

## SS1 Physics - Motion

Lesson Objectives:

- Define motion.
- State and explain types of motion.
- Differentiate between speed, velocity, and acceleration.
- Solve simple numerical problems on motion.

### 1. Meaning of Motion:

Motion is the continuous change in the position of a body with respect to time and a reference point.

### 2. Types of Motion:

- Translational Motion: Movement from one point to another in a straight line or curved path. Example: A car moving along a road.
- Rotational Motion: Movement around an axis. Example: A spinning wheel.
- Vibrational Motion: To-and-fro movement about a fixed point. Example: Motion of a pendulum.
- Random Motion: Motion without a definite pattern or direction. Example: Movement of gas molecules.
- Periodic Motion: Motion that repeats itself at regular intervals. Example: Earth revolving around the sun.

### 3. Concepts in Motion:

#### (a) Distance and Displacement

- Distance: The total path covered by a moving object (scalar quantity).
- Displacement: The change in position of a body in a particular direction (vector quantity).

#### (b) Speed and Velocity

- Speed: The rate at which distance is covered. Formula:  $\text{Speed} = \text{Distance} / \text{Time}$
- Velocity: The rate at which displacement occurs in a particular direction. Formula:  $\text{Velocity} = \text{Displacement} / \text{Time}$

#### (c) Acceleration

- The rate of change of velocity with respect to time. Formula:  $a = (v - u) / t$

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### 4. Equations of Uniformly Accelerated Motion:

1.  $v = u + at$
2.  $s = ut + 0.5at^2$
3.  $v^2 = u^2 + 2as$
4.  $s = (u + v)/2 \times t$

### 5. Graphical Representation of Motion:

- Distance-Time Graph
- Velocity-Time Graph
- Acceleration-Time Graph

### 6. Differences Between Speed and Velocity:

Speed: Scalar quantity, No direction, Always positive.

Velocity: Vector quantity, Has direction, Can be positive or negative.

### 7. Simple Problems:

Example 1: A car travels 120 km in 3 hours. Speed =  $120 \text{ km} / 3 \text{ hr} = 40 \text{ km/h}$ .

Example 2: An object accelerates from rest to 20 m/s in 5 seconds. Acceleration =  $(20 - 0)/5 = 4 \text{ m/s}^2$ .

### Summary:

- Motion involves a change of position over time.
- Types include translational, rotational, vibrational, random, and periodic motion.
- Speed and velocity are related but different.
- Acceleration describes how velocity changes over time.
- Equations of motion can solve various problems in uniformly accelerated motion.

### Classwork:

1. Define motion.
2. State and explain 3 types of motion with examples.
3. Differentiate between speed and velocity.
4. A train moves with a uniform acceleration from rest to 60 m/s in 10 seconds. Find its acceleration.

## **SS1 Physics - Motion**

Assignment:

1. A car moves with a velocity of 30 m/s for 20 seconds. How far has it travelled?
2. An object is accelerated uniformly from 5 m/s to 25 m/s in 4 seconds. Calculate the acceleration.