MOTION IN A STRAIGHT LINE
SET 1

SET 1 – Motion in a Straight Line (50 MCQs)

Q1. Motion in a straight line is also called:
a) Curvilinear motion
b) Rectilinear motion
c) Circular motion
d) Random motion
Answer: b) Rectilinear motion

Q2. Which of the following is a vector quantity?
a) Speed
b) Distance
c) Velocity
d) Path length
Answer: c) Velocity

Q3. Displacement can be:
a) Only positive
b) Only negative
c) Zero, positive or negative
d) Always equal to distance
Answer: c) Zero, positive or negative

Q4. SI unit of displacement is:
a) m/s
b) m/s²
c) m
d) km/h
Answer: c) m

Q5. A particle moves 10 m east and then 6 m west. Its displacement is:
a) 16 m
b) 4 m east
c) 4 m west
d) Zero
Answer: b) 4 m east

Q6. Which of the following is NOT true?
a) Displacement is the shortest distance between initial and final positions.
b) Distance is always greater than or equal to displacement.
c) Speed is always equal to velocity.
d) Velocity is displacement per unit time.
Answer: c) Speed is always equal to velocity.

Q7. If a car goes around a circular track and returns to starting point, its displacement is:
a) Greater than distance
b) Equal to distance
c) Zero
d) Negative
Answer: c) Zero

Q8. The slope of a position-time graph gives:
a) Acceleration
b) Displacement
c) Velocity
d) Distance
Answer: c) Velocity

Q9. The slope of velocity-time graph represents:
a) Displacement
b) Speed
c) Acceleration
d) Distance
Answer: c) Acceleration

Q10. Area under velocity-time graph represents:
a) Acceleration
b) Displacement
c) Speed
d) Time
Answer: b) Displacement

Q11. Instantaneous velocity is defined as:
a) $\Delta x/\Delta t$ for large Δt
b) dx/dt
c) Average velocity
d) Total distance / total time
Answer: b) dx/dt

Q12. If velocity-time graph is a straight line parallel to time axis, then:
a) Acceleration = 0
b) Constant acceleration
c) Increasing acceleration
d) Decreasing acceleration
Answer: a) Acceleration = 0

Q13. Which is always positive?
a) Displacement
b) Distance
c) Velocity
d) Acceleration
Answer: b) Distance

Q14. A body moving with uniform acceleration has initial velocity u, acceleration a. Its velocity after time t is:
a) u + at
b) u – at
c) at – u
d) uat
Answer: a) u + at

Q15. Equation of motion: s=ut+12at2s = ut + \tfrac{1}{2} at^2s=ut+21at2 gives:
a) Displacement
b) Velocity
c) Acceleration
d) Distance only
Answer: a) Displacement

Q16. A car accelerates uniformly from rest to 20 m/s in 5 s. Its acceleration is:
a) 4 m/s²
b) 5 m/s²
c) 2 m/s²
d) 10 m/s²
Answer: a) 4 m/s²

Q17. A body is thrown upward with velocity u. At the highest point:
a) Velocity = u, Acceleration = 0
b) Velocity = 0, Acceleration = g
c) Velocity = g, Acceleration = 0
d) Velocity = 0, Acceleration = 0
Answer: b) Velocity = 0, Acceleration = g

Q18. A ball dropped freely from rest has velocity after t seconds:
a) gt
b) 2gt
c) g/t
d) t/g
Answer: a) gt

Q19. Which of the following is dimensionally correct for displacement?
a) [L]
b) [LT]
c) [LT–1]
d) [LT–2]
Answer: a) [L]

Q20. A train moves with uniform acceleration. If it passes successive points A, B, C in equal intervals of time, then:
a) AB = BC
b) AB < BC
c) AB > BC
d) AB = 2BC
Answer: b) AB < BC

Q21. Stopping distance of a vehicle is proportional to:
a) v
b) v²
c) 1/v
d) 1/v²
Answer: b) v²

Q22. Reaction time of driver is important in:
a) Speed limit rules
b) Traffic signals
c) Road safety (braking distance)
d) Overtaking rule
Answer: c) Road safety (braking distance)

Q23. A body thrown vertically upwards has maximum height given by:
a) u²/2g
b) u/g
c) u²/g
d) u²/4g
Answer: a) u²/2g

Q24. Average velocity of a body is given by:
a) Total displacement / total time
b) dx/dt
c) Total path length / total time
d) Area under v–t graph
Answer: a) Total displacement / total time

Q25. A car covers 120 km in 2 h moving east, then 120 km in 2 h moving west. Its average velocity is:
a) 60 km/h
b) 30 km/h east
c) 0
d) 120 km/h
Answer: c) 0

Q26. The slope of displacement-time graph is negative when:
a) Object is moving away from origin
b) Object is moving towards origin
c) Object is at rest
d) Object is moving with acceleration
Answer: b) Object is moving towards origin

Q27. A body covers equal distances in equal intervals of time. It is in:
a) Non-uniform motion
b) Uniform acceleration
c) Uniform motion
d) Rest
Answer: c) Uniform motion

Q28. The position-time graph of a body at rest is:
a) Straight line parallel to x-axis
b) Straight line parallel to time axis
c) Straight line with positive slope
d) Straight line with negative slope
Answer: a) Straight line parallel to x-axis

Q29. For an object in free fall, velocity after falling through height h is:
a) $\sqrt{(2gh)}$
b) $2gh$
c) gh^2
d) $h/2g$
Answer: a) $\sqrt{(2gh)}$

Q30. If average velocity equals instantaneous velocity, motion must be:
a) Accelerated
b) Non-uniform
c) Uniform
d) Retarded
Answer: c) Uniform

Q31. A velocity-time graph of a particle is a straight line with negative slope. The motion is:
a) Uniformly accelerated
b) Uniformly retarded
c) Uniform
d) Oscillatory
Answer: b) Uniformly retarded

Q32. Area under acceleration-time graph gives:
a) Velocity
b) Displacement
c) Distance
d) Speed
Answer: a) Velocity

Q33. A body moves with velocity v = 5t m/s. Its acceleration is:
a) 5 m/s²
b) t m/s²
c) 10 m/s²
d) Zero
Answer: a) 5 m/s²

Q34. The displacement of a particle is given by x=t2+2tx = t^2 + 2tx=t2+2t. Its initial velocity is:
a) 0
b) 1 m/s
c) 2 m/s
d) 4 m/s
Answer: c) 2 m/s

Q35. A ball is thrown upwards with velocity 20 m/s. Maximum height reached is (g = 10 m/s²):
a) 10 m
b) 20 m
c) 40 m
d) 30 m
Answer: c) 20² / (2×10) = 20 m

Q36. Which of the following situations shows uniform acceleration?
a) A bus moving with constant speed on straight road
b) A car moving in circular track with uniform speed
c) Free fall of a stone
d) A person running 100 m race
Answer: c) Free fall of a stone

Q37. The distance travelled by a freely falling body in 2nd second is:
a) 4.9 m
b) 9.8 m
c) 19.6 m
d) 29.4 m
Answer: b) 9.8 m

Q38. Galileo's law of odd numbers refers to:
a) Time of flight
b) Successive distances travelled in equal time intervals
c) Free fall velocity
d) Acceleration due to gravity
Answer: b) Successive distances travelled in equal time intervals

Q39. The retardation of a car brought to rest from 20 m/s in 4 seconds is:
a) 5 m/s²
b) –5 m/s²
c) –10 m/s²
d) 10 m/s²
Answer: b) –5 m/s²

Q40. A body covers 1st, 2nd, and 3rd second distances of 5 m, 15 m, 25 m. The motion is:
a) Uniform
b) Uniformly accelerated
c) Uniformly retarded
d) Oscillatory
Answer: b) Uniformly accelerated

Q41. Relative velocity of two objects moving in same direction with velocities v_1 and v_2 is:
a) $v_1 + v_2$
b) $v_1 – v_2$
c) $v_2 – v_1$
d) Either (b) or (c) depending on choice of observer
Answer: d) Either (b) or (c) depending on choice of observer

Q42. The displacement of an object in nth second under uniform acceleration is given by:
a) u + (a/2)(2n–1)
b) u + a(n–1/2)
c) u + ½ a (2n–1)
d) u + a(2n–1)
Answer: c) u + ½ a (2n–1)

Q43. If velocity-time graph is a straight line inclined to time axis, acceleration is:
a) Zero
b) Constant
c) Variable
d) Infinite
Answer: b) Constant

Q44. Which is NOT possible for a one-dimensional motion?
a) Particle moves with zero velocity but non-zero acceleration
b) Particle moves with non-zero velocity but zero acceleration
c) Particle moves with both zero velocity and zero acceleration
d) Particle moves with zero velocity and negative displacement
Answer: d) Particle moves with zero velocity and negative displacement

Q45. A car accelerates from 5 m/s to 15 m/s in 5 seconds. Displacement is:
a) 25 m
b) 50 m
c) 100 m
d) 75 m
Answer: d) 75 m

Q46. The average acceleration of a body whose velocity changes from 5 m/s to 25 m/s in 4 s is:
a) 5 m/s^2
b) 6 m/s^2
c) 7.5 m/s^2
d) 10 m/s^2
Answer: c) 5 m/s^2

Q47. A body moves with displacement x=4t2x = 4t^2x=4t2. At t = 2 s, velocity is:
a) 4 m/s
b) 8 m/s
c) 12 m/s
d) 16 m/s
Answer: d) 16 m/s

Q48. A police van moves with 30 km/h and fires a bullet at a car moving with 192 km/h ahead. If muzzle speed is 150 m/s, bullet's velocity relative to car is:
a) 100 m/s
b) 120 m/s
c) 150 m/s
d) 80 m/s
Answer: a) 100 m/s

Q49. The speed-time graph of a body is a horizontal straight line parallel to x-axis. The body is moving with:
a) Constant velocity
b) Variable velocity
c) Uniform acceleration
d) Increasing acceleration
Answer: a) Constant velocity

Q50. Which equation is NOT a kinematic equation of uniformly accelerated motion?
a) $v = u + at$
b) $s = ut + \frac{1}{2} at^2$
c) $v^2 = u^2 + 2as$
d) $s = (u + v)/2t^2$
Answer: d) $s = (u + v)/2t^2$