coaster's initial momentum?
- What is the coaster's final momentum?
- What is the coaster's Impulse?



- How much force is needed to accelerate the coaster?

- How quickly does the coaster accelerate?

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

By increasing the time over which a force is applied to an object the impulse can be increased and therefore a greater object velocity can be attained. Try this problem to see how this happens:

3. A bullet is fired from a short barreled revolver. The mass of the bullet is 0.03kg and the bullet's initial velocity is zero before being fired. Force is only applied to the bullet while it is inside the barrel of the gun. It is in the barrel for only 0.2 seconds. The gunpowder in the casing will cause the bullet to accelerate at 35.5m/s^2 .
- a. Knowing the information above, calculate the bullet's velocity as it exits the barrel of the revolver.



- b. If the barrel of the gun was longer, such as for a rifle, what would be the bullet's velocity as it left the rifle's barrel if it was in it for 0.6 seconds? (the bullet will still accelerate at 35.5m/s^2).



- c. Is this velocity faster, slower, or the same as from the revolver?
- d. How much faster or slower is the bullet
- e. In your own words, state why the velocity of the bullet changed.