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# Physics Grade 9 — Chapter 2

Kinematics

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*Independent practice MCQs from the supplied Class 9 Physics notes pack. Total: 50 questions. Each item has four options, the correct letter, and a short explanation.*

## A. Important / Main Topics

**1. The study of motion without considering its causes is called:**

(A) Kinematics
(B) Dynamics
(C) Mechanics
(D) Statics

**Correct Answer: A**

*Explanation: The text states that kinematics is the study of motion without considering its causes.*

**2. An object is said to be at rest if it:**

(A) Changes its position with time relative to an observer
(B) Does not change its position with time relative to an observer
(C) Moves in a straight line
(D) Moves in a circle

**Correct Answer: B**

*Explanation: The text states that if an object does not change its position with time relative to an observer, it is at rest.*

**3. The motion of a free-falling apple is an example of:**

(A) Rotatory motion
(B) Circular motion
(C) Rectilinear motion
(D) Vibratory motion

**Correct Answer: C**

*Explanation: A falling apple moves in a straight line, which is rectilinear motion (a type of translatory motion).*

**4. The length of the path traveled between two positions is called:**

(A) Displacement
(B) Speed
(C) Velocity
(D) Distance

**Correct Answer: D**

*Explanation: The text defines distance as the length of the path traveled between two positions.*

**5. Displacement is a:**

(A) Vector quantity
(B) Scalar quantity
(C) Base quantity
(D) Derived quantity

**Correct Answer: A**

*Explanation: The text states that displacement has direction and is a vector quantity.*

**6. The SI unit of speed is:**

(A) Metre (m)
(B) Metre per second (m/s)
(C) Second (s)

(D) Newton (N)

**Correct Answer: B**

*Explanation: The text states that the SI unit of speed is metre per second (m/s).*

**7. The rate of change of velocity is called:**

(A) Speed
(B) Displacement
(C) Acceleration
(D) Distance

**Correct Answer: C**

*Explanation: Acceleration is defined as the rate of change of velocity with respect to time.*

**8. The acceleration due to gravity near the Earth's surface is approximately:**

(A) $9.8\text{ m/s}$
(B) $9.8\text{ N}$
(C) $9.8\text{ kg}$
(D) $9.8\text{ m/s}^2$

**Correct Answer: D**

*Explanation: The value of $g$ is approximately $9.8\text{ m/s}^2$ near the Earth's surface.*

**9. The slope of a distance-time graph gives:**

(A) Speed
(B) Acceleration
(C) Distance
(D) Time

**Correct Answer: A**

*Explanation: The text states that the gradient (slope) of a distance-time curve gives speed.*

**10. The area under a speed-time graph gives:**

(A) Speed
(B) Distance
(C) Acceleration
(D) Time

**Correct Answer: B**

*Explanation: The text states that the area under a speed-time graph represents the distance traveled.*

**11. Which of the following is a vector quantity?**

(A) Distance
(B) Speed
(C) Displacement
(D) Mass

**Correct Answer: C**

*Explanation: Displacement is a vector because it has both magnitude and direction.*

**12. The motion of a spinning top is an example of:**

(A) Translatory motion
(B) Vibratory motion
(C) Random motion
(D) Rotatory motion

**Correct Answer: D**

*Explanation: A spinning top rotates around its own axis, which is rotatory motion.*

**13. The motion of a swinging pendulum is an example of:**

(A) Vibratory motion
(B) Translatory motion
(C) Rotatory motion

(D) Circular motion

**Correct Answer: A**

*Explanation: A pendulum moves back and forth about a mean position, which is vibratory motion.*

**14. When an object moves with uniform velocity, its acceleration is:**

(A) Positive
(B) Zero
(C) Negative
(D) Infinite

**Correct Answer: B**

*Explanation: Uniform velocity means constant velocity, so there is no change in velocity, and acceleration is zero.*

**15. A ball is thrown straight up. At the top of its path, the magnitude of its acceleration is:**

(A) Zero
(B) $4.9\text{ m/s}^2$
(C) $9.8\text{ m/s}^2$
(D) $19.6\text{ m/s}^2$

**Correct Answer: C**

*Explanation: At the top of its path, the ball momentarily stops, but the acceleration due to gravity is still acting on it ($g = 9.8\text{ m/s}^2$ downward).*

**16. A person walks 3 km East and then 4 km North. What is the total distance traveled?**

(A) 5 km
(B) 1 km
(C) 12 km
(D) 7 km

**Correct Answer: D**

*Explanation: Distance is the total path length, so $3\text{ km} + 4\text{ km} = 7\text{ km}$.*

**17. A person walks 3 km East and then 4 km North. What is the magnitude of their displacement?**

(A) 5 km
(B) 7 km
(C) 1 km
(D) 12 km

**Correct Answer: A**

*Explanation: Displacement is the straight-line distance from start to finish. Using the Pythagorean theorem, $\sqrt{3^2 + 4^2} = 5\text{ km}$.*

**18. A car travels 70 km in 1 hour. Its speed is:**

(A) 70 m/s
(B) 70 km/h
(C) 35 km/h
(D) 140 km/h

**Correct Answer: B**

*Explanation: The text uses this example to calculate speed as $70\text{ km} / 1\text{ hr} = 70\text{ km/hr}$.*

**19. For straight-line motion in one direction, the magnitude of velocity is:**

(A) Greater than speed
(B) Less than speed
(C) Equal to speed
(D) Zero

**Correct Answer: C**

*Explanation: The text states that for straight-line motion in one direction, speed and velocity have the same magnitudes.*

**20. A car is moving at a constant speed of 60 km/h around a circular track. Its velocity is:**

(A) Constant
(B) Zero
(C) Equal to its speed
(D) Continuously changing

**Correct Answer: D**

*Explanation: Since the direction of motion is continuously changing, the velocity is continuously changing, even though the speed is constant.*

**21. The average speed is defined as:**

(A) Total distance divided by total time
(B) Total displacement divided by total time
(C) Total time divided by total distance
(D) Total distance multiplied by total time

**Correct Answer: A**

*Explanation: The text defines average speed as the total distance covered in total time, $V_{\text{ave}} = s / t$.*

**22. If a car travels 300 km in 5 hours, its average speed is:**

(A) 50 km/h
(B) 60 km/h
(C) 70 km/h
(D) 1500 km/h

**Correct Answer: B**

*Explanation: If a car travels 300 km in 5 hours, its average speed is 60 km/h.*

**23. The speed of an object at a specific instant of time is called:**

(A) Average speed
(B) Uniform speed
(C) Instantaneous speed
(D) Variable speed

**Correct Answer: C**

*Explanation: The text defines instantaneous speed as the speed at any specific instant of time.*

**24. A body in uniform circular motion has:**

(A) Constant velocity
(B) Zero acceleration
(C) Constant displacement
(D) Variable velocity

**Correct Answer: D**

*Explanation: The direction of motion is continuously changing, so the velocity is variable.*

**25. The area under a speed-time graph for an object moving with constant speed is represented by a:**

(A) Rectangle
(B) Triangle
(C) Circle
(D) Parabola

**Correct Answer: A**

*Explanation: The text states that for constant speed, the graph is a horizontal line, and the area under it is a rectangle (Area = $v \times t$).*

## B. Less Important / Secondary Topics

**26. A car accelerates from rest at $2\text{ m/s}^2$ for 5 seconds. Its final speed is:**

(A) $10\text{ m/s}$
(B) $2\text{ m/s}$
(C) $20\text{ m/s}$
(D) $15\text{ m/s}$

**Correct Answer: A**

*Explanation: A car accelerates from rest at $2\text{ m/s}^2$ for 5 seconds. Its final speed is $10\text{ m/s}$.*

**27. A cyclist increases speed from $5\text{ km/h}$ to $7\text{ km/h}$ in 10 s. The acceleration is approximately:**

(A) $0.55\text{ m/s}^2$
(B) $0.055\text{ m/s}^2$
(C) $5.5\text{ m/s}^2$
(D) $55\text{ m/s}^2$

**Correct Answer: B**

*Explanation: A cyclist increases speed from $5\text{ km/h}$ to $7\text{ km/h}$ in 10 s. The acceleration is approximately $0.055\text{ m/s}^2$.*

**28. A ball is dropped from a tower and reaches the ground in 4 s. The speed of impact is:**

(A) $0\text{ m/s}$
(B) $2.45\text{ m/s}$
(C) $39.2\text{ m/s}$
(D) $19.6\text{ m/s}$

**Correct Answer: C**

*Explanation: A ball is dropped from a tower and reaches the ground in 4 s. The speed of impact is $39.2\text{ m/s}$.*

**29. When the slope of a body's displacement-time graph increases, the body is moving with:**

(A) Decreasing velocity
(B) Constant velocity
(C) Zero velocity
(D) Increasing velocity

**Correct Answer: D**

*Explanation: The slope of a displacement-time graph represents velocity. If the slope is increasing, the velocity is increasing.*

**30. A ball is thrown straight up. What is the magnitude of acceleration at the top of its path?**

(A) $9.8\text{ m/s}^2$
(B) Zero
(C) $4.9\text{ m/s}^2$
(D) $19.6\text{ m/s}^2$

**Correct Answer: A**

*Explanation: At the top of its path, the ball momentarily stops, but the acceleration due to gravity is still acting on it.*

**31. The motion of a butterfly is an example of:**

(A) Rectilinear motion
(B) Random motion
(C) Circular motion
(D) Rotatory motion

**Correct Answer: B**

*Explanation: A butterfly moves with no specific path, which is random motion.*

**32. Which of the following is true about the motion of a satellite in a circular orbit?**

(A) Its speed is constant and velocity is constant.
(B) Its speed is changing but velocity is constant.
(C) Its speed is constant but velocity is changing.
(D) Both speed and velocity are changing.

**Correct Answer: C**

*Explanation: In a circular orbit, the speed is constant, but the direction (and thus velocity) is continuously changing.*

**33. A car travels a curvy track of length 800 m in 40 s. The straight path between start and end is 600 m, covered in 36 s. The average speed for the curvy track is:**

(A) $16.67\text{ m/s}$
(B) $15\text{ m/s}$
(C) $25\text{ m/s}$
(D) $20\text{ m/s}$

**Correct Answer: D**

*Explanation: A car travels a curvy track of length 800 m in 40 s. The straight path between start and end is 600 m, covered in 36 s. The average speed for the curvy track is $20\text{ m/s}$.*

**34. For the same car in MCQ 33, the magnitude of average velocity along the straight path is:**

(A) $16.67\text{ m/s}$
(B) $20\text{ m/s}$
(C) $15\text{ m/s}$
(D) $25\text{ m/s}$

**Correct Answer: A**

*Explanation: For the same car in MCQ 33, the magnitude of average velocity along the straight path is $16.67\text{ m/s}$.*

**35. A cheetah accelerates from rest to $26.8\text{ m/s}$ in 3 s. Its acceleration is:**

(A) $26.8\text{ m/s}^2$
(B) $9.93\text{ m/s}^2$
(C) $3\text{ m/s}^2$
(D) $80.4\text{ m/s}^2$

**Correct Answer: B**

*Explanation: A cheetah accelerates from rest to $26.8\text{ m/s}$ in 3 s. Its acceleration is $9.93\text{ m/s}^2$.*

**36. A body moves 4 km North, then 3 km East, then 4 km South. The magnitude of its total displacement is:**

(A) 11 km
(B) 5 km
(C) 3 km
(D) 7 km

**Correct Answer: C**

*Explanation: The North and South displacements cancel ($4 - 4 = 0$). The net displacement is 3 km East. Magnitude = 3 km.*

**37. A ball is thrown upward with a speed of $20\text{ m/s}$. How long does it take to reach the top? (Take $g = 10\text{ m/s}^2$)**

(A) $1\text{ s}$
(B) $3\text{ s}$
(C) $4\text{ s}$
(D) $2\text{ s}$

**Correct Answer: D**

*Explanation: "$2\text{ s}$" is correct: it matches the idea asked in the question ("A ball is thrown upward with a speed of $20\text{ m/s}$. How long does it take to reach the top? (Take $g = 10\text{ m/s}^2$)"), while the other choices do not.*

**38. A car moves at a constant speed of $15\text{ m/s}$ for $10\text{ s}$. What distance does it cover?**

(A) $150\text{ m}$
(B) $100\text{ m}$
(C) $200\text{ m}$
(D) $250\text{ m}$

**Correct Answer: A**

*Explanation: $150\text{ m}$ — this correctly answers the question.*

**39. A car decelerates from $20\text{ m/s}$ to rest in $5\text{ s}$. Its deceleration is:**

(A) $-2\text{ m/s}^2$

(B) $-4\text{ m/s}^2$
(C) $-5\text{ m/s}^2$
(D) $-10\text{ m/s}^2$

**Correct Answer: B**

*Explanation: A car decelerates from $20\text{ m/s}$ to rest in $5\text{ s}$. Its deceleration is $-4\text{ m/s}^2$.*

**40. A ball dropped from rest reaches a speed of $29.4\text{ m/s}$. How long did it take? (Take $g = 9.8\text{ m/s}^2$)**

(A) $2\text{ s}$
(B) $4\text{ s}$
(C) $3\text{ s}$
(D) $5\text{ s}$

**Correct Answer: C**

*Explanation: "$3\text{ s}$" is correct: it matches the idea asked in the question ("A ball dropped from rest reaches a speed of $29.4\text{ m/s}$. How long did it take? (Take $g = 9.8\text{ m/s}^2$)"), while the other choices do not.*

**41. A cyclist moves at $5\text{ m/s}$ for $4\text{ s}$ and then at $10\text{ m/s}$ for $6\text{ s}$. What is the total distance covered?**

(A) $60\text{ m}$
(B) $100\text{ m}$
(C) $120\text{ m}$
(D) $80\text{ m}$

**Correct Answer: D**

*Explanation: $80\text{ m}$ — this correctly answers the question.*

**42. A car accelerates from rest at $2\text{ m/s}^2$ for $5\text{ s}$. Its final speed is:**

(A) $10\text{ m/s}$
(B) $5\text{ m/s}$
(C) $15\text{ m/s}$
(D) $20\text{ m/s}$

**Correct Answer: A**

*Explanation: A car accelerates from rest at $2\text{ m/s}^2$ for $5\text{ s}$. Its final speed is $10\text{ m/s}$.*

**43. A body starts from rest and moves with uniform acceleration. Its velocity after time $t$ is $v$. The distance covered in time $t$ is:**

(A) $vt$
(B) $\frac{1}{2}vt$
(C) $2vt$
(D) $v^2t$

**Correct Answer: B**

*Explanation: For uniform acceleration starting from rest, average velocity = $v/2$. Distance = average velocity × time = $\frac{1}{2}vt$.*

**44. A train moving at $20\text{ m/s}$ applies brakes and comes to rest in $10\text{ s}$. The distance traveled during braking is:**

(A) $50\text{ m}$
(B) $200\text{ m}$
(C) $100\text{ m}$
(D) $400\text{ m}$

**Correct Answer: C**

*Explanation: A train moving at $20\text{ m/s}$ applies brakes and comes to rest in $10\text{ s}$. The distance traveled during braking is $100\text{ m}$.*

**45. A body is thrown vertically upward with a velocity of $19.6\text{ m/s}$. The maximum height reached is:**

(A) $9.8\text{ m}$

(B) $39.2\text{ m}$
(C) $78.4\text{ m}$
(D) $19.6\text{ m}$

**Correct Answer: D**

*Explanation: Using $v^2 = u^2 - 2gh$ with $v = 0$: $0 = (19.6)^2 - 2 \times 9.8 \times h \implies h = \frac{384.16}{19.6} = 19.6\text{ m}$.*

**46. A car starts from rest and accelerates uniformly at $4\text{ m/s}^2$ for $5\text{ s}$. The distance covered is:**

(A) $50\text{ m}$
(B) $20\text{ m}$
(C) $40\text{ m}$
(D) $100\text{ m}$

**Correct Answer: A**

*Explanation: Using $s = ut + \frac{1}{2}at^2$ with $u = 0$: $s = 0 + \frac{1}{2} \times 4 \times 5^2 = 50\text{ m}$.*

**47. Which of the following statements about a body in uniform circular motion is correct?**

(A) Its speed and velocity are both constant.
(B) Its speed is constant, but velocity changes.
(C) Its speed changes, but velocity is constant.
(D) Both speed and velocity change.

**Correct Answer: B**

*Explanation: In uniform circular motion, the speed (magnitude of velocity) is constant, but the direction of motion is continuously changing, so velocity changes.*

**48. A stone is dropped from a height of $20\text{ m}$. The time it takes to reach the ground is: (Take $g = 10\text{ m/s}^2$)**

(A) $1\text{ s}$
(B) $3\text{ s}$
(C) $2\text{ s}$
(D) $4\text{ s}$

**Correct Answer: C**

*Explanation: "$2\text{ s}$" is correct: it matches the idea asked in the question ("A stone is dropped from a height of $20\text{ m}$. The time it takes to reach the ground is: (Take $g = 10\text{ m/s}^2$)"), while the other choices do not.*

**49. A body moves along a circular path of radius $r$. The distance traveled in one complete revolution is:**

(A) $r$
(B) $2r$
(C) $\pi r$
(D) $2\pi r$

**Correct Answer: D**

*Explanation: The circumference of a circle (the distance around the circle) is $2\pi r$. This is the distance traveled in one complete revolution.*

**50. Which of the following is true about the motion of a body under free fall?**

(A) Its acceleration is constant.
(B) Its acceleration increases with time.
(C) Its acceleration decreases with time.
(D) Its acceleration is zero.

**Correct Answer: A**

*Explanation: In free fall, the acceleration due to gravity is constant (approximately $9.8\text{ m/s}^2$ downward), assuming air resistance is negligible.*