1. If a car covers 2/5th of the total distance with v_1 speed and 3/5th distance with v_2, then average speed is :-

(1) $\frac{1}{2}\sqrt{v_1 v_2}$ (2) $\frac{v_1 + v_2}{2}$

(3) $\frac{2v_1 v_2}{v_1 + v_2}$ (4) $\frac{5v_1 v_2}{3v_1 + 2v_2}$

2. A particle moving in a straight line covers half the distance with speed of 3m/s. The other half of the distance covered in two equal time intervals with speed of 4.5 m/s and 7.5 m/s respectively. The average speed of the particle during this motion is :-

(1) 4.0 m/s (2) 5.0 m/s
(3) 5.5 m/s (4) 4.8 m/s

3. A particle located at x = 0 at time t = 0, starts moving along the positive x–direction with a velocity 'v' which varies as $v = \alpha\sqrt{x}$, then velocity of particle varies with time as : (α is a constant)

(1) $v \propto t$ (2) $v \propto t^2$

(3) $v \propto \sqrt{t}$ (4) v = constant

4. A train accelerates from rest at a constant rate α for distance x_1 and time t_1. After that is retards at constant rate β for distance x_2 and time t_2 and comes to the rest. Which of the following relations is correct ?

(1) $\frac{x_1}{x_2} = \frac{\alpha}{\beta} = \frac{t_1}{t_2}$ (2) $\frac{x_1}{x_2} = \frac{\beta}{\alpha} = \frac{t_1}{t_2}$

(3) $\frac{x_1}{x_2} = \frac{\alpha}{\beta} = \frac{t_2}{t_1}$ (4) $\frac{x_1}{x_2} = \frac{\beta}{\alpha} = \frac{t_2}{t_1}$

5. Which of of the following represents uniformly acceleated motion :-

(1) $x = \sqrt{\frac{t-a}{b}}$ (2) $x = \frac{t-a}{b}$

(3) $t = \sqrt{\frac{x-a}{b}}$ (4) $x = \sqrt{t} + a$

6. A particle experiences a constant acceleration for 20 second after starting from rest. If it travels a distance s_1 in 10 second and distance s_2 in the next 10 sec, then :-

(1) $s_1 = s_2$ (2) $s_1 = \frac{s_2}{3}$

(3) $s_1 = \frac{s_2}{2}$ (4) $s_1 = \frac{s_2}{4}$

7. A point moves with uniform acceleration and v_1, v_2 and v_3 denote the average velocities in three successive intervals of time t_1, t_2 and t_3. Which of the following relations is correct :-

(1) $v_1 - v_2 : v_2 - v_3 = t_1 - t_2 : t_2 + t_3$
(2) $v_1 - v_2 : v_2 - v_3 = t_1 + t_2 : t_2 + t_3$
(3) $v_1 - v_2 : v_2 - v_3 = t_1 - t_2 : t_1 - t_3$
(4) $v_1 - v_2 : v_2 - v_3 = t_1 - t_2 : t_2 - t_3$

8. Speed of two identical cars are u and 4u at a specific instant. The ratio of the respective distances in which the two cars are stopped from that instant is :-

(1) 1 : 1 (2) 1 : 4
(3) 1 : 8 (4) 1 : 16

9. A particle is dropped vertically from rest from a height. The time takes by it to fall through successive of 1 meter each will then be :-

(1) all equal, being equal to $\frac{2}{g}$ second

(2) in the ratio of square roots of integers 1, 2, 3,...

(3) in the ratio of the dirrence in the square roots of integers $(\sqrt{1}-\sqrt{0}),(\sqrt{2}-\sqrt{1}),(\sqrt{3}-\sqrt{2}),(\sqrt{4}-\sqrt{3})$

(4) in the ratio $\frac{1}{\sqrt{1}} : \frac{1}{\sqrt{2}} : \frac{1}{\sqrt{3}} : \frac{1}{\sqrt{4}}$

10. Two ball A and B of same mass are thrown from the top of the building. A thrown upward with velocity v and B, thrown down with velocity v, then :-

(1) velocity A is more than B at the ground
(2) velocity of B is more than A at the ground
(3) both A and B strike the ground with same velocity
(4) none of these

11. A stone is thrown vertically upward. On its way up it passes point A with speed of v, and point B, 3m highter than A, with speed V/2 The maximum height reached by stone above point B is :-

(1) 1 m (2) 2 m

(3) 3 m (4) 5 m

12. A body is projected vertically upwards. If t_1 and t_2 be the times at which it is at hight h above the projection while ascending and descending respectively, then h is :-

(1) $\frac{1}{2}gt_1t_2$ (2) gt_1t_2

(3) $2gt_1t_2$ (4) 2hg

13. A body A starts from rest with an accelertion a_1. After 2 seconds, another body B starts from rest with an acceleration a_2. If they travel equal distances in the 5th seconds, after start of A, then the ratio $a_1 : a_2$ is equal to :-

(1) 5 : 9 (2) 5 : 7

(3) 9 : 5 (4) 9 : 7

14. Two balls are dropped to the ground from different heights. One ball is dropped 2s after the other but they both strike the ground at the same time. If the first ball takes 5s to reach the ground, then the difference in initial heights is ($g = 10\ ms^{-2}$) :-

(1) 20 m (2) 80 m (3) 170 m (4) 40 m

15. The initial velocity of particle is u and the acceleration at the time t is at, a being a constant. Then the v at the time t is given by :-

(1) $v = u$

(2) $v = u + at$

(3) $v = u + at^2$

(4) $v = u + \frac{1}{2}at^2$

16. The displacement-time graph for two particles A and B are straight lines inclined at angles of 30° and 60° with the time axis. The ratio of velocities of $V_A : V_B$ is :-

(1) 1 : 2 (2) $1 : \sqrt{3}$

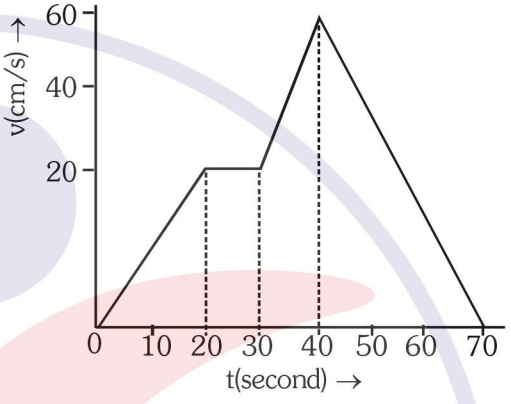
(3) $\sqrt{3} : 1$ (4) 1 : 3

17. An elevator is accelerating upward at a rate of 6 ft/sec^2 when a bolt from its ceiling falls to the floor of the lift (Distance = 9.5 feet). The time (in seconds) taken by the falling bolt to hit the floor is (take g = 32 ft/ sec^2)

(1) $\sqrt{2}$ (2) $\frac{1}{\sqrt{2}}$

(3) $2\sqrt{2}$ (4) $\frac{1}{2\sqrt{2}}$

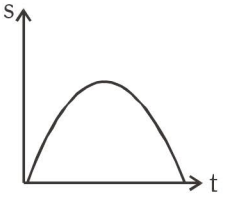
18. The velocity versus time curve of a moving point is as given below. The maximum acceleration is :-



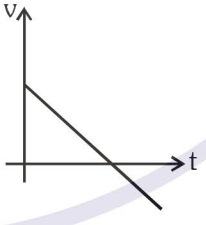
(1) 1 cm/s^2 (2) 2 cm/s^2

(3) 3 cm/s^2 (4) 4 cm/s^2

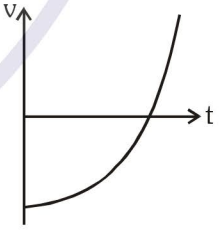
19. The graph of displacement v/s time is, then its corresponding velocity time graph will be :-



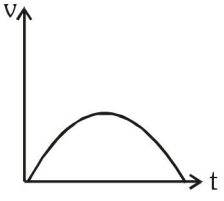
(1)



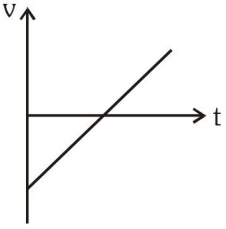
(2)



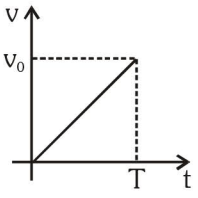
(3)



(4)



20. The velocity-time graph of a body is shown in figure. The slope of the line is 'm'. The distance travels by body in time T s :-



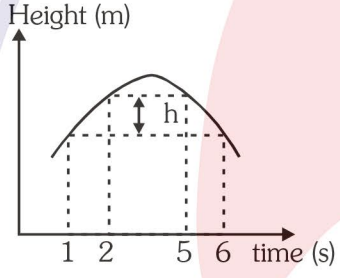
(1) $\frac{mv_0^2}{2T}$ (2) $\frac{v_0^2}{2T}$

(3) $2mv_0^2$ (4) $\frac{v_0^2}{2m}$

21. Position of a particle moving along x–axis is given by $x = 2 + 8t - 4t^2$. The distance travelled by the particle from t = 0 to t = 2 is :

(1) 0 (2) 8 (3) 12 (4) 16

22. A ball is thrown upwards. Its height varies with time as shown in figure. If the acceleration due to gravity is 7.5 m/s², then the height h is



(1) 10 m (2) 15 m (3) 20 m (4) 25 m

23. A body is projected upwards with a velocity u. It passes through a certain point above the ground after t_1 second. The time after which the body passes through the same point during the return journey is:

(1) $(\frac{u}{g} - t_1^2)$ (2) $2(\frac{u}{g} - t_1)$

(3) $3(\frac{u^2}{g} - t_1)$ (4) $3(\frac{u^2}{g^2} - t_1)$

24. A body is thrown vertically upwards from the top A of a tower. It reaches the ground in t_1 seconds. If it is thrown vertically downwards from A with the same speed it reaches the ground in t_2, seconds. If it is allowed to fall freely from A, then the time it takes to reach the ground is given by :

(1) $t = \frac{t_1 + t_2}{2}$ (2) $t = \frac{t_1 - t_2}{2}$

(3) $t = \sqrt{t_1 t_2}$ (4) $t = \sqrt{\frac{t_1}{t_2}}$

25. A particle of unit mass undergoes one-dimensional motion such that its velocity varies according to

$$v(x) = \beta x^{-4n}$$

where β and n are constants and x is the position of the particle. The acceleration of the particle as a function of x, is given by :

(1) $-4n\beta^2 x^{-8n-1}$ (2) $-4\beta^2 x^{-8n+1}$

(3) $-4n\beta^2 e^{-8n+1}$ (4) $-4n\beta^2 x^{-8n-1}$

26. A particle moves a distance y in time t according to equation $y = (t + 10)^{-1}$. The acceleration of particle is proportional to :-

(1) (velocity)$^{2/3}$ (2) (velocity)$^{3/2}$

(3) (distance)^2 (4) (distance)$^{-2}$

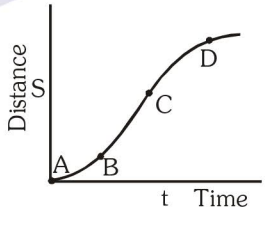
27. A body starting from rest is moving under a constant acceleration up to 40 sec. If it moves S_1 distance in first 20 sec., and S_2 distance in next 20 sec. then S_2 will be equal to :

(1) S_1 (2) $2S_1$ (3) $3S_1$ (4) $4S_1$

28. A particle moves along a straight line OX. At a time t (in seconds) the distance x (in metres) of the particle from O is given by $x = 50 + 12t - t^3$. How long would the particle travel before coming to rest ?

(1) 66 m (2) 56 m (3) 26 m (4) 16 m

29. A particle shows distance-time curve as given in this figure. The maximum instantaneous velocity of the particle is around the point :-



(1) D (2) A (3) B (4) C

30. If a body starts from rest and travels 120cm in the 6^{th} second then what is the acceleration ?

(1) 0.526 m/s^2 (2) 0.218 m/s^2

(3) 0.109 m/s^2 (4) 0.056 m/s^2

31. A ballon rises from ground with an acceleration of 2 m/s^2 after 10 second, a stone is released from the ballon the stone will

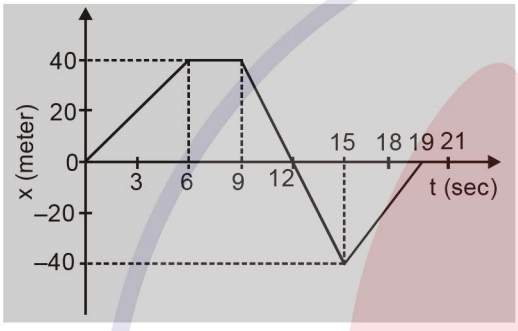
(1) have a displacement of 150 m

(2) cover a distance of 140 m in reaching the ground

(3) reach the ground in 4 second

(4) begin to move downward after being released

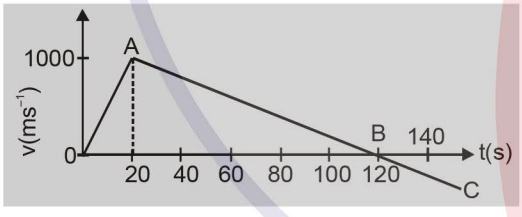
32. A person walks along an east-west street and a graph of his displacement from home is shown in figure. His average velocity for the whole time interval is:



(1) 0 (2) 23 ms^{-1}

(3) 8.4 ms^{-1} (4) None of above

33. A rocket is launched upward from the earth is surface whose velocity time graphs shown in figure. Then maximum height attained by the rocket is:



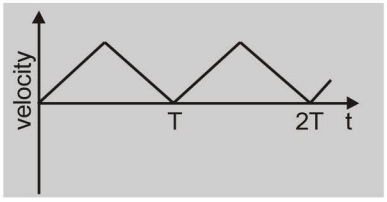
(1) 1 km (2) 10 km

(3) 100 km (4) 60 km

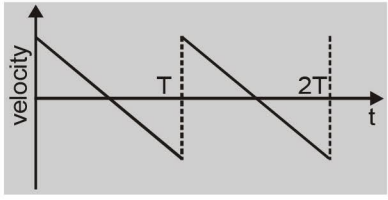
34. A ball is dropped from the certain height on the surface of glass. It collides elastically and comes back to its initial position. If this process it repeated then the velocity time graph is :

(Take downward direction as positive)

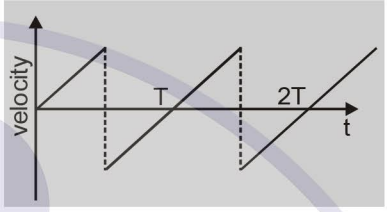
(1)



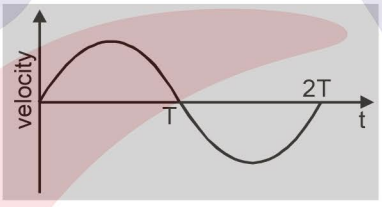
(2)



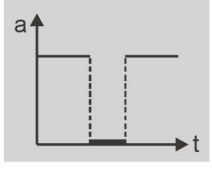
(3)



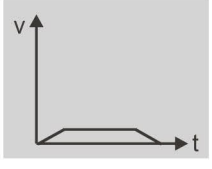
(4)



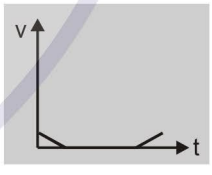
35. Acceleration-time graph of a body is shown. The corresponding velocity-time graph is :



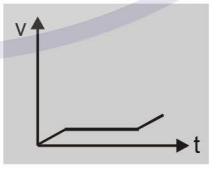
(1)



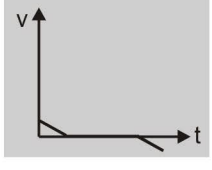
(2)



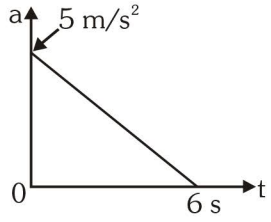
(3)



(4)



36. A particle starts from rest. Its acceleration at time t = 0 is 5 m/s² which varies with time as shown in the figure. The maximum speed of the particle will be :



(1) 7.5 m/s

(2) 15 m/s

(3) 30 m/s

(4) 37.5 m/s

37. Two trains A and B, each of length 100m, are running on parallel tracks. One overtakes the other in 20 s and one crosses the other in 10 s. The velocity of trains are :-

(1) 5 m/s, 5 m/s (2) 10 m/s, 15 m/s

(3) 15 m/s, 5 m/s (4) 15 m/s, 30 m/s

38. A ball A is thrown up vertically with a speed u and at the same instant another ball B is relased from a height h. At time t, the speed of A relative of B is :-

(1) u (2) 2u

(3) u – 2gt (4) $\sqrt{(u^2 - gt)}$

39. A stone is dropped from a hight h, simultaneously another stone is thrown up from the ground which reaches at a height 4h, the two stones cross each other after time :-

(1) $\sqrt{\frac{h}{2g}}$ (2) $\sqrt{\frac{h}{8g}}$ (3) $\sqrt{8hg}$ (4) $\sqrt{2hg}$

40. A car moves on a straight track from station A to the station B, with an acceleration a = (b – cx), where b and c are contants and x is the distance from station A. The maximum velocity between the two stations is :-

(1) $\frac{b}{\sqrt{c}}$ (2) b/c (3) $\frac{c}{\sqrt{a}}$ (4) $\frac{\sqrt{b}}{c}$

41. A car, start from rest, accelerates at the rate 'f' through a distance s, then continues at constant speed for time t and then decelerates at the rate f/2 come to rest. If the total distance traversed is 5 s, then :-

(1) $s = \frac{1}{4}ft^2$ (2) $s = \frac{1}{2}ft^2$

(3) $s = \frac{1}{6}ft^2$ (4) s = ft

42. A boat which has a speed of 5 km/h, in still water crosses a river of width 1 km along the shortest possible path in 15 minute. The velocity of the river water in km/h is :-

(1) 1 (2) 3 (3) 4 (4) $\sqrt{41}$

43. A man is running up hill with a velocity $(2\hat{i} + 3\hat{j})$ m/s w.r.t. ground. He feels that the rain drops are falling vertically with velocity 4 m/s. If he runs down hill with same speed, find v_m.

(1) $2\sqrt{2}$ m/s (2) $2\sqrt{3}$ m/s

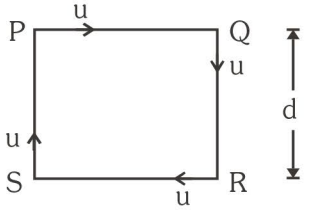
(3) $2\sqrt{5}$ m/s (4) $2\sqrt{10}$ m/s

44. A man is going east in a car with a velocity of 20 km/hr, a train appears to move towards north to him with a velocity of $20\sqrt{3}$ km/hr. What is the actual velocity and direction of motion of train ?

(1) 40 m/s, 60° N of W (2) 40 m/s, 60° W of N

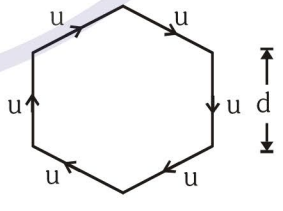
(3) 40 m/s, 60° N of E (4) 40 m/s, 60° E of N

45. Four persons P, Q, R and S of same mass travel with same speed u along a square of side 'd' such that each one always faces the other. After what time will they meet each other ?



(1) $\frac{d}{u}$ (2) $\frac{2d}{3u}$ (3) $\frac{2d}{u}$ (4) $d\sqrt{3}u$

46. Six persons of same mass travel with same speed u along a regular hexagon of side 'd' such that each one always faces the other. After how what will they meet each other ?



(1) $\frac{d}{u}$ (2) $\frac{2d}{3u}$ (3) $\frac{2d}{u}$ (4) $d\sqrt{3}u$

47. A boy is running on a levelled road with velocity (v) with a long hollow tube in his hand. Water is falling vertically downwards with velocity (u). At what angle to the vertical, should ve incline the tube so that the water drops enters without touching its side :

(1) $\tan^{-1}\left(\frac{v}{u}\right)$ (2) $\sin^{-1}\left(\frac{v}{u}\right)$

(3) $\tan^{-1}\left(\frac{u}{v}\right)$ (4) $\cos^{-1}\left(\frac{v}{u}\right)$

48. A river 2 km wide is flows at the rate of 2km/h. A boatman who can row a boat at a speed of 4 km/h in still water, goes a distance of 2 km upstream and then comes back. The time taken by him to complete his journey is

(1) 60 min (2) 70 min (3) 80 min (4) 90 min

49. Two towns A and B are connected by a regular bus service with a bus leaving in either direction every T minutes. A man cycling with a speed of 20 km h^{-1} in the direction A to B notices that a bus goes past him every 18 min in the direction of his motion, and every 6 min in the opposite direction. What is the period T of the bus service and with what speed (assumed constant) do the buses ply on the road?

(1) T = 9 min., Speed = 40 km h^{-1}
(2) T = 10 min., Speed = 40 km h^{-1}
(3) T = 9 min., Speed = 20 km h^{-1}
(4) T = 10 min., Speed = 20 km h^{-1}

50. Rain drops are falling with velocity $(2\hat{i} - 4\hat{j})$ m/s. What should be the velocity of a man so that rain drops hit him with speed 5m/s ?

(1) $-\hat{i}$ (2) $5\hat{i}$

(3) $2\hat{i}$ (4) Both (1) & (2)

51. A man runs at a speed of 4.0 m/s to overtake a standing bus. When he is 6.0 m behind the door (at t = 0), the bus moves forward and continues with a constant acceleration of 1.2 m/s^2. The man shall access the door at time t equal to

(1) 5.2 s
(2) 4.3 s
(3) 2.3 s
(4) the man shall never access the door

52. A ship A is moving Eastward with a speed of 10 km h^{-1} and a ship B 100 km North of A, is moving Sorthward with a speed of 10 km h^{-1}. The time after which the distance between them becomes shortest, is :-

(1) 5 h (2) $5\sqrt{2}$ h (3) $10\sqrt{2}$ h (4) 0 h

53. Two particles A and B, move with constant velocities $\vec{v}_1$ and $\vec{v}_2$. At the initial moment their position vectors are $\vec{r}_1$ and $\vec{r}_2$ respectively. The condition for particle A and B for their collision is :-

(1) $\vec{r}_1 - \vec{r}_2 = \vec{v}_1 - \vec{v}_2$

(2) $\frac{\vec{r}_1 - \vec{r}_2}{|\vec{r}_1 - \vec{r}_2|} = \frac{\vec{v}_2 - \vec{v}_1}{|\vec{v}_2 - \vec{v}_1|}$

(3) $\vec{r}_1 \cdot \vec{v}_1 = \vec{r}_2 \cdot \vec{v}_2$

(4) $\vec{r}_1 \times \vec{v}_1 = \vec{r}_2 \times \vec{v}_2$

54. Two cars A and B start from a point at the same time in a straight line and their positions are represented by $x_A(t) = at + bt^2$ and $x_B(t) = ft + t^2$. At what time do the cars have the same velocity?

(1) $\frac{a+f}{2(1+b)}$ (2) $\frac{f-a}{2(1-b)}$

(3) $\frac{a-f}{1+b}$ (4) $\frac{a+f}{2(b-1)}$

55. Priya reached the metro station and found that the escalator was not working. She walked down the stationary escalator in time t_1. On other days, if she remains stationary on the moving escalator, then the escalator takes her down in time t_2. The time taken by her to walk down on the moving escalator will be

(1) $\frac{t_1 t_2}{t_2 - t_1}$ (2) $\frac{t_1 t_2}{t_2 + t_1}$ (3) $t_1 - t_2$ (4) $\frac{t_1 + t_2}{2}$

56. A stone is just released from the window of a train moving along a horizontal striaght track. The stone will hit the ground following :-

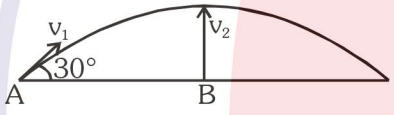
(1) straight path
(2) circular path
(3) parabolic path
(4) hyperbolic path

57. At the top of the trajectory of a projectile, the acceleration is :-
(1) maximum (2) minimum
(3) zero (4) g

58. The range of a projectile which is the launched at an angle of 15° with the horizontal is 1.5 km. What is the range of the projectile if it is projected of an angle 45° to the horizontal ?
(1) 1.5 km (2) 3 km
(3) 6 km (4) 0.75 km

59. An aeroplane is flying horizontally with a velocity of 600 km/h at a height of 1960 m. When it is vertically at a point A on the ground, a bomb is released from it. The bomb strikes the ground at point B. The distance AB is :-
(1) 1200 m (2) 0.33 km
(3) 3.33 km (4) 33 km

60. A body is projected with velocity v_1 from point A. At the same time another body is projected vertically upwards with velocity v_2. The point B lies vertically below the highest point. For both the bodies to collide $\frac{v_2}{v_1}$ should be :-



(1) 2 (2) $\frac{\sqrt{3}}{2}$ (3) 0.5 (4) 1

61. A boy throws a ball with a velocity u at an angle θ with the horizontal. At the same instant he starts running with uniform velocity to catch the ball before it hits the ground. To achieve this he should run with a velocity of :-
(1) u cos θ (2) u sin θ
(3) u tan θ (4) $\sqrt{u^2 \tan\theta}$

62. A cricketer can throw a ball to a maximum horizontal distance of d. How high above the ground can the cricketer throw the same ball?
(1) $\frac{d}{2}$ (2) d
(3) 2d (4) $\frac{5d}{2}$

63. A particle is projected from the ground with a velocity of 25 m/s. After 2 second, it just clears a wall 5 m height. Then angle of projection of particle is [$g = 10\ m/s^2$]
(1) 30° (2) 45° (3) 60° (4) 75°

64. The horizontal and vertical components of the velocity of a projectile are 10 m/s and 20 m/s, respectively. The horizontal range of the projectile will be [$g = 10\ m/s^2$] :-
(1) 5 m (2) 10 m (3) 20 m (4) 40 m

65. A cart is moving horizontally along a straight line with constant speed 30 m/s. A projectile is to be fired from the moving cart in such a way what it will return to the cart after the cart has moved 80 m. At what speed (relative to the cart) must the projectile be fired (Take $g = 10\ m/s^2$) :-
(1) 10 m/s (2) $10\sqrt{8}$ m/s
(3) $\frac{40}{3}$ m/s (4) None of these

66. For an object thrown at 45° to horizontal, the maximum height (H) and horizontal range (R) are related as :-
(1) R = 16 H (2) R = 8 H
(3) R = 4 H (4) R = 2 H

67. A ball is thrown up at an angle 45° with the horizontal. Then the total change of momentum by the instant it returns to ground is :-
(1) zero (2) 2 mv (3) $\sqrt{2}$ mv (4) $\frac{mv}{\sqrt{2}}$

68. A stone projected with a velocity u at an angle θ with the horizontal reaches maximum height H_1. When it is projected with velocity u at an angle $\left(\frac{\pi}{2} - \theta\right)$ with the horizontal, it reaches maximum height H_2. The relation between the horizontal range R of the projectile. H_1 and H_2 is :-
(1) $R = 4\sqrt{H_1 H_2}$ (2) $R = 4(H_1 - H_2)$
(3) $R = 4(H_1 + H_2)$ (4) $R = \frac{H_1^2}{H_2^2}$

69. A projectile is thrown with an initial velocity of $\vec{v} = a\hat{i} + b\hat{j}$. If range of the projectile is double the maximum height attained by it then :

(1) a = 2 b (2) b = a

(3) b = 2a (4) b = 4a

70. Two stones are projected with the same speed but making different angles with the horizontal. Their ranges are equal. If the angle of projection of one is $\frac{\pi}{3}$ and its maximum height is y_1, then the maximum height of the other will be :

(1) $3y_1$ (2) $2y_1$

(3) $\frac{y_1}{2}$ (4) $\frac{y_1}{3}$

71. A particle is projected with a velocity v, so that its range on a horizontal plane is twice the greatest height attained. If g is acceleration due to gravity, then its range is :

(1) $\frac{4v^2}{5g}$ (2) $\frac{4g}{5v^2}$

(3) $\frac{4v^3}{5g^2}$ (4) $\frac{4v}{5g^2}$

72. A projectile can have the same range R for two angles of projection. If t_1 and t_2 be the times of flight in the two cases, then :–

(1) $t_1t_2 \propto R^2$ (2) $t_1t_2 \propto R$

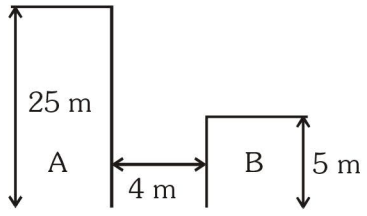
(3) $t_1t_2 \propto \frac{1}{R}$ (4) $t_1t_2 \propto \frac{1}{R^2}$

73. A number of bullets are fired in all possible directions with the same initial velocity u. The maximum area of ground covered by bullets is :–

(1) $\pi\left(\frac{2u^2}{g}\right)^2$ (2) $3\pi\left(\frac{u}{g}\right)^2$

(3) $5\pi\left(\frac{u}{2g}\right)^2$ (4) $\pi\left(\frac{u^2}{g}\right)^2$

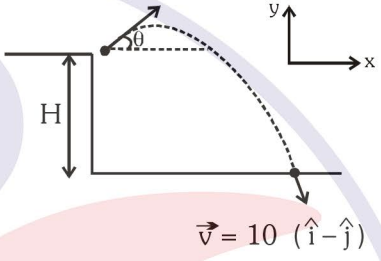
74. A boy wants to jump from building A to building B. Height of building A is 25 m and that of building B is 5m. Distance between buildings is 4m. Assume that the boy jumps horizontally, then calculate minimum velocity with which he has to jump to land safely on building B.



(1) 6 m/s (2) 8 m/s

(3) 4 m/s (4) 2 m/s

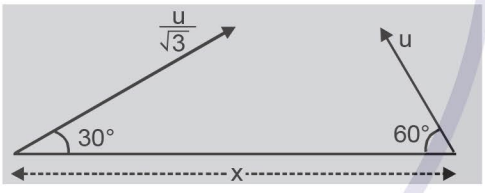
75. A ball was thrown from height H and the ball hit the floor with velocity $10(\hat{i} - \hat{j})$ after 1.5 sec of its projection. Find initial speed of ball.



(1) $10\sqrt{5}$ m/s (2) $5\sqrt{5}$ m/s

(3) 15 m/s (4) 30 m/s

76. Two particles are separated by a horizontal distance x as shown in figure. They are projected as shown in figure with different initial speeds. The time after which the horizontal distance between them becomes zero is :



(1) $\frac{x}{u}$ (2) $\frac{u}{2x}$

(3) $\frac{2u}{x}$ (4) none of these

77. A particle has initial velocity $(3\hat{i} + 4\hat{j})$ and has acceleration $(0.4\hat{i} + 0.3\hat{j})$. Its speed after 10s is :-

(1) 7 unit (2) $7\sqrt{2}$ unit

(3) 8.5 unit (4) 10 unit

78. A body starts from rest from the origin with an acceleration of 6 m/s² along the x-axis and 8 m/s² along the y-axis. Its distance from the origin after 4 seconds will be :-

(1) 56 m (2) 64 m (3) 80 m (4) 128 m

79. The position vector of a particle $\vec{R}$ as a function of time is given by :-

$\vec{R} = 2\sin(2\pi t)\hat{i} + 2\cos(2\pi t)\hat{j}$

Where R is in meters, t is in seconds and $\hat{i}$ and $\hat{j}$ denote unit vectors along x and y-directions, respectively. Which one of the following statements is wrong for the motion of particle ?

(1) Path of the particle is a circle of radius 2 meter

(2) Acceleration vectors is along $-\vec{R}$

(3) Magnitude of acceleration vector is $\frac{v^2}{R}$ where v is the velocity of particle.

(4) Magnitude of the velocity of particle is 8 meter/second

80. A particle moves so that its position vector is given by $\vec{r} = \cos\omega t\hat{x} + \sin\omega t\hat{y}$. Where ω is a constant.

Which of the following is true ?

(1) Velocity and acceleration both are perpendicular to $\vec{r}$.

(2) Velocity and acceleration both are parallel to $\vec{r}$

(3) Velocity is perpendicular to $\vec{r}$ and acceleration is directed towards the origin

(4) Velocity is perpendicular to $\vec{r}$ and acceleration is directed away from the origin

81. The x and y coordinates of the particle at any time are $x = 8t - 2t^2$ and $y = 40t$ respectively, where x and y are in meters and t in seconds. The acceleration of the particle at t = 2s is :-

(1) 5 m/s² (2) – 4 m/s²

(3) – 8 m/s² (4) 0

82. A toy car with charge q moves on a frictionless horizontal plane surface under the influence of a uniform electric field $\vec{E}$. Due to the force $q\vec{E}$, its velocity increases from 0 to 12 m/s in one second duration. At that instant the direction of the field is reversed. The car continues to move for two more seconds under the influence of this field. The average velocity and the average speed of the toy car between 0 to 3 seconds are respectively :-

(1) 2 m/s, 4 m/s (2) 2 m/s, 6 m/s

(3) 1 m/s, 3.5 m/s (4) 1.5 m/s, 3 m/s

83. If the velocity of a particle is $v = At + Bt^2$, where A and B are constants, then the distance travelled by it between 2s and 3s is :-

(1) $\frac{3}{2}A+4B$ (2) 3A+7B

(3) $\frac{5}{2}A+\frac{19}{3}B$ (4) $\frac{A}{2}+\frac{B}{3}$

ANSWER KEY

Que.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
Ans.	**4**	**1**	**1**	**2**	**3**	**2**	**2**	**4**	**3**	**3**	**1**	**1**	**1**	**2**	**4**
Que.	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
Ans.	**4**	**2**	**4**	**1**	**4**	**2**	**2**	**2**	**3**	**1**	**2**	**3**	**4**	**4**	**2**
Que.	31	32	33	34	35	36	37	38	39	40	41	42	43	44	45
Ans.	**2**	**1**	**4**	**3**	**3**	**2**	**3**	**3**	**2**	**1**	**2**	**1**	**3**	**3**	**1**
Que.	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60
Ans.	**3**	**1**	**3**	**1**	**4**	**3**	**1**	**2**	**2**	**2**	**3**	**4**	**2**	**3**	**3**
Que.	61	62	63	64	65	66	67	68	69	70	71	72	73	74	75
Ans.	**1**	**1**	**1**	**4**	**3**	**3**	**3**	**1**	**3**	**4**	**1**	**2**	**4**	**4**	**2**
Que.	76	77	78	79	80	81	82	83							
Ans.	**1**	**2**	**3**	**4**	**3**	**2**	**2**	**3**							