# Motion-Assignment 1

1. (a) Identify the kind of motion in the following cases:
    (i)   A car moving with constant speed turning around a curve.
    (ii) An electron orbitting around nucleus.
    (b) An artificial satellite is moving in a circular orbit of radius 36,000 km. Calculate its speed if it takes 24 hours to revolve around the earth.

2. (a) Define average speed.
    (b) A bus travels a distance of 120 km with a speed of 40 km/h and returns with a speed of 30 km/h. Calculate the average speed for the entire journey.

3. Define uniform and non-uniform motion. Write one example for each.

4. What does the odometer of an automobile measure? Which of the following is moving faster? Justify your answer.
    (i) A scooter moving with a speed of 300 m per I minute.
    (ii) A car moving with a speed of 36 km per hour.

5. A car travels from stop A to stop B with a speed of 30 km/h and then returns back to A with a speed of 50 km/h. Find
    (i) displacement of the car.
    (ii) distance travelled by the car.
    (iii) average speed of the car.

6. Velocity-time graph for the motion of an object in a straight path is a straight line parallel to the time axis.
    (a) Identify the nature of motion of the body.
    (b) Find the acceleration of the body.
    (c) Draw the shape of distance-time graph for this type of motion.

7. Draw the shape of the distance-time graph for uniform and non-uniform motion of object. A bus of starting from rest moves with uniform acceleration of 0.1 ms^{-2} for 2 minutes. Find
    (a) the speed acquired.
    (b) the distance travelled.

8. (a) Define uniform acceleration. What is the acceleration of a body moving with uniform velocity?
    (b) A particle moves over three quarters of a circle of radius r. What is the magnitude of its displacement?

9. A bus accelerates uniformly from 54 km/h to 72 km/h in 10 seconds Calculate
    (i) acceleration in m/s^2
    (ii) distance covered by the bus in metres during this interval.

10. A car moves with a speed of 30 km/h^{-1} for half an hour, 25 km/h^{-1} for one hour and 40 km/h^{-1} for two hours. Calculate the average speed of the car.

11. Derive the equation for velocity-time relation ($v = u + at$) by graphical method.

12. A car is travelling at 20 km/h, it speeds upto 60 km/h in 6 seconds. What is its acceleration?

13. A car accelerates from 6 ms^{-1} 16 ms^{-1} in 10 sec. Calculate
    (a) the acceleration and
    (b) the distance covered by the car in that time.

14. A circular track has a circumference of 3140 m with AB as one of its diameter. A scooterist moves from A to B alone the circular path with a uniform speed of 10 m/s. Find
    (a) distance covered by the scooterist,
    (b) displacement of the scooterist, and
    (c) time taken by the scooterist in reaching from A to B.

15. (a) Differentiate between uniform linear and uniform circular motion.
    (b) Write any four examples of uniform circular motion.
    (c) Is uniform circular motion accelerated motion?

16. (a) Differentiate between speed and velocity.
    (b) When is a body said to have uniform velocity?
    (c) How can we describe the position of an object?
    Illustrate with suitable example.

17. The graph given alongside shows how the speed of a car changes with time.
   (i) What is the initial speed of the car?
   (ii) What is the maximum speed attained by the car?
   (iii) Which part of the graph shows zero acceleration?
   (iv) Which part of the graph shows varying retardation?
   (v) Find the distance travelled in first 8 hours.
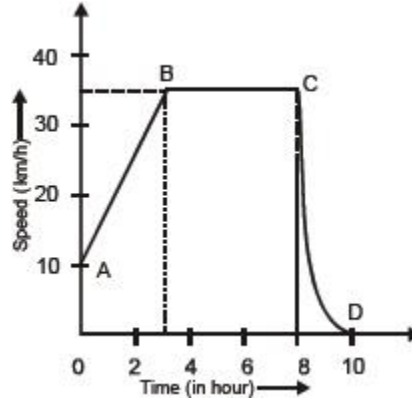
18. Study the velocity-time graph and calculate.
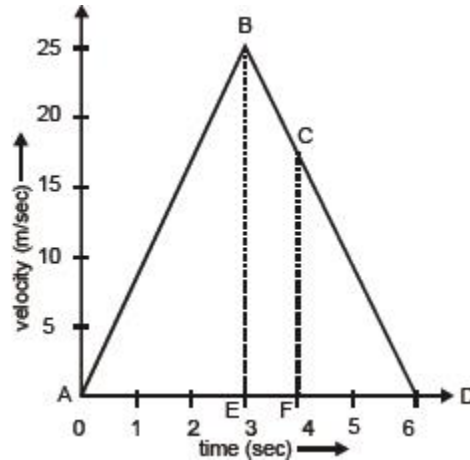
   (a) The acceleration from A to B
   (b) The acceleration from B to C
   (c) The distance covered in the region ABE
   (d) The average velocity from C to D
   (e) The distance covered in the region BCFE

19. The following table gives the data about motion of a car.

Time (h)	11.00	11.30	12.00	12.30	1.00
Distance (km)	0	30	30	65	100

Plot the graph.
   (i) Find the speed of the car between 12.00 hours and 12.30 hours.
   (ii) What is the average speed of the car?
   (iii) Is the car's motion an example of uniform motion? Justify.

20. (a) Derive the equation of motion v = u +at, using graphical method.
   (b) A train starting from rest attains a velocity of 72 km/h in 5 minutes. Assuming the acceleration is uniform, find
   (i) the acceleration.
   (ii) the distance travelled by the train for attaining this velocity.