52. The distance between two moving particles at any time is a. If v be their relative velocity and v_1 and v_2 be the components of v along and perpendicular to a. The time when they are closest to each other are

(a) $\frac{a v_1}{v^2}$ (b) $\frac{a v_2}{v^2}$

(c) $\frac{a v}{v_1^2}$ (d) $\frac{a v}{v_2^2}$

53. In the above problem, the minimum distance between them is

(a) $\frac{a v}{v_2}$ (b) $\frac{a v}{v_1}$

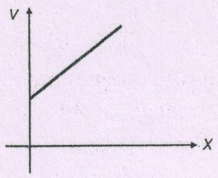
(c) $\frac{a v_1}{v}$ (d) $\frac{a v_2}{v}$

54. Consider a collection of large number of particles each with speed v. The direction of velocity is randomly distributed in the collection. The magnitude of relative velocity between a pair of particles averaged over all the pairs is

(a) zero (b) greater than v

(c) less than v (d) v

55. Velocity *versus* displacement graph of a particle moving in a straight line is as shown in figure.



The acceleration of the particle is

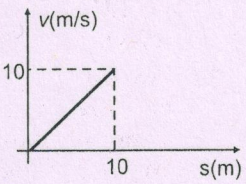
(a) constant

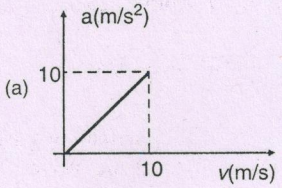
(b) increases linearly with x

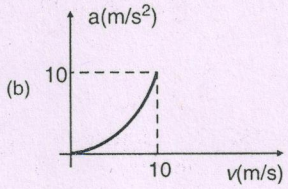
(c) increases parabolically with x

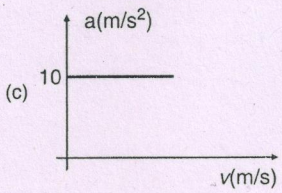
(d) None of the above

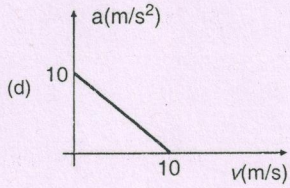
56. Velocity *versus* displacement graph of a particle moving in a straight line is shown in figure. Corresponding acceleration *versus* velocity graph will be



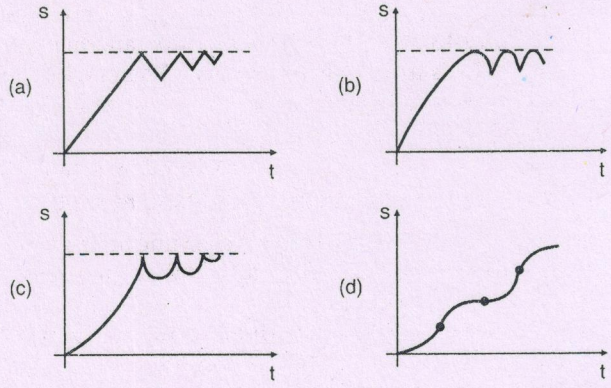




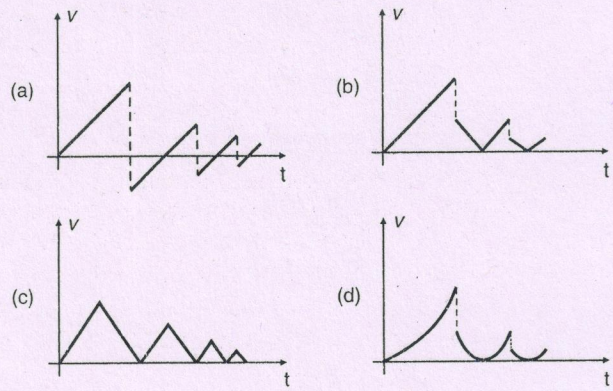




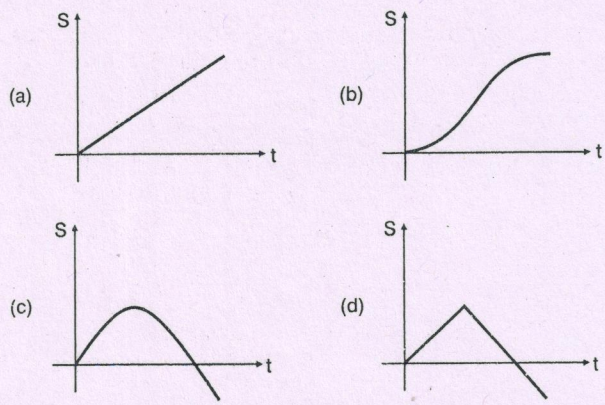
57. A ball is dropped from a certain height on a horizontal floor. The coefficient of restitution between the ball and the floor is $\frac{1}{2}$. The displacement-time graph of the ball will be



58. The speed-time graph of the ball in the above situation is



59. A particle is moving in x-y plane with $y = \frac{x}{2}$ and $v_x = 4 - 2t$. The displacement *versus* time graph of the particle would be



60. Ratio of minimum kinetic energies of two projectiles of same mass is 4 : 1. The ratio of the maximum height attained by them is also 4 : 1. The ratio of their ranges would be

(a) 16 : 1 (b) 4 : 1

(c) 8 : 1 (d) 2 : 1