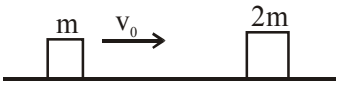
1. A particle of mass m moving with a velocity $(3\hat{i}+2\hat{j})$ m/s collides with stationary body of mass M and finally moves with velocity $(-2\hat{i}+\hat{j})$ m/s. Then

(A) Impulse received by $m = m(5\hat{i}-5\hat{j})$ (B) Impulse received by $m = m(-5\hat{i}-\hat{j})$

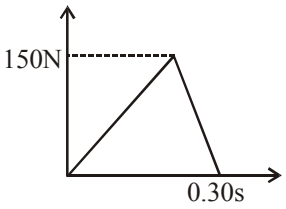
(C) Impulse received by $m = m(5\hat{i}+\hat{j})$ (D) Impulse received by $M = m(5\hat{i}-\hat{j})$

2. A block of mass m is moving with a velocity v_0 and makes collision with another mass 2m which is at rest. If coefficient of restitution is 0.8 then impulse between the two blocks during the collision is



(A) mv_0 (B) $\frac{3}{5}mv_0$ (C) $\frac{5}{3}mv_0$ (D) $\frac{6}{5}mv_0$

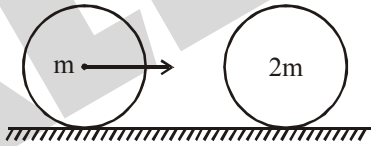
3.. Two bodies A and B of masses 5.00 kg and 10.0 kg respectively moving in opposite directions with velocities 4.00 m/s and 0.50 m/s respectively make head-on collision in free space. The force of their mutual interaction varies according to the given graph. The coefficient of restitution is



(A) 0.25 (B) 0.33

(C) 0.50 (D) 0.75

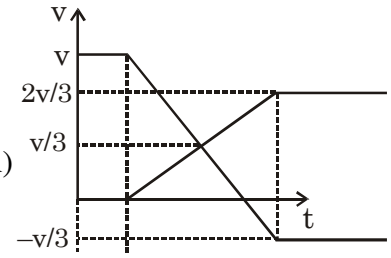
4. A uniform sphere of mass m moving along a smooth horizontal surface strikes another uniform sphere of mass 2m (initially at rest) head on. If loss in K.E. of first sphere is maximum, then value of coefficient of restitution is :-



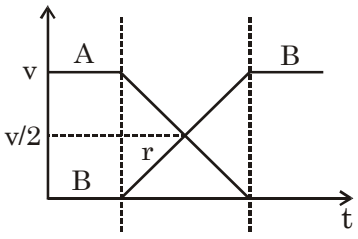
(A) 0.2 (B) 0.5 (C) 0.7 (D) 1

5. Two particle of mass m and mass 2m are placed on smooth horizontal surface. m is moving with velocity v and 2m is stationary. m collides with 2m elastically. Thier velocity time graph for the time of interaction of two particle is given. Select the **CORRECT** graph :-

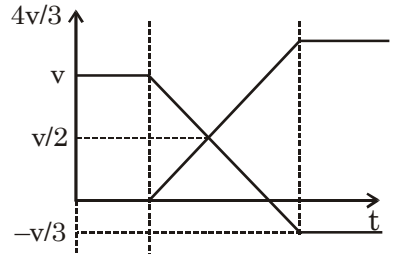
(A)



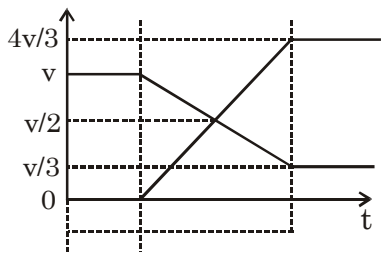
(B)



(C)



(D)



6. Two balls A & B mass 1 kg & 2 kg are moving with speeds 21 m/s & 4 m/s respectively in opposite direction collide head on. After collision A moves with speed 1 m/s in its initial direction. Which is /are correct?

(A) Velocity of B after collision is 6 m/s opposite to its direction before collision

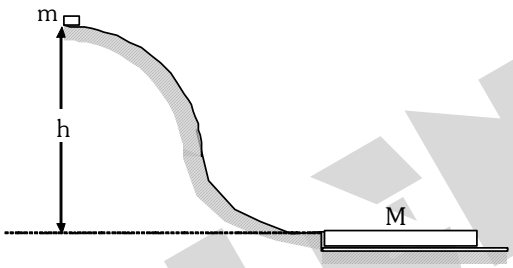
(B) e = 0.2

(C) Loss of kinetic energy due to collision is 200J

(D) Impulse of force between 2 balls is 400 N-s

Paragraph for Question No. 7 to 9

A small disc of mass m slides down a smooth hill of height h without initial velocity and gets onto a plank of mass M lying on the horizontal smooth plane at the base of the hill, as shown in the figure. Due to friction between the disc and the plank, the disc slows down and ultimately, both move together. Given friction coefficient is μ.



7. Find the common velocity of the disc and the plank.

(A) 2√(2gh) m/m+M (B) (√(2gh) m/5m+M (C) (3√(2gh) m/m+M (D) √(2gh) m/m+M

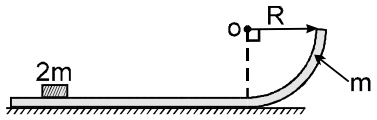
8. Find the total work done by the friction

(A) – μghMm/(M+m) (B) – ghMm/(M+2m) (C) – ghMm/(M+m) (D) – μghMm/(M+2m)

9. Find the distance moved by the disc with respect to the plank before they start moving together.

(A) 3Mh/μ(M–m) (B) Mh/μ (M–2m) (C) Mh/μ(M+m) (D) Mh/μ(M–3m)

10. Block of mass 2m is kept on a smooth circular track of mass m which is kept on a smooth horizontal surface. The circular track is given a horizontal velocity $\sqrt{2gR}$ towards left. Find the maximum height reached by the block in meters (R = 6 meters)



N_Race # 49			ANSWER KEY
1. Ans. (B)	**2. Ans. (D)**	**3. Ans. (C)**	**4. Ans. (B)**
5. Ans. (A)	**6. Ans. (A,B,C)**	**7. Ans. (D)**	**8. Ans. (C)**
9. Ans. (C)	**10. Ans. 2**		