

SCIENTRIX ACADEMY, BANGALORE

Class test

Example 1.4: On a coordinate system (showing all the four quadrants) show the following vectors:

$$\mathbf{A} = 4\hat{i} + 0\hat{j}, \mathbf{B} = 0\hat{i} + 5\hat{j}, \mathbf{C} = 4\hat{i} + 5\hat{j},$$
$$\mathbf{D} = 6\hat{i} - 4\hat{j}.$$

Find their magnitudes and directions.

Example 2.1 : The position of an object moving along the x -axis is defined as $x = 20t^2$, where t is the time measured in seconds and position is expressed in metres. Calculate the average velocity of the object over the time interval from 3s to 4s.

Example 2.2 : A person runs on a 300m circular track and comes back to the starting point in 200s. Calculate the average speed and average velocity.

Example 2.3 : A train A is moving on a straight track (or railway line) from North to South with a speed of 60km h^{-1} . Another train B is moving from South to North with a speed of 70km h^{-1} . What is the velocity of B relative to the train A?

Example 2.4 : The velocity of a car moving towards the East increases from 0 to 12ms^{-1} in 3.0 s. Calculate its average acceleration.

Example 2.5 : The position - time graphs of two bodies A and B are shown in Fig. 2.4. Which of these has greater velocity?

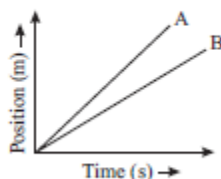


Fig. 2.4 : Position-time graph of bodies A and B

Example 2.6 : The position - time graph for the motion of an object for 20 seconds is shown in Fig. 2.6. What distances and with what speeds does it travel in time intervals (i) 0 s to 5 s, (ii) 5 s to 10 s, (iii) 10 s to 15 s and (iv) 15 s to 17.5 s? Calculate the average speed for this total journey.

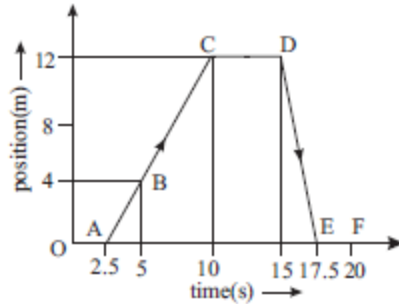


Fig. 2.6: Position-time graph

Example 2.7 : The velocity-time graphs for three different bodies A,B and C are shown in Fig. 2.11.

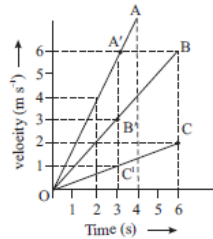


Fig. 2.11 : Velocity-time graph of uniformly accelerated motion of three different bodies

- (i) Which body has the maximum acceleration and how much?
- (ii) Calculate the distances travelled by these bodies in first 3s.
- (iii) Which of these three bodies covers the maximum distance at the end of their journey?
- (iv) What are the velocities at $t = 2s$?