1. Which statement correctly distinguishes rest and motion for a body?
   A. Rest or motion is absolute and does not depend on anything
   B. Rest or motion depends on the chosen frame of reference
   C. A body at rest in one frame must be at rest in all frames
   D. A body in motion cannot appear at rest to any observer (B)

Explanation : Rest and motion are defined with respect to a frame of reference; the same body can be at rest in one frame and in motion in another.

2. What is a frame of reference?
   A. The shortest path between two points
   B. A device that measures instantaneous speed
   C. A system used to specify the position of an observer or object
   D. A graphical method for plotting velocity (C)

Explanation: A frame of reference is the coordinate system or setup used to determine positions and describe motion.

3. Which example best represents one-dimensional (1-D) motion?
   A. A kite flying in a windy sky
   B. A car moving along a zig-zag path
   C. A car moving on a straight road
   D. A stone orbiting Earth (C)

Explanation: 1-D motion occurs along a straight line; a car on a straight road fits this description.

4. Which statement about distance and displacement is correct?
   A. Distance can be negative
   B. Displacement is always positive
   C. Displacement may be positive, negative, or zero
   D. Distance is a vector quantity (C)

Explanation : Displacement (a vector) can have positive, negative, or zero value; distance (a scalar) is always non-negative.

5. A body travels 4 m east and then 3 m north. What is the magnitude of its displacement?
   A. 3 m B. 4 m
   C. 5 m D. 7 m (C)

Explanation: The path forms a right triangle: $\sqrt{4^2 + 3^2} = \sqrt{25} = 5$m

6. The numerical ratio displacement/distance is always
   A. greater than one
   B. less than one
   C. equal to one only
   D. equal to or less than one (D)

Explanation: The magnitude of displacement cannot exceed distance, so the ratio is ≤ 1.

7. Which of the following can be negative for a moving body?
   A. Speed
   B. Distance
   C. Velocity
   D. Path length (C)

Explanation: Velocity is a vector and can be positive, zero, or negative depending on direction; speed and distance are non-negative scalars.

8. The instantaneous speed v of a particle with position x(t) is given by
   A. $v=\Delta x/\Delta t$ only for large Δt
   B. $v=d^2x/dt^2$
   C. $v=dx/dt$
   D. $v=dt/dx$ (C)

Explanation: Instantaneous speed/velocity is the time derivative of position: $v=dx/dt$.

9. A car covers half the distance at 40 km/h and the remaining half at 60 km/h. What is its average speed (km/h)?
   A. 40
   B. 45
   C. 48
   D. 50 (C)

Explanation: or equal distances, average speed is the harmonic mean:
$v_{avg}=2v_1v_2/v_1+v_2=2\cdot40\cdot60/40+60=48$ km/h.

10. A particle's position is x = 3t ^ 2 + 2t + 1 (in metres). Its speed at f1s is
    A. 3 m/s
    B. 5 m/s
    C. 6 m/s
    D. 8 m/s (D)

Explanation : v= dx/dt= 6t+2; v(1)= 6(1) +2 8 m/s