Yakeen NEET 2.0 (2026)

Physics by Saleem Sir

KPP - 16

Kinematics

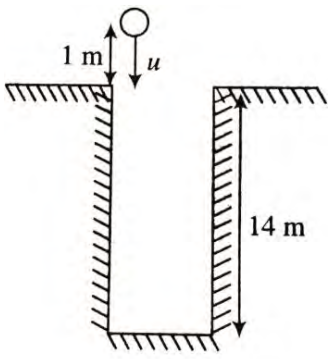
Time Limit 80 minutes

1. From the top of a tower, a ball is thrown vertically upwards. When the ball reaches *h* below the tower, its speed is double of what it was at height *h* above the tower. Find the greatest height attained by the ball from the tower.

2. A rocket is fired vertically upwards with initial velocity 40 m/s at the ground level. Its engines then fired and it is accelerated at 2 m/s^2 until it reaches an altitude of 1000 m. At that point the engines shut off and the rocket goes into free-fall. If the velocity (in m/s) just before it collides with the ground is 40α. Then fill the value of α. Disregard air resistance (g =10 m/s^2).

3. A stone is dropped from the top of a tall cliff, and 1s later a second stone is thrown vertically downward with a velocity of 20 ms^{-1}. How far below the top of the cliff will the second stone overtake the first?

4. A boy throws a ball with speed u in a well of depth 14 m as shown. On bounce with bottom of the well the speed of the ball gets halved. What should be the minimum value of u(in m/s) such that the ball may be able to reach his hand again? It is given that his hands are at 1 m height from top of the well while throwing and catching.



5. The engine of a motorcycle can produce a maximum acceleration 5 m/s^2. Its brakes can produce a maximum retardation 10 m/s^2. If motorcyclist start from point A and reach at point B. What is the minimum time in which it can cover if distance between A and B is 1.5 km. (Given: that motorcycle comes to rest at B).

(1) 30 sec (2) 15 sec
(3) 10 sec (4) 5 sec

6. A body falls freely from rest. It covers as much distance in the last second of its motion as covered in the first three seconds. The body has fallen for a time of:

(1) 3 s (2) 5 s
(3) 7 s (4) 9 s

7. A ball is thrown vertically upward with initial velocity 30 m/sec. What will be its position vector at time t = 5 sec taking origin at the point of projection, vertical up as positive y-axis and horizontal as x-axis:

(1) (0, 25) (2) (0, 20)
(3) (0, 45) (4) (0, 5)

8. A particle moves along the X-axis as
$x = u(t - 2s) + a(t - 2s)^2$

(1) The initial velocity of the particle is u
(2) The acceleration of the particle is a
(3) The acceleration of the particle is $2a$
(4) At t = 2s particle is at the origin.

9. A rocket is fired vertically up from the ground with a resultant vertical acceleration of 10 m/s^2. The fuel is finished in 1 minute and it continues to move up.

(a) What is the maximum height reached?
(b) After finishing fuel, calculate the time for which it continues its upwards motion.
(Take g = 10 m/s^2)

10. A particle is thrown with a speed 60 ms^{-1} at an angle 60° to the horizontal. When the particle makes an angle 30° with the horizontal in downward direction, it's speed at that instant is *v*. What is the value of v^2 in SI units?

11. A balloon rises up with constant net acceleration of 10 m/s^2. After 2 s a particle drops from the balloon. After further 2 s match the following:
(g = 10 m/s^2).

Column-I		Column-II	
(A)	Height of particle from ground	(P)	Zero
(B)	Speed of particle	(Q)	10 SI units
(C)	Displacement of Particle	(R)	40 SI units
(D)	Acceleration of particle	(S)	20 SI units

12. A particle is projected upwards with a velocity of 100 m/s at an angle of 60° with the vertical. Find the time when the particle will move perpendicular to its initial direction, taking g = 10 m/s^2.

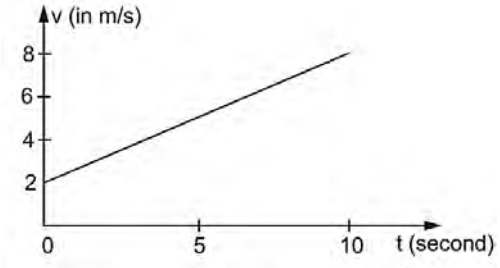
13. Consider a particle initially moving with a velocity of 5 ms^{-1} starts decelerating at a constant rate of 2 ms^{-2}.
(a) Determine the time at which the particle becomes stationary.
(b) Find the distance travelled in the second second.
(c) Find the distance travelled in the third second.

14. If a body starting from the fest travels with a uniform acceleration of 10 ms^{-2} for first 10 second and with uniform acceleration 5 ms^{-2} for next 20 seconds, then average acceleration of the body for 30 s is:
(1) 15 ms^{-2} (2) 10 ms^{-2}
(3) 20 ms^{-2} (4) 20/3 ms^{-2}

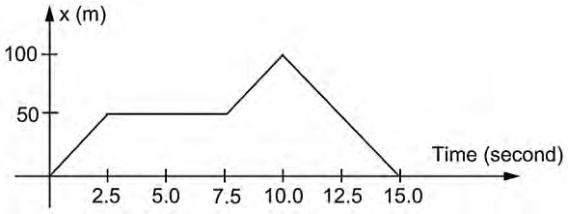
15. A moving train is stopped by applying brakes. It stops after traveling 80 m. If the speed of the train is doubled and retardation remains the same. It will cover a distance:
(1) Same as earlier
(2) Double the distance traveled earlier
(3) Four time the distance traveled earlier
(4) Half the distance traveled earlier

HCV Question

16. Figure shows the graph of velocity versus time for a particle going along the X-axis. Find (a) the acceleration, (b) the distance travelled in 0 to 10 s and (c) the displacement in 0 to 10 s.



17. Figure shows the graph of the *x*-coordinate of a particle going along the X-axis as a function of time. Find (a) the average velocity during 0 to 10 s,
(b) instantaneous velocity at 2, 5, 8 and 12s.

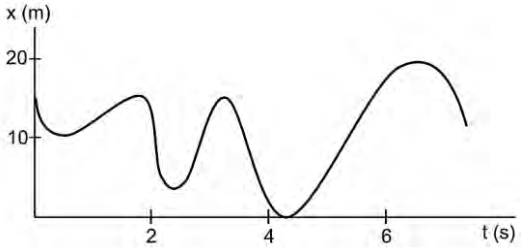


18. A bullet going with speed 350 m/s enters a concrete wall and penetrates a distance of 5.0 cm before coming to rest. Find the deceleration.

19. A particle starting from rest moves with constant acceleration. If it takes 5.0 s to reach the speed 18.0 km/h find (a) the average velocity during this period, and (b) the distance travelled by the particle during this period.

20. A driver takes 0.20 s to apply the brakes after he sees a need for it. This is called the reaction time of the driver. If he is driving a car at a speed of 54 km/h and the brakes cause a deceleration of 6.0 m/s^2, find the distance travelled by the car after he sees the need to put the brakes on.

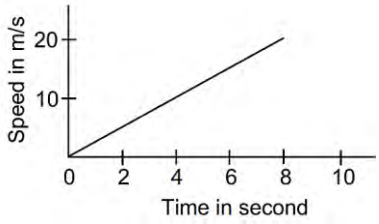
21. Figure shows the position of a particle moving on the X-axis as a function of time.



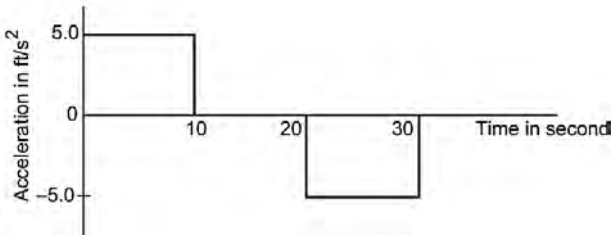
(1) The particle has come to rest 6 times.
(2) The maximum speed is at $t = 6$ s.
(3) The velocity remains positive for $t = 0$ to $t = 6$ s.
(4) The average velocity for the total period shown is negative

22. An athelete takes 2.0 s to reach his maximum speed of 18.0 km/h. What is the magnitude of his average acceleration?

23. The speed of a car as a function of time is shown in figure. Find the distance travelled by the car in 8 seconds and its acceleration.



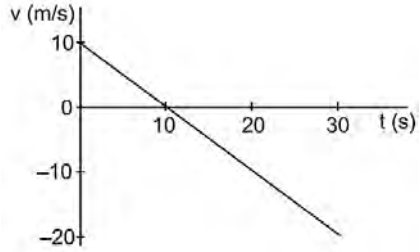
24. The acceleration of a cart started at $t = 0$, varies with time as shown in figure. Find the distance travelled in 30 seconds and draw the position-time graph.



25. The velocity of a particle is zero at $t = 0$.
(1) The acceleration at $t = 0$ must be zero.
(2) The acceleration at $t = 0$ may be zero.
(3) If the acceleration is zero from $t = 0$ to $t = 10$ s, the speed is also zero in this interval.
(4) If the speed is zero from $t = 0$ to $t = 10$ s the acceleration is also zero in this interval.

26. Mark the correct statements:
(1) The magnitude of the velocity of a particle is equal to its speed.
(2) The magnitude of average velocity in an interval is equal to its average speed in that interval.
(3) It is possible to have a situation in which the speed of a particle is always zero but the average speed is not zero.
(4) It is possible to have a situation in which the speed of the particle is never zero but the average speed in an interval is zero.

27. The velocity-time plot for a particle moving on a straight line is shown in the figure.

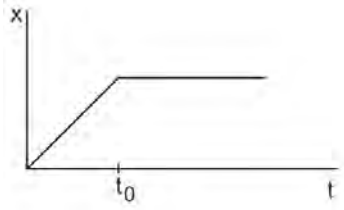


(1) The particle has a constant acceleration.
(2) The particle has never turned around.
(3) The particle has zero displacement.
(4) The average speed in the interval 0 to 10 s is the same as the average speed in the interval 10 s to 20 s.

28. An object may have
(1) varying speed without having varying velocity
(2) varying velocity without having varying speed
(3) nonzero acceleration without having varying velocity
(4) nonzero acceleration without having varying speed

29. Mark the correct statements for a particle going on a straight line:
(1) If the velocity and acceleration have opposite sign, the object is slowing down.
(2) If the position and velocity have opposite sign, the particle is moving towards the origin.
(3) If the velocity is zero at an instant, the acceleration should also be zero at that instant.
(4) If the velocity is zero for a time interval, the acceleration is zero at any instant within the time interval.

30. Figure shows the displacement-time graph of a particle moving on the X-axis.



(1) the particle is continuously going in positive x direction.
(2) the particle is at rest
(3) the velocity increases up to a time t_0, and then becomes constant
(4) the particle moves at a constant velocity up to a time t_0, and then stops.

31. A particle has a velocity u towards east at $t = 0$. Its acceleration is towards west and is constant. Let x_A and x_B be the magnitude of displacements in the first 10 seconds and the next 10 seconds.

(1) $x_A < x_B$
(2) $x_A = x_B$
(3) $x_A > x_B$
(4) the information is insufficient to decide the relation of x_A with x_B.

32. A person travelling on a straight line moves with a uniform velocity v_1 for some time and with uniform velocity v_2 for the next equal time. The average velocity v is given by:

(1) $v = \frac{v_1 + v_2}{2}$
(2) $v = \sqrt{v_1 v_2}$
(3) $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
(4) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$

33. A person travelling on a straight line moves with a uniform velocity v_1 for a distance x and with a uniform velocity v_2 for the next equal distance. The average velocity v is given by:

(1) $v = \frac{v_1 + v_2}{2}$
(2) $v = \sqrt{v_1 v_2}$
(3) $\frac{2}{v} = \frac{1}{v_1} + \frac{1}{v_2}$
(4) $\frac{1}{v} = \frac{1}{v_1} + \frac{1}{v_2}$

Answer Key

1. **(5h/3)**
2. **(4)**
3. $\frac{45}{4}$m
4. **(30)**
5. **(1)**
6. **(2)**
7. **(1)**
8. **(3, 4)**
9. **(a) 36, (b) 60 s**
10. **(1200)**
11. **(A) – (R); (B) – (P); (C) – (S); (D) – (Q)**
12. **20 S**
13. **(2.5 s, 2 m, 0.5 m)**
14. **(4)**
15. **(3)**
16. **(a) 0.6 m/s^2, (b) 50 m, (c) 50 m**
17. **(a) 10 m/s, (b) 20 m/s, zero, 20 m/s, –20 m/s**
18. **100 m, zero**
19. **(a) 2.5 m/s, (b) 12.5 m**
20. **(22 m)**
21. **(1)**
22. **(2.5 m/s^2)**
23. **(80 m, 2.5 m/s^2)**
24. **(1000 ft)**
25. **(2, 3, 4)**
26. **(1)**
27. **(1, 4)**
28. **(2, 4)**
29. **(1, 2, 4)**
30. **(4)**
31. **(4)**
32. **(1)**
33. **(3)**