

QB365 Question Bank Software

11 physics case study questions Motion in a Straight Line for -2024

11th Standard

Physics

SECTION - A

2 x 4 = 8

1) It must be clearly understood that distance is not the same as displacement. Distance is a scalar quantity and is given by the total length of the path travelled by the body in a certain interval of time. Displacement is a vector quantity and is given by the shortest distance (in a specified direction) between the initial and the final positions of the body. The direction of the displacement vector is from the initial position to the final position of the motion. Speed IS a scalar quantity. The average speed and average velocity are different in many respect. The direction of the velocity vector is the same as that of the displacement vector. Acceleration is defined as the rate of change of velocity and it is a vector quantity.

(i) Mention a condition when displacement and distance are both equal.

(ii) Define average speed and average velocity.

(iii) Draw position-time graph of uniform accelerated motion.

(iv) What does the area under velocity-time graph and time axis signifies?

(v) What does the slope of position-time graph and velocity-time graph represent at any instant?

(vi) Mention a condition when body is at rest but still it has acceleration.

(vii) A body is moving in circular parth with uniform speed. What is the acceleration and average velocity during one complete revolution?

Answer : (i) When a body is moving in straight line in a specific direction then both displacement and distance would be equal in magnitude.

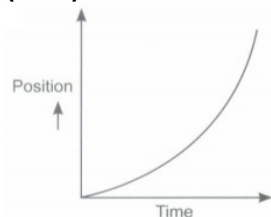
(ii) Average speed is the average distance travelled per unit time

$$\text{OR } v = \frac{\text{total distance travelled}}{\text{total time taken}}$$

Average velocity is the average displacement covered per unit time. It is a vector quantity.

$$\bar{v} = \frac{\text{net displacement}}{\text{time taken}}$$

(iii)



(iv) Area under velocity-time graph and time axis is the measure of displacement in that particular interval of time.

(v) Slope of Position-time at any instant represent instantaneous velocity while that of velocity-time represent instantaneous acceleration.

(vi) A body thrown upward then at highest point body comes to rest momentarily but still acceleration is acrtng downward.

(vii) During one complete revolution average displacement and velocity is zero while acceleration is acting radially toward the center of circular path.

2) Kinematics is the branch of mechanics which deals with the study of motion of material objects without taking into account the factors affecting the motion. Rest and motion are relative concept and nothing is absolute. The Position of the object at a given instant of time is described in terms of position coordinates. The coordinate system along with a clock constitutes a frame of reference. Frame of reference can be of two types viz: inertial frame of reference and non-inertial frame of reference. When position of body change in a frame of reference, it is said to be in motion which is categorised as uniform and non-uniform. Motion of a body is studied in terms of position-time graph and velocity-time graph.

- (i) "Rest and motion are relative not absolute." Comment.
- (ii) What are different types of frames of reference? Explain.
- (iii) Draw position-time graph for uniform and Non-uniform motion.
- (iv) Draw velocity-time graph for uniform and non-uniform motion.
- (v) Relative velocity of two bodies is zero. What is nature of Position-time graph for it?

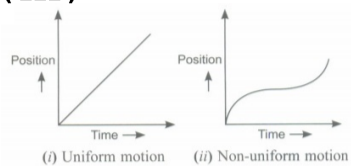
Answer : (i) Position of an object is determined with respect to some reference point. When position change with respect to the reference point this indicates motion while when position do not change with respect to the reference point, then it state of rest. So rest and motion are the relative terms because they depend on the observer's frame of reference.

(ii) There are two types of frames of reference.

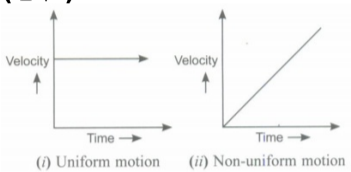
(i) Inertial frame of reference is one in which Newton's first law of motion holds true.

(ii) Non-inertial frame of reference is one in which Newton's first law of motion does not hold true.

(iii)



(iv)



(v) Position time graph of two bodies for zero relative velocity is Parallel straight line.