

Class - XI Physics
Chapter - 3
Motion in a Straight Line
Module - 2 Worksheet

Each question carries 3 marks

- 1) The position of an object moving along x-axis is given by $x = a + bt^2$ where $a = 8.5 \text{ m}$, $b = 2.5 \text{ m s}^{-2}$ and t is measured in seconds. What is its velocity at $t = 0 \text{ s}$ and $t = 2.0 \text{ s}$. What is the average velocity between $t = 2.0 \text{ s}$ and $t = 4.0 \text{ s}$?
- 2) A ball is thrown vertically upwards with a velocity of 20 m s^{-1} from the top of a multistorey building. The height of the point from where the ball is thrown is 25.0 m from the ground. (a) How high will the ball rise ? and (b) how long will it be before the ball hits the ground? Take $g = 10 \text{ m s}^{-2}$.
- 3) A woman starts from her home at 9.00 am, walks with a speed of 5 km h^{-1} on a straight road up to her office 2.5 km away, stays at the office up to 5.00 pm, and returns home by an auto with a speed of 25 km h^{-1} . Choose suitable scales and plot the x-t graph of her motion.
- 4) A drunkard walking in a narrow lane takes 5 steps forward and 3 steps backward, followed again by 5 steps forward and 3 steps backward, and so on. Each step is 1 m long and requires 1 s . Plot the x-t graph of his motion. Determine graphically and otherwise how long the drunkard takes to fall in a pit 13 m away from the start.
- 5) A car moving along a straight highway with speed of 126 km h^{-1} is brought to a stop within a distance of 200 m . What is the retardation of the car (assumed uniform), and how long does it take for the car to stop?
- 6) Two trains A and B of length 400 m each are moving on two parallel tracks with a uniform speed of 72 km h^{-1} in the same direction, with A ahead of B. The driver of B decides to overtake A and accelerates by 1 m s^{-2} . If after 50 s , the guard of B just brushes past the driver of A, what was the original distance between them?
- 7) On a two-lane road, car A is travelling with a speed of 36 km h^{-1} . Two cars B and C approach car A in opposite directions with a speed of 54 km h^{-1} each. At a certain instant, when the distance AB is equal to AC, both being 1 km , B decides to overtake A before C does. What minimum acceleration of car B is required to avoid an accident?

- 8) Two towns A and B are connected by a regular bus service with a bus leaving in either direction every T minutes. A man cycling with a speed of 20 km h^{-1} in the direction A to B notices that a bus goes past him every 18 min in the direction of his motion, and every 6 min in the opposite direction. What is the period T of the bus service and with what speed (assumed constant) do the buses ply on the road?
- 9) A player throws a ball upwards with an initial speed of 29.4 m s^{-1} .
- (a) What is the direction of acceleration during the upward motion of the ball?
 - (b) What are the velocity and acceleration of the ball at the highest point of its motion?
 - (c) Choose the $x = 0 \text{ m}$ and $t = 0 \text{ s}$ to be the location and time of the ball at its highest point, vertically downward direction to be the positive direction of x -axis, and give the signs of position, velocity and acceleration of the ball during its upward, and downward motion.
 - (d) To what height does the ball rise and after how long does the ball return to the player's hands? (Take $g = 9.8 \text{ m s}^{-2}$ and neglect air resistance).
- 10) A man walks on a straight road from his home to a market 2.5 km away with a speed of 5 km h^{-1} . Finding the market closed, he instantly turns and walks back home with a speed of 7.5 km h^{-1} . What is the
- (a) magnitude of average velocity, and
 - (b) average speed of the man over the interval of time (i) 0 to 30 min, (ii) 0 to 50 min, (iii) 0 to 40 min ?
