

Chapter-2

Motion in a Straight Line

1. Sameer went on his bike from Delhi to Gurgaon at a speed of 60km/hr and came back at a speed of 40km/hr. What is his average speed for the entire journey?
2. Displacement of a particle is given by the expression  $2x^3 - 7t - 9 = 0$ , where x is in meters and t is in seconds. What is acceleration?
3. A particle is thrown upwards. It attains a height (h) after 5 seconds and again after 9s comes back. What is the speed of the particle at a height h?
4. A balloon is ascending at the rate of 4.9m/s. A packet is dropped from the balloon when situated at a height of 245m. How long does it take the packet to reach the ground? What is its final velocity?
5. A car moving on a straight highway with speed of 126km/hr. is brought to a stop within a distance of 200m. What is the retardation of the car (assumed uniform) and how long does it take for the car to stop?
6. A particle is moving along a straight line and its position is given by the relation  $x = 3t^2 - 6t + 15$  m. Find (a) The time at which velocity is zero. (b) Position and displacement of the particle at that point. (c) Acceleration
7. Two trains A and B of length 400 m each are moving on two parallel tracks with a uniform speed of 72 km / hr in the same direction, with A ahead of B. The driver of B decides to overtake A and accelerates by  $2 \text{ m/s}^2$ . If after 50 s, the guard of B just brushes past the driver of A, what was the original distance between them?
8. Draw displacement time graph for a uniformly accelerated motion? What is its shape
9. The displacement x of a particle moving in one dimension under the action of constant force is related to the time by the equation  $x = 3t^2 - 6t + 15$  where x is in meters and t is in seconds. Find the velocity of the particle at (1)  $t = 3\text{s}$  (2)  $t = 6\text{s}$ .
10. A boy standing on a stationary lift (open from above) throws a ball upwards with the maximum initial speed he can, equal to  $49 \text{ m/s}$ . How much time does the ball take to return to his hands? If the lift starts moving up with a uniform speed of  $5 \text{ m/s}$  and the boy again throws the ball up with the maximum speed he can, how long does the ball take to return to his hands?