CBSE

MOTION IN A STRAIGHT LINE WS 6

Class 11 - Physics

Section A

1. When a ball is thrown vertically upwards, at the maximum height **[1]**

   a) the acceleration is independent of the velocity

   b) the acceleration depends on the velocity as a $= \frac{dv}{dt}$

   c) the acceleration is present and therefore velocity is not zero

   d) the velocity is zero and therefore there is no acceleration acting on the particle

2. The displacement of a body is given to be proportional to the cube of time elapsed. The magnitude of the acceleration of the body is: **[1]**

   a) zero

   b) increasing with time

   c) decreasing with time

   d) constant but not zero

3. **Assertion (A):** It is possible that acceleration decreases, while the velocity increases. **[1]**
   Reason (R): Acceleration is the change of velocity with respect to time.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

4. **Assertion:** A body may have velocity even its acceleration is zero. **[1]**
   Reason: Acceleration of a body is the rate of change of velocity of the body.

   a) If both assertion and reason are true and the reason is the correct explanation of assertion.

   b) If both assertion and reason are true but the reason is not the correct explanation of assertion.

   c) If the assertion is true but the reason is false.

   d) If both assertion and reason are false.

5. **Assertion (A):** A body having non-zero acceleration can have a constant velocity. **[1]**
   Reason (R): Acceleration is the rate of change of velocity.

   a) Both A and R are true and R is the correct explanation of A.

   b) Both A and R are true but R is not the correct explanation of A.

   c) A is true but R is false.

   d) A is false but R is true.

6. **Assertion:** In free fall, the initial velocity of a body may not be zero. **[1]**
   Reason: Free fall means the acceleration of the body is equal to the acceleration due to gravity $(\vec{\mathbf{g}})$.

   a) If both assertion and reason are true and the reason is the correct explanation of assertion.

   b) If both assertion and reason are true but the reason is not the correct explanation of assertion.

c) If assertion is true but reason is false.
d) If both assertion and reason are false.

7. **Assertion:** A negative acceleration of a body can be associated with a speeding up of the body. **[1]**
Reason: If a body have negative velocity and negative acceleration then magnitude of velocity increases.

a) If both assertion and reason are true and the reason is the correct explanation of assertion.
b) If both assertion and reason are true but the reason is not the correct explanation of assertion.
c) If the assertion is true but the reason is false.
d) If both assertion and reason are false.

8. **Assertion (A):** A body falling freely may do so with constant velocity. **[1]**
Reason (R): The body falls freely when the acceleration of a body is equal to the acceleration due to gravity.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

9. **Assertion:** A body is thrown vertically upwards with an initial speed 25 m/s from a position 1. It falls back to position 1 after some time. During this time duration, total change of velocity of the body is zero. **[1]**
Reason: Average acceleration of the body during this time is zero.

a) If both assertion and reason are true and the reason is the correct explanation of assertion.
b) If both assertion and reason are true but the reason is not the correct explanation of assertion.
c) If the assertion is true but the reason is false.
d) If both assertion and reason are false.

10. **Assertion:** An object may have varying speed without having varying velocity. **[1]**
Reason: For an object, if velocity is zero at an instant, acceleration should also be zero at that instant.

a) If both assertion and reason are true and the reason is the correct explanation of assertion.
b) If both assertion and reason are true but the reason is not the correct explanation of assertion.
c) If the assertion is true but the reason is false.
d) If both assertion and reason are false.

11. **Assertion (A):** A negative acceleration of a body is associated with a slowing down of a body. **[1]**
Reason (R): Acceleration is vector quantity.

a) Both A and R are true and R is the correct explanation of A.
b) Both A and R are true but R is not the correct explanation of A.
c) A is true but R is false.
d) A is false but R is true.

12. The v-t graphs of two objects make angle 30° and 60° with the time axis. Find the ratio of their accelerations. **[1]**

13. If the position of a particle at instant t is given by $x = 2t^3$, find the acceleration of the particle. **[1]**

14. If the instantaneous velocity of a particle is zero, will its instantaneous acceleration be necessarily zero? **[1]**

15. Give an example that shows that a negative acceleration can be associated with speeding up the object. **[1]**

16. Even when rain is falling vertically downwards, the front screen of a moving car gets wet while the back screen remains dry. Why? **[1]**

Section B

17. A bullet bike moving on a straight road at a speed of 120 kmph is made to stop by a police officer within a 100m distance. Calculate the retardation of the bike (assumed uniform) and the time it takes for the bike to stop? **[2]**

18. Starting from a stationary position, a bus attains a velocity of 6 m/s in 30 s. Then, the driver of the bus applies a brake such that the velocity of the bus comes down to 4 m/s in the next 5 s. Calculate the acceleration of the bus in both cases. **[2]**

19. Read each statement below carefully and state with reasons and examples, if it is true or false. A particle in one-dimensional motion: **[2]**

    i. with zero speed at an instant may have non-zero acceleration at the instant,
    ii. with zero speed may have non-zero velocity,
    iii. with constant speed must have zero acceleration,
    iv. with positive value of acceleration must be speeding up.

20. The displacement x of a particle is dependent on time t according to the relation: $x = 3 - 5t + 2t^2$. If t is measured in seconds and x in metres, find its **[2]**

    i. velocity at t = 2s and
    ii. acceleration at t = 4s

21. A car starts from rest and accelerates uniformly for 10 s to a velocity of 8 ms^{-1}. It then runs at a constant velocity and is finally brought to rest in 64 m with a constant retardation. The total distance covered by the car is 584 m. Find the value of acceleration, retardation and total time take. **[2]**

Section C

22. **State True or False:** **[3]**

    (a) Acceleration and velocity are always in the same direction. **[1]**
    (b) An object can have negative acceleration even when it is speeding up. **[1]**
    (c) A particle in one-dimensional motion with zero speed at an instant may have non-zero acceleration at that instant. **[1]**

23. A motor car, starting from rest, moves with uniform acceleration and attains a velocity of 8 ms^{-1} in 8 s. It then moves with uniform velocity and finally brought to rest in 32 m under uniform retardation. The total distance covered by the car is 464 m. Find: **[3]**

    i. the acceleration
    ii. the retardation and
    iii. the total time taken.

Section D

Question No. 24 to 27 are based on the given text. Read the text carefully and answer the questions: **[4]**

Free fall is a kind of motion that everybody can observe in daily life. We drop something accidentally or purposely and see its motion. At the beginning its speed is zero and until the end it gains speed and before it reaches ground its maximum speed. It gains speed approximately 10 m/s in a second while falling because of the gravitation.

During the fall, the air resistance is neglected and the acceleration remains constant (equal to g). The object is said to be in free fall. If the height through which the object falls is small compared to the earth's radius, g can be taken to be constant and equal to 10 m/s^2 approximately.

f the object is dropped from the top of a tall building, and it takes t seconds to reach the ground hen the velocity when it reaches ground is gt. The height of the building is $\frac{1}{2}gt^2$.

24. If an object dropped from the top of a tall building takes 2 seconds to reach ground, find the height of the building?
25. Which assumptions are considered when object falls freely from height?
26. Draw velocity time graph of an object during free fall.

27. Draw acceleration-time graph during free fall.

Section E

Question No. 28 to 32 are based on the given text. Read the text carefully and answer the questions: **[5]**

Free fall is a kind of motion that everybody can observe in daily life. We drop something accidentally or purposely and see its motion. At the beginning its speed is zero and until the end it gains speed and before it reaches ground its maximum speed. It gains speed approximately 10 m/s in a second while falling because of the gravitation.

During the fall, the air resistance is neglected and the acceleration remains constant (equal to g). The object is said to be in free fall. If the height through which the object falls is small compared to the earth's radius, g can be taken to be constant and equal to 10 m/s^2 approximately.

f the object is dropped from the top of a tall suilding, and it takes t seconds to reach the ground hen the velocity when it reaches ground is gt. The leight of the building is $\frac{1}{2}gt^2$.

28. During free fall, the speed of object

a) Increases 10 m/s in a second

b) remains same

c) depends on the mass of the object

d) decreases 10 m/s in a second

29. If an object dropped from the top of a tall building takes 2 seconds to reach ground then the height of the building is

a) 10 m

b) 20 m

c) 15 m

d) 5 m

30. During free fall, which of the following consideration(s) is are taken into account

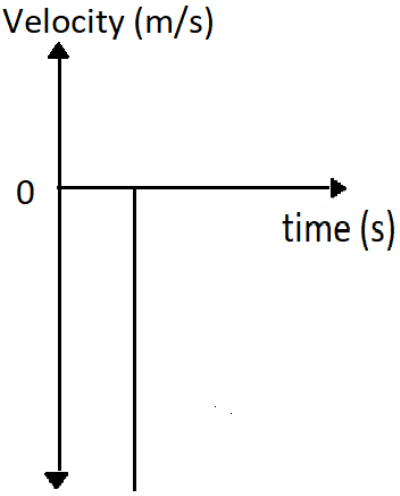
a) There is no air resistance

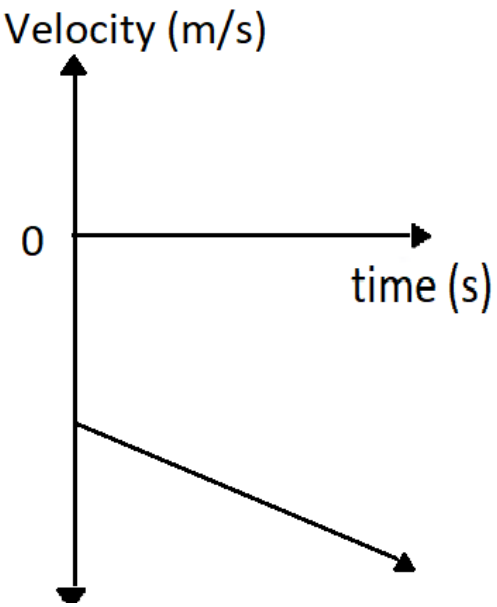
b) Height through which the object falls is large compared to the earth's radius

c) Height through which the object falls is small compared to the earth's radius

d) Both There is no air resistance and Height through which the object falls is small compared to the earth's radius.

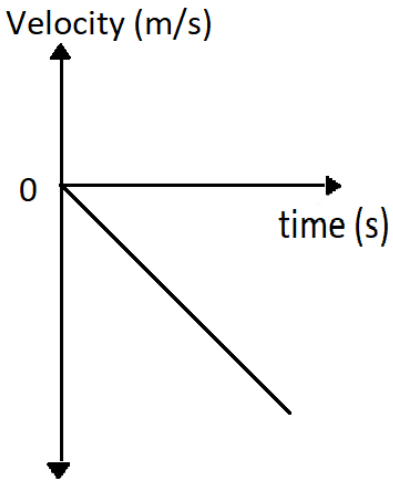
31. Velocity time graph during free fall is

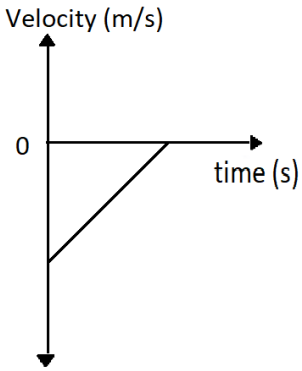
a) 

b) 

c)

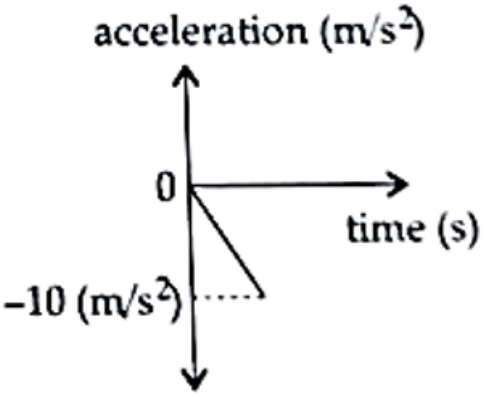
d)



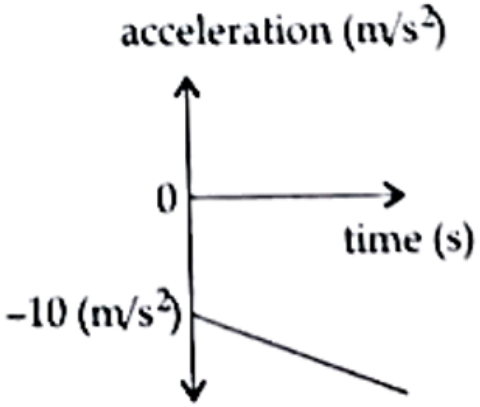


32. Acceleration-time graph during free fall is

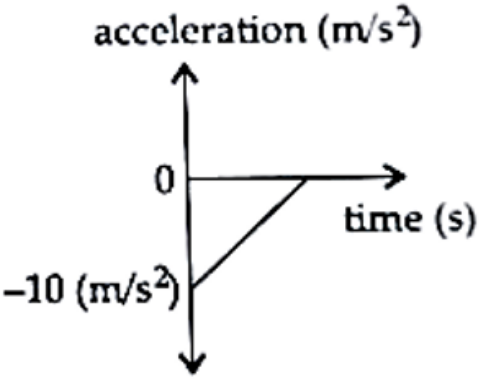
a)



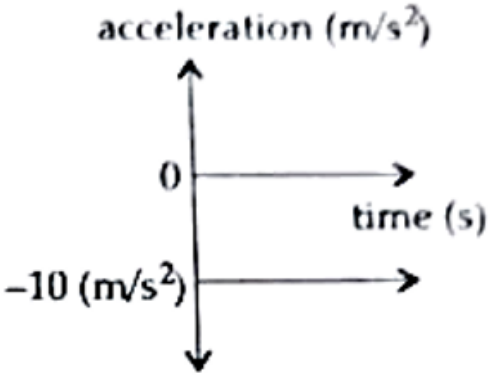
b)



c)



d)



33. i. With the help of a simple case of an object moving with a constant velocity, show that the area under velocity-time curve represents the displacement over a given time interval. **[5]**

ii. Establish the relation : $x = v_0t + \frac{1}{2}at^2$ graphically.

iii. A car moving with a speed of 126 km h^{-1} is brought to a stop within a distance of 200 m. Calculate the retardation of the car and the time required to stop it.