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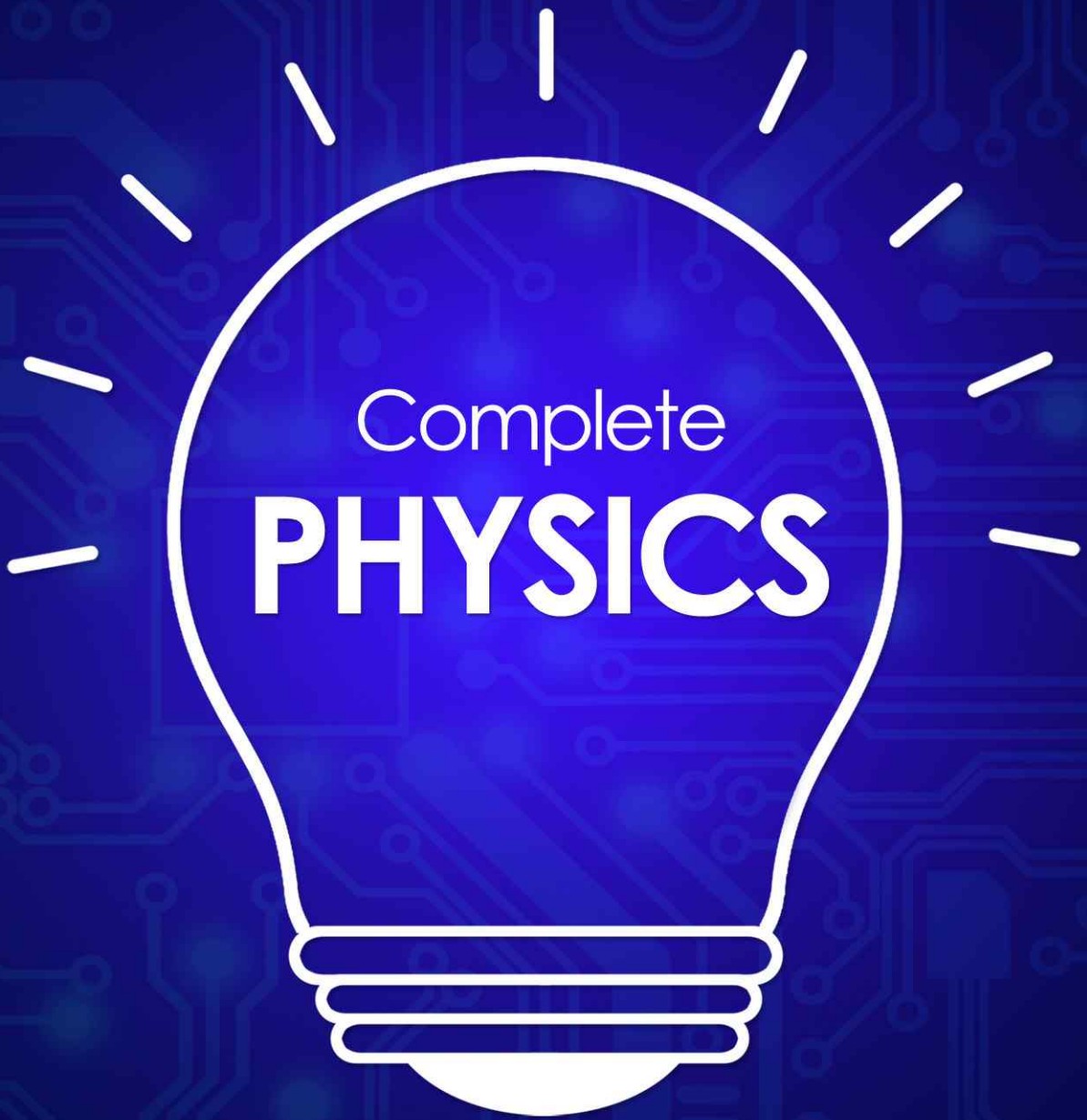

# Complete PHYSICS

## IIT-JEE · NEET · CBSE eBOOKS

CLASS 11&12th

CLASS 11th

# Motion in a Straight Line

## 01. Introduction

Statics and dynamics are the two main branches of mechanics. Whereas statics is the study of the objects at rest, dynamics is the study of objects in motion. An object can have uniform motion, even when a number of forces are acting on it. Such forces are said to be in equilibrium.

*Thus, statics is the study of the motion of an object under the effect of forces in equilibrium.*

The motion of objects is studied under two separate headings:

***Kinematics.*** *The study of the motion of the objects without talking into account the cause of their motion is called kinematics.*

**Dynamics.** *The study of the motion of the objects by taking into account the cause (or cause) opf their change of state (rest or of uniform motion) is called dynamics.*

## 02. Rest and Motion

Rest and motion are relative terms.

*An object is said to be in motion, if it changes its position w.r.t its surroundings with the passage of time.*

One *the other hand, if an object does not change its position w.r.t. its surroundings with passage of time, it is said to be at rest.*

## 03. The Concept of a Point Object

While studying the motion of an object; sometimes, its dimensions are of no importance. For example, if one travels from one place to another distant place by a bus, the length of the bus may be ignored as compared to the distance travelled. In other words, although the bus has a finite size, yet for the study of the motion of the bus along the road; its motion may be considered as the motion of a point or a particle.

In mechanics, *a particle is a geometrical mass point or a material body of negligible dimensions.*

## 04. Motion Along a Straight Line – Path Length and Displacement

In the present chapter, we shall confine our study to the motion of an object along a straight line, also known as ***rectilinear motion.***

**Path length.** *The distance covered by the object in a given time is called* ***path length.***

**Displacement.** *The distance covered by the object in a particular direction is called displacement.*

The displacement has both magnitude and direction and hence it is a vector* quantity.

(i) *The displacement has units of length.*

(ii) *The displacement of an object in a given time interval can be positive, zero or negative.*

(iii) *The actual distance travelled by an object in a given time interval is either equal to or greater than the magnitude of the displacement.*