

Class: XI
Subject: Physics
Topic: Description of Motion in One Dimension
No. of Questions: 30

1. A car, starting from rest, has a constant acceleration a_1 for a time interval t_1 during which it covers a distance s_1 . In the next time interval t_2 , the car has a constant retardation a_2 and comes to rest after covering a distance s_2 in time t_2 . Which of the following relations is correct?

- A. $a_1/a_2 = s_1/s_2 = t_1/t_2$
B. $a_1/a_2 = s_2/s_1 = t_1/t_2$
C. $a_1/a_2 = s_1/s_2 = t_2/t_1$
D. $a_1/a_2 = s_2/s_1 = t_2/t_1$

2. The distance x covered by a body moving in a straight line in time t is given by the relation $2x^2 + 3x = t$. If v is the velocity of the body at a certain instant of time, its acceleration will be

- A. $-v^3$
B. $-2v^3$
C. $-3v^3$
D. $-4v^3$

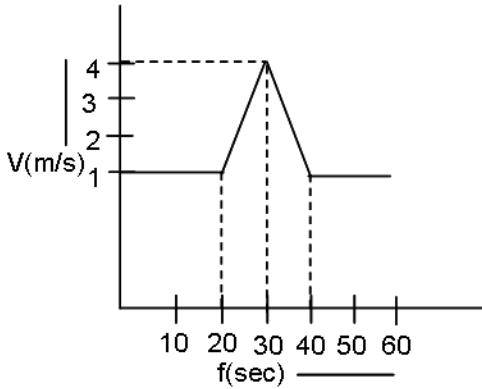
3. A car was moving on a straight horizontal road with speed v . When brakes were applied to give a constant retardation a , the car was stopped in a shortest distance S . If the car is moving on the same road with speed $3v$ and the same retardation a is applied, then the shortest distance in which the car is stopped is given by
- A. $3S$
 - B. $6S$
 - C. $9S$
 - D. $27S$
4. A person aims a gun at a target located at a horizontal distance of 100 m . If the gun imparts a horizontal speed of 500 ms^{-1} to the bullet, at what height above the target must he aim his gun in order to hit it? Take $g = 10\text{ ms}^{-2}$.
- A. 10 cm
 - B. 20 cm
 - C. 50 cm
 - D. 100 cm
5. From the top of a tower of height 40 m , a ball is projected upwards with a speed of 20 m/s at an angle of elevation of 30° . The ratio of the total time taken by the ball to hit the ground to its time of flight (time taken to come back to the same elevation) is (Take $g = 10\text{ m/s}^2$)
- A. $2 : 1$
 - B. $3 : 1$
 - C. $3 : 2$
 - D. $1.5 : 1$

6. A gun kept on a straight horizontal road is used to hit a car travelling on the same road away from the gun at a uniform speed of 14.41 ms^{-1} . The car is at a distance of 150 m from the gun when it is fired at an angle of 45° to the horizontal. With what speed should the shell be projected so that it hits the car?
Take $g = 10 \text{ ms}^{-2}$.
- A. 20 ms^{-1}
B. 30 ms^{-1}
C. 40 ms^{-1}
D. 50 ms^{-1}
7. A gun kept on a straight horizontal road is used to hit a car travelling on the same road away from the gun at a uniform speed of 14.14 ms^{-1} . The car is at a distance of 150 m from the gun when it is fired at an angle of 45° to the horizontal. What is the distance of the car from the gun when the shell hits it?
- A. 250 m
B. 750 m
C. 500 m
D. 1000 m
8. A body thrown along a frictionless inclined plane of angle of inclination 30° covers a distance of 40 m along the plane. If the body is projected with same speed at an angle of 30° with the ground, it will have a range of _____ (Take $g = 10 \text{ ms}^{-2}$)
- A. 20 m
B. 28.28 m
C. 34.46 m
D. 40 m
9. A body, projected with a certain kinetic energy, has a horizontal range R. The kinetic energy will be minimum at a position of the projectile when its horizontal range is
- A. R
B. $3R/4$
C. $R/2$
D. $R/4$

10. Four projectiles are projected with the same speed at angles 20° , 35° , 60° and 75° with the horizontal. The range will be the longest for the projectile whose angle of projection is
- A. 75°
 - B. 35°
 - C. 20°
 - D. 60°
11. The maximum height attained by a projectile is increased by 10% by increasing its speed of projection, without changing the angle of projection. The percentage increase in the horizontal range will be
- A. 20%
 - B. 15%
 - C. 10%
 - D. 5%
12. The maximum height attained by a projectile is increased by 10% by increasing its speed of projection, without changing the angle of projection. What is the percentage increase in the time of flight of the projectile?
- A. 20%
 - B. 15%
 - C. 10%
 - D. 5%
13. The speed of projection of projectile is increased by 5%, without changing the angle of projection. The percentage increase in the range will be
- A. 2.5%
 - B. 5%
 - C. 7.5%
 - D. 10%

14. A projectile attains a certain maximum height when projected from the earth. If it is projected at the same angle and with the same initial speed from the moon, where the acceleration due to gravity is one-sixth that on the earth, by what factor will the maximum height of the projectile increase?
- A. 1.732
B. 3
C. 2.45
D. 6
15. A body is projected horizontally from a point above the ground. The motion of the body is described by the equations
$$x = 2t$$
and
$$y = 5t^2$$
where, x and y are the horizontal and vertical displacements (in m) respectively at time t . The trajectory of the body is
- A. a straight line
B. a circle
C. an ellipse
D. a parabola
16. A block is placed on the top of a smooth inclined plane of inclination x kept on the floor of a lift. When the lift is descending with a retardation a , the block is released. The acceleration of the block relative to the inclined plane is
- A. $g \sin x$
B. $a \sin x$
C. $(g - a) \sin x$
D. $(g + a) \sin x$

17. Velocity-time ($v - t$) graph for a moving object is shown in the figure. Total displacement of the object during the time interval when there is non-zero acceleration and retardation is



- A. 60 m
B. 50 m
C. 40 m
D. 30 m
18. A car moving with a speed of 50 km/h, can be stopped by brakes after at least 6 m. If the same car is moving at a speed of 100 km/h, the minimum stopping distance is
- A. 12 m
B. 18 m
C. 24 m
D. 6 m
19. A metro train starts from rest, and in 5 s attains a speed of 108 km/h. After that, it moves with constant velocity and comes to rest after travelling 45 metres with uniform retardation. If the total distance travelled is 395 metres, find the total time of travelling.

- A. 12.2 s
B. 15.3 s
C. 9 s
D. 17.2 s

20. The speed of the car is reduced to one-third of its original speed in travelling a distance s . Later, the car is brought to rest. The distance covered is
- A. $9s$
 - B. $(8/9)s$
 - C. $(9/8)s$
 - D. $3s$
21. A railway train 400m long is going from New Delhi railway station to Kanpur. Can we consider railway train as a point object
22. Shipra went from her home to school 2.5km away. On finding her home closed she returned to her home immediately. What is her net displacement? What is the total distance covered by her?
23. Can speed of an object be negative? Justify
24. What causes variation in velocity of a particle?
25. Figure. Shows displacement – time curves I and II. What conclusions do you draw from these graphs?
26. Displacement of a particle is given by the expression $x = 3t^2 + 7t - 9$, where x is in meter and t is in seconds. What is acceleration?
27. A particle is thrown upwards. It attains a height (h) after 5 seconds and again after 9s comes back. What is the speed of the particle at a height h ?
28. A police jeep on a petrol duty on national highway was moving with a speed of 54km/hr. in the same direction. It finds a thief rushing up in a car at a rate of 126km/hr in the same direction. Police sub – inspector fired at the car of the thief with his service revolver with a muzzle speed of 100m/s. with what speed will the bullet hit the car of thief?
29. Establish the relation $S_n = u + a/2 (2n - 1)$ where the letters have their usual meanings.
30. A stone is dropped from the top of a cliff and is found to travel 44.1m during the last second before it reaches the ground. What is the height of the cliff? $g = 9.8\text{m/s}^2$