

Class Notes

Class : IX

Subject: Physics

Topics: Motion

Rest, Motion, Distance, Displacement, Speed, Velocity, Acceleration, Graph (diagrams only)

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Motion: Part 1

Physics:

It is the branch of science which deals with the study of the natural laws and their manifestation in the natural phenomenon.

Mechanics:

It deals with the conditions of rest or motion of the material objects around us.

Statics:

It deals with the study of object at rest or in equilibrium, even when they are under the action of several forces (measurement of time is not essential).

Kinematics:

It deals with the study of motion of objects without considering the cause of motion (measurement of time is essential).

$\left[\text{Kinematics} \frac{\text{Greek}}{\text{Word}} \text{Kinema} \rightarrow \text{motion} \right]$

Dynamics:

It deals with the study of objects taking into consideration the cause of their motion.

$\left(\text{Dynamics} \frac{\text{Greek}}{\text{Word}} \text{Dynamis} \rightarrow \text{power} \right)$

➤ One dimensional motion:

It is the motion of an object along a straight line. It is also called a rectilinear motion or linear motion.

To describe one dimensional motion we need X, Y or Z axis.

Example: i) train moving in a track,
ii) free fall etc.

➤ Two dimensional motion:

It is the motion of an object in a plane. We need two axes to represent a 2 D motion.

Example: i) A car moving in a plane road.
ii) Circular motion
iii) Motion of planet around the sun.

➤ Three dimensional motion:

It is the motion of an object in a space. To describe 3 D motion we need all the three axes at the same time.

Example: i) Motion of an aero plane

ii) Motion of a bird

iii) A flying kite etc.

Rest:

When a body does not change its position with respect to time, then the body is said to be at rest.

Conclusion:

a) Time: Changes

b) Position: Does not change

Example:

A person is sitting in a chair for the last 5 min. Thus the person is at rest for the last 5 min.

Motion:

When a body changes its position with time, the body is said to be in motion.

Conclusion:

a) Time: Changes

b) Position: Changes

Example:

A car is moving for the last 5 min.

Reference Point:

To describe the position of an object we need to specify a reference point which is called the origin.

Direction: In addition to the reference point, a direction is also required to locate the position of an object precisely.

Example:

“Rohit’s home is 1 km north to the railway station.”

Here, railway station is the reference point, and 1 km north is direction.

Generally, any popular place like school, bank, shopping mall etc. are chosen as reference point.

Types of Motion:

Linear Motion

In linear motion, the particles move from one point to another in either a straight line or a curved path. The linear motion depending on the path of motion is further divided as follows

- Rectilinear Motion – The path of the motion is a straight line.
- Curvilinear Motion – The path of the motion is curved.

A few examples of linear motion are the motion of the train, football, the motion of a car on the road, etc.

Rotatory Motion

Rotatory motion is the motion that occurs when a body rotates on its own axis. A few examples of the rotatory motion are as follows:

- The motion of the earth about its own axis around the sun is an example of rotary motion.
- While driving a car, the motion of wheels and the steering wheel about its own axis is an example of rotatory motion.

Oscillatory Motion

Oscillatory motion is the motion of a body about its mean position. A few examples of oscillatory motion are

- When a child on a swing is pushed, the swing moves to and fro about its mean position.
- The pendulum of a clock exhibits oscillatory motion as it moves to and fro about its mean position.
- The string of the guitar when strummed moves to and fro by its mean position resulting in an oscillatory motion.

Complex Motion:

Most of the motions that we see are complex in nature, i.e. combination of at least two different motions. Example: A particle on a vehicle's wheel. It is rotatory as well as linear i.e. complex in nature.