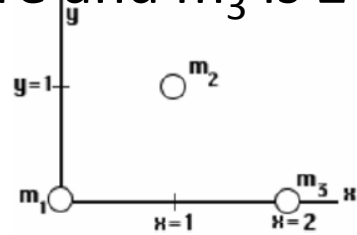1. If the mass of m_1 is 1 kg and m_2 is 3 kg in the figure and m_3 is 2 kg, what is the x coordinate of the center of mass?

   (A) 0.67   (B) 1.17   (C) 1.33   (D) 1.67

$X_{CM} = (m_1 X_1 + m_2 X_2 + m_3 X_3)/(m_1+m_2+m_3) = (0+3+4)/(1+3+2)=1.17$

<u>Correct answer is (B)</u>

2. An inelastic collision of two objects is characterized by the following

(A) Momentum is conserved   (B)Kinetic Energy is conserved

(C) Both (A) and (B)   (D) Neither (A) nor B

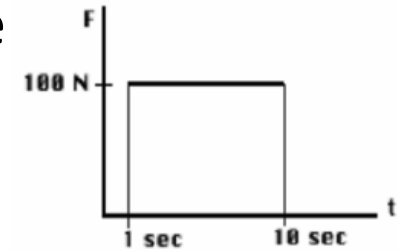   **<u>Correct answer is (A)</u>** (this is the definition of inelastic)

3. A firehose directs a steady stream of 15 kg/sec of water with velocity 28 m/sec against a flat plate. What force is required to hold the plate in place?

   (A) 110 N   (B) 420 N   (C) 1100 N   (D) 4116 N

$F = \Delta P/\Delta t = 15$ Kg/sec * 28 m/sec = 420 N   **<u>Correct answer is (B)</u>**

4. What is the magnitude of the impulse in the figure

   (A) 100 Ns   (B) 900 Ns   (C) 1000 Ns   (D) 1100 NS

$I = F \Delta t = 100 * 9 = 900$ Ns   **Correct answer is (B)**

5. A 12000 kg railroad car travelling at 10 m/s strikes and couples with a 6000 kg caboose moving towards it at a speed of 2 m/s. What is the speed of the combination of railroad cars after the collision

   (A) 5.2 m/s   (B) 6.0 m/s   (C) 7.3 m/s   (D) 8 m/s

$P_{init} = m_1 v_1 - m_2 v_2$ and $P_{final} = (m_1 + m_2) v$ ... Momentum is conserved

$P_{init} = P_{final}$

$v = (m_1 v_1 - m_2 v_2)/ (m_1 + m_2) = (12*10-6*2)/(12+6)$ m/sec

$V = 108/18$ m/sec $= 6$ m/sec   **Correct answer is (B)**