Distance-Time Graph

Introduction to Graphs

A graph is a diagrammatic representation that depicts the relationship between two quantities. It consists of two perpendicular lines meeting at a common point called the origin (O). These lines are referred to as the axes of the graph:

- **X-axis:** The horizontal line (denoted as X'OX)
- **Y-axis:** The vertical line (denoted as YOY')

Graphs help visualize data and identify patterns in motion, such as speed, uniform motion, and non-uniform motion.

Understanding the Distance-Time Graph

A distance-time graph represents how distance changes over time. The distance is plotted on the Y-axis, and time is plotted on the X-axis. The slope of the graph gives the speed of the object.

- If an object moves at a constant speed, the graph appears as a straight, sloping line.
- If an object stops moving, the graph appears as a horizontal line because distance does not change with time.
- If an object moves with changing speed, the graph appears as a curved line.

Example 1: Distance-Time Table for Uniform Motion

The following table shows the distance covered by a motorcyclist moving at a constant speed:

Time (s)	0	1	2	3	4	5
Distance (m)	0	15	30	45	60	75

Graph Interpretation

- The distance covered in each second is constant (15m per second).
- The graph obtained is a straight line, indicating uniform motion.
- A straight-line distance-time graph signifies that the object is moving at a constant speed.

Definition of Uniform Motion

If an object covers equal distances in equal intervals of time, the object is said to be in uniform motion.

- The distance-time graph for uniform motion is a straight, sloping line.
- The steeper the line, the greater the speed.

Example 2: Distance-Time Table for Non-Uniform Motion

The following table shows the distance covered by an object moving with changing speed:

Time (min)	0	1	2	3	4	5
Distance (m)	0	2	3.5	4	6.5	9

Graph Interpretation

- The distance covered in each interval is not equal.
- The graph obtained is a curved line, indicating non-uniform motion.

Definition of Non-Uniform Motion

If an object covers unequal distances in equal intervals of time, it is said to be in non-uniform motion.

- The distance-time graph for non-uniform motion is a curve.
- The object's speed is changing throughout the motion.

Graph for a Stationary Object (Zero Speed)

When an object is at rest (not moving), its distance does not change over time. The corresponding graph is a horizontal line parallel to the X-axis.

Key Points:

- If the object is not moving, the graph remains flat.
- The distance remains constant over time.

Example: A parked car or a person sitting still.

Comparison of Different Distance-Time Graphs

Type of Motion	Shape of Graph
Uniform Motion	Straight, sloping line
Non-Uniform Motion	Curved line
Stationary Object	Horizontal line