BYJU'S
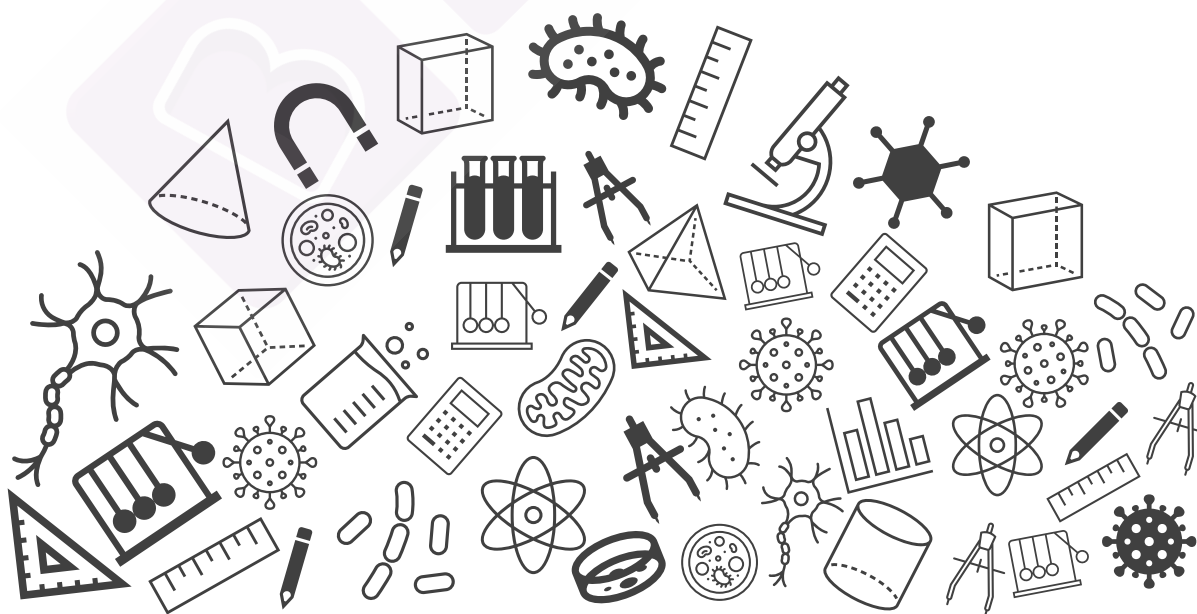
Grade 07
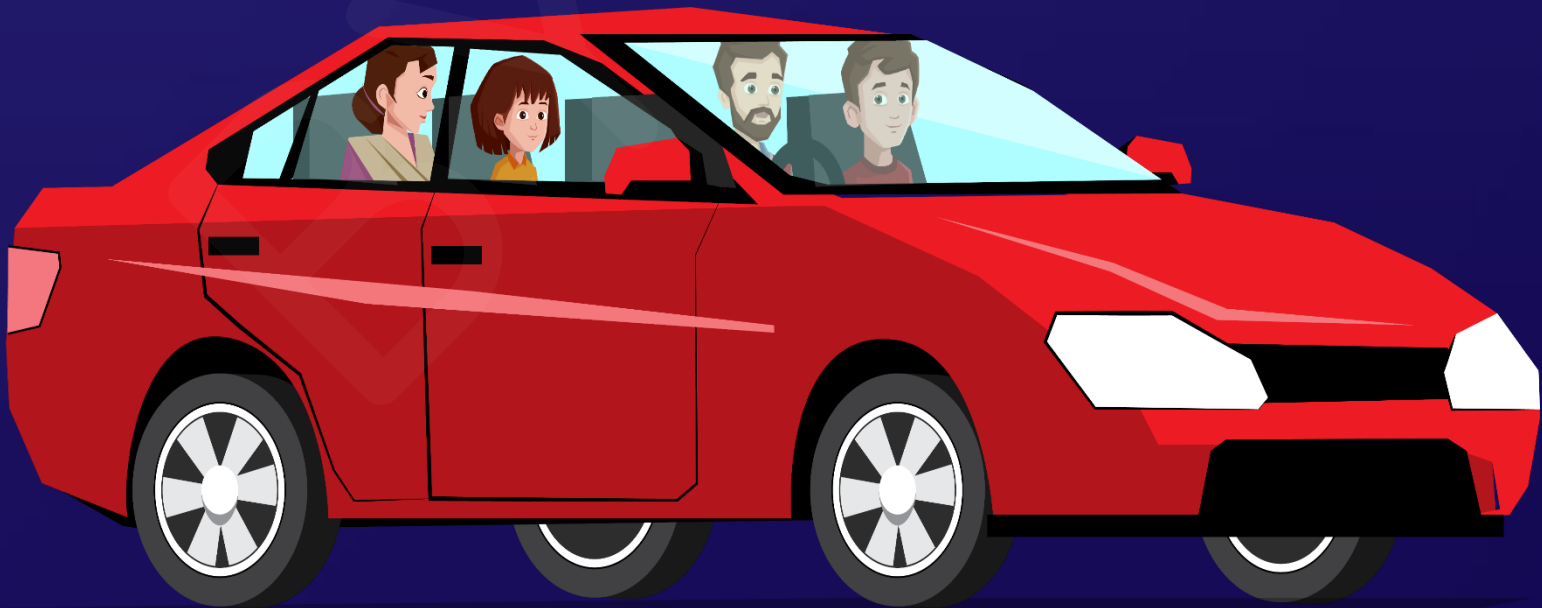## Chapter Notes

BYJU'S Classes

Class Notes

Motion and Time

Grade 07

Topics to be Covered

1 **Motion and its Types**

1.1 Rectilinear Motion
1.2 Circular Motion
1.3 Rotational Motion
1.4 Periodic Motion

2 **Distance and Speed**

2.1 Distance
2.2 Speed
  - Average Speed
  - Instantaneous Speed
2.3 Odometer and Speedometer

3 **Uniform and Non-uniform Motion**

5.1 Uniform Motion
5.2 Non-uniform Motion

4 **Measuring Time**

4.1 Time Measuring Devices
4.2 Simple Pendulum
4.3 Units of Time

5 **Graphical Representation of Motion**

5.1 Types of Graphs
5.2 Distance-Time Graphs
  - For Uniform Motion
  - For Non-Uniform Motion

Mind Map

Motion and Time

Measuring Time
- Time Measuring Devices
- Simple Pendulum

Uniform and Non-Uniform Motion
- Uniform Motion
- Non-Uniform Motion

Motion and its Types
- Rectilinear
- Circular
- Rotational
- Periodic

Graphical Representation of Motion
- Bar Graph
- Line Graph
- Pie Chart
- Distance-Time Graph

Distance and Speed
- Distance
- Speed
 - Instantaneous Speed
  - Average Speed

1. Motion and its Types

An object is said to be in motion when it changes its position with time with respect to its surroundings. Motion can be of different types:

1.1 Rectilinear Motion

If an object is moving along a straight path, the motion of the object is called rectilinear motion. Example: A car moving on a straight path, marching soldiers, etc.
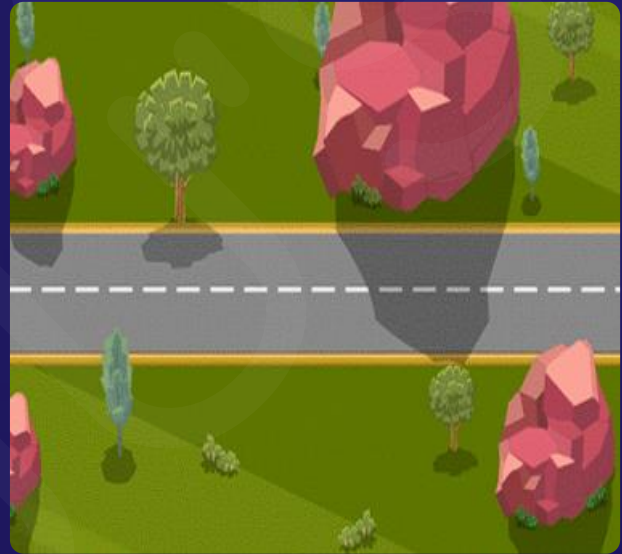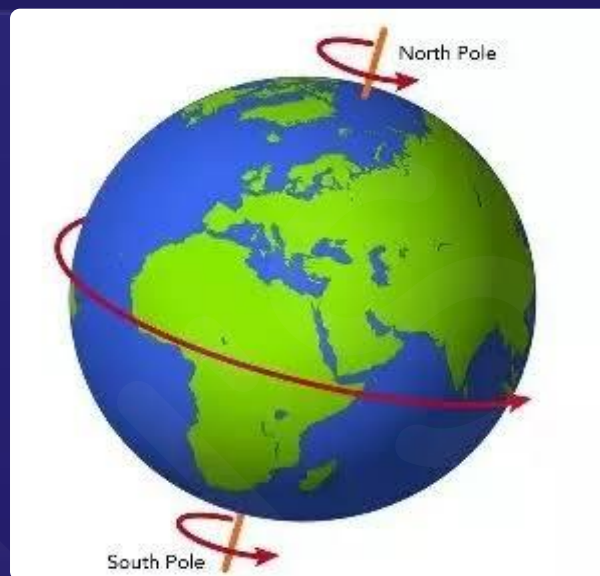

1.2 Circular Motion

If an object is moving along a circular path, the motion of the object is called circular motion. Examples: A car moving on a circular track, an artificial satellite orbiting Earth, etc.
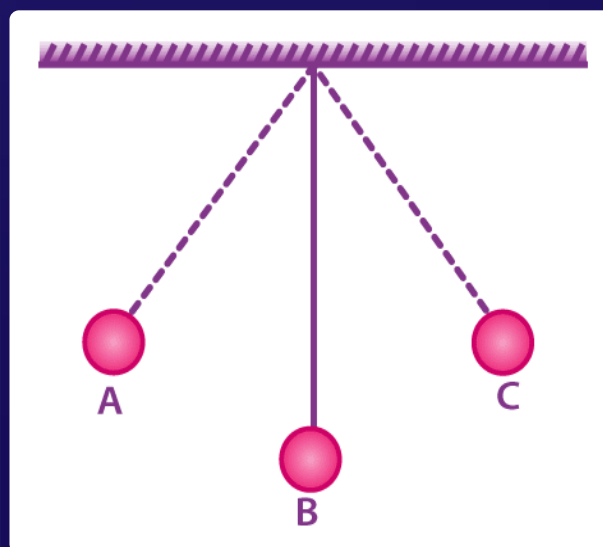
1.3 Rotational Motion

Rotational motion is defined as the motion of a body about a fixed axis. Examples: Motion of Earth about its axis, a spinning top, etc.

1.4 Periodic Motion

If an object repeats its motion after fixed intervals of time, its motion is called periodic motion. Examples: An oscillating pendulum, the motion of Earth around the Sun, etc.

2. Distance and Speed

2.1 Distance

The length of the path covered by an object is called distance. It is measured in units such as metre (m), kilometre (km), etc.

2.2 Speed

Speed refers to how fast or slow an object is moving.

It is defined as distance covered per unit of time.
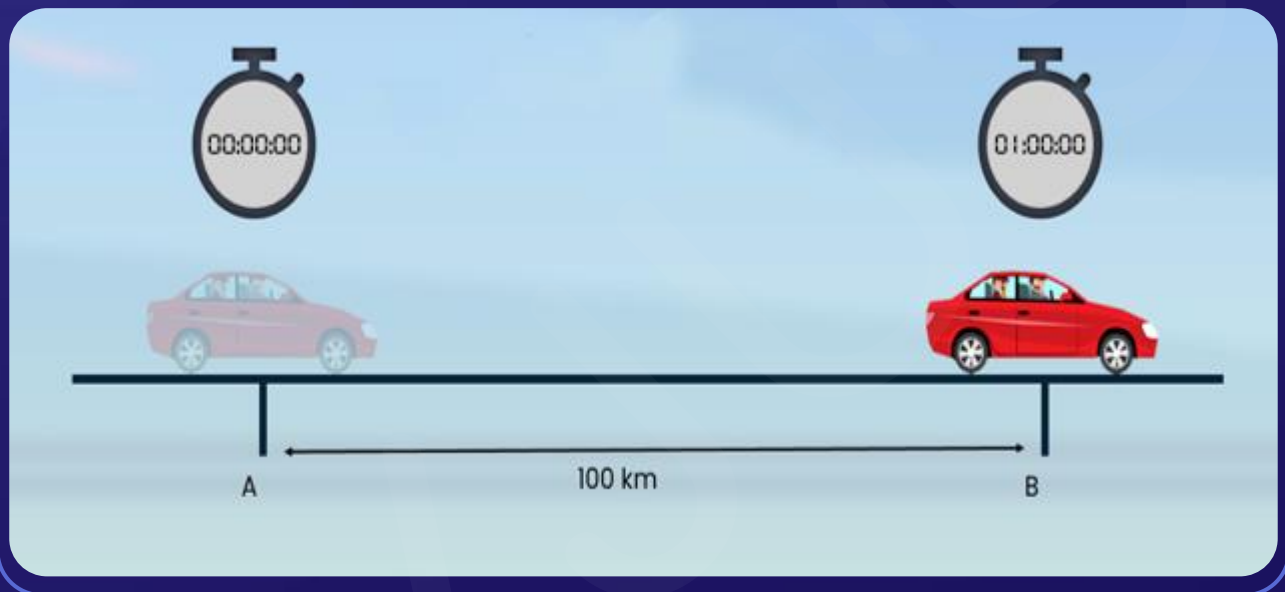
Units of speed include m/s and km/hr.

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

Average Speed

Average speed basically denotes the overall speed for a given time interval. It is given by total distance travelled divided by total time taken.

$$\text{Average Speed} = \frac{\text{Total Distance}}{\text{Total Time}}$$

💡 **Note:**

We use the terms 'speed' and 'average speed' interchangeably, unless stated otherwise.

Instantaneous Speed

Instantaneous speed represents the speed at a particular instant of time. There can be only one instantaneous speed at a moment.

💡 **Note:**

If a body moves at a constant speed during a specific time interval, the average speed during that period is equal to the instantaneous speed at any moment in that time interval.

2.3 Odometer and Speedometer

Distance is measured using a device called an odometer. It measures the total distance travelled by any vehicle.

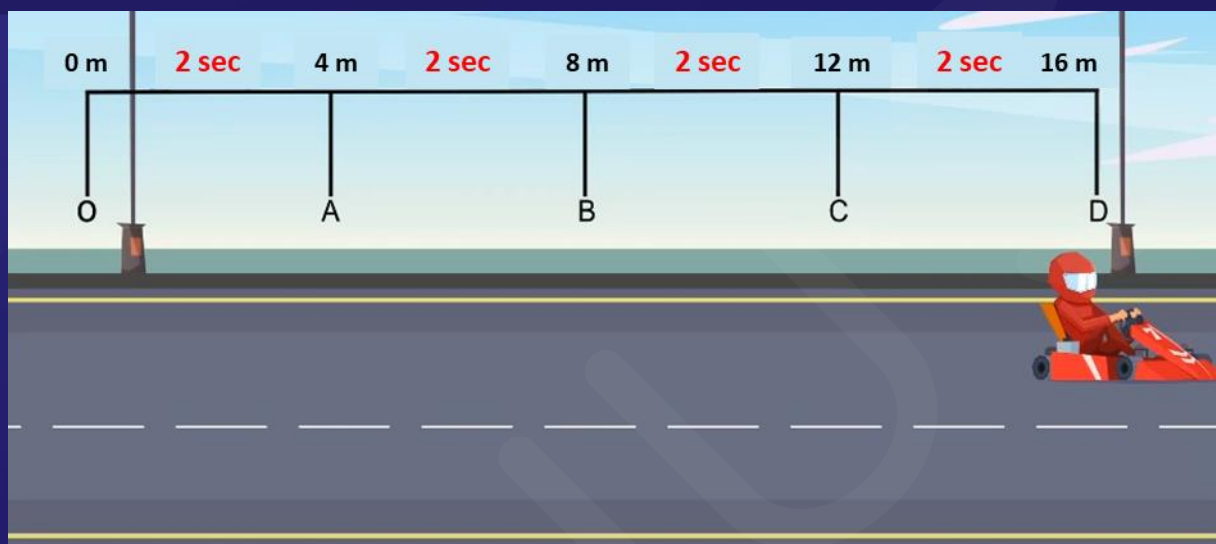Speed measuring device is called a speedometer. It measures the instantaneous speed of a vehicle.

Speedometer

kmph

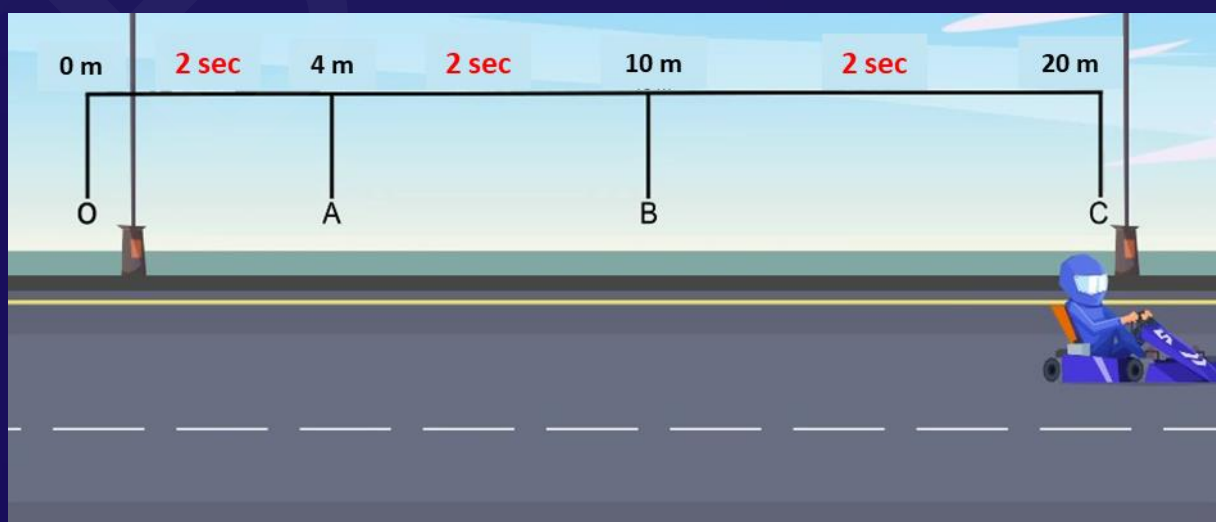00250 km

Odometer

3. Uniform and Non-Uniform Motion

3.1 Uniform Motion

An object moving along a straight line with a constant speed is said to be in uniform motion.

3.2 Non-Uniform Motion

An object moving along a straight line with varying speed is said to be in non-uniform motion.

4.1 Time Measuring Devices

Time can be measured using any periodic event. Before the modern clocks became popular, people used to measure time using devices like sundial, sand clock or water clock. A sundial measures time by the position of the shadow cast by the Sun.

With the advancement of science, now we have clocks and watches, both digital and analog to measure time. These have complex mechanisms but make use of some period motion.

Analog Clock

Digital Clock

4.2 Simple Pendulum

A simple pendulum consists of a bob suspended from a rigid support using a string. The bob is free to swing back and forth.

The pendulum is said to complete an oscillation when it starts from one extreme position A, moves to the other extreme B and then back to A.

As the oscillations of the pendulum are periodic, it can be used for measuring time.

The time taken by the pendulum to complete one oscillation is known as its time period.

One complete oscillation
⟶ A-O-B-O-A

Time period of the pendulum
= t + t + t + t
= 4t
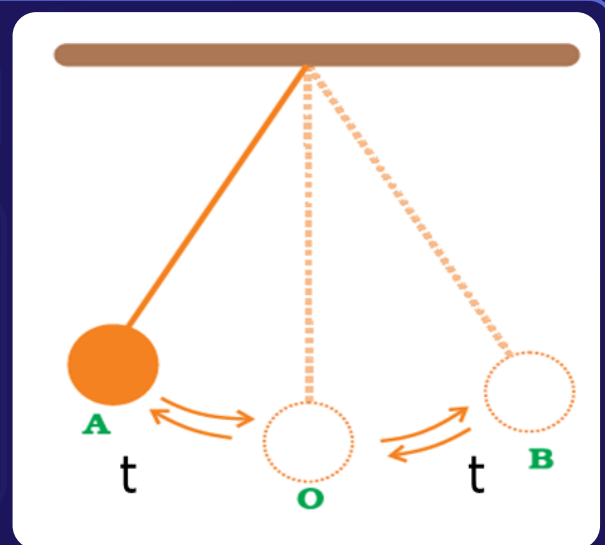
4. Measuring Time

4.3 Units of Time

There are various units of time such as second, minute, hour, day, etc.

The SI unit of time is second (s).

To measure smaller intervals, we have units such as millisecond, microsecond or nanosecond.

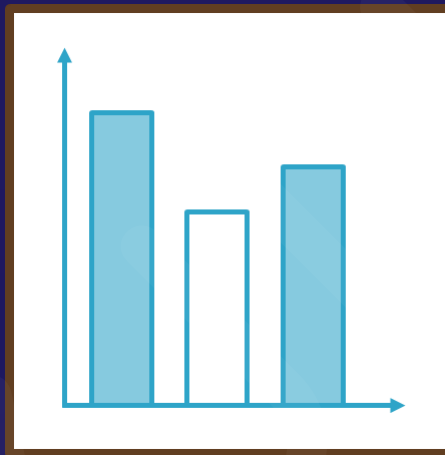$$1 \text{ second} = 10^3 \text{ milliseconds}$$

$$1 \text{ second} = 10^6 \text{ microseconds}$$

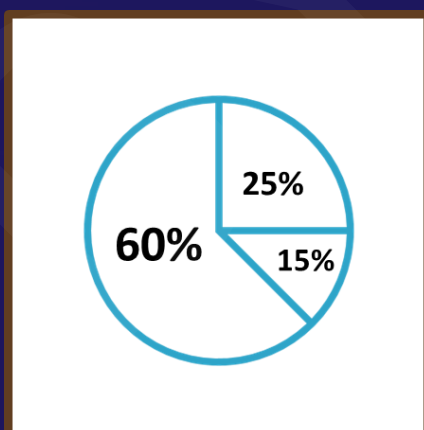$$1 \text{ second} = 10^9 \text{ nanoseconds}$$

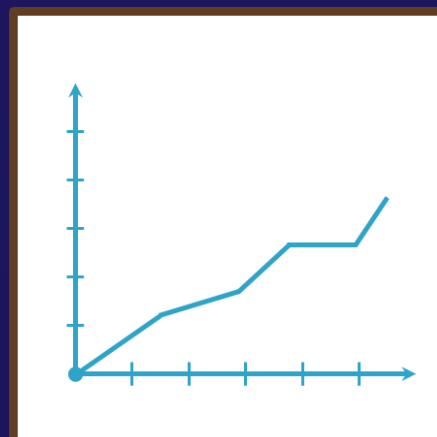# 5. Graphical Representation of Motion

5.1 Types of Graphs

Data can be represented graphically. Some of the types of graphs are: Bar Graph, Pie Chart and Line Graph.
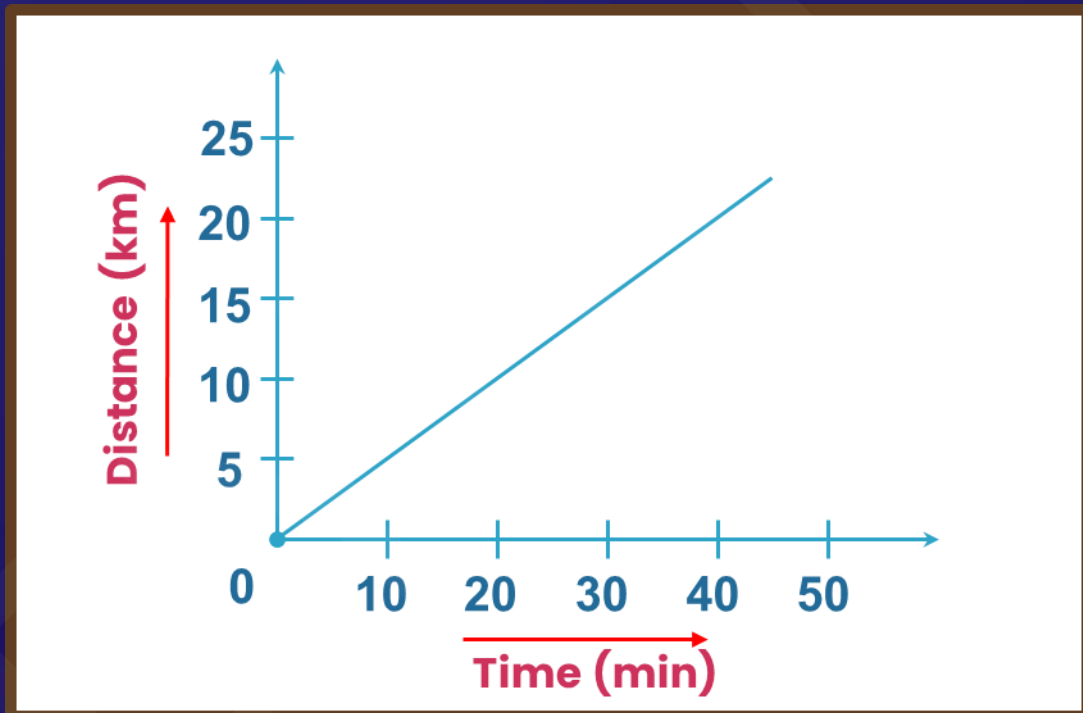

Bar Graph

Pie Chart

Line Graph

5.2 Distance-Time Graph

The distance-time graph is a line graph that shows the distance covered by a body at different moments of time.

We can find the speed of the moving body with the help of this graph.

- In distance-time graph, distance is marked along the Y-axis and time along the X-axis.
- The point where the two mutually perpendicular axes intersect is called the origin.

5. Graphical Representation of Motion

Distance-Time Graph for Uniform Motion

For an object in uniform motion, the distance-time graph is a straight line.
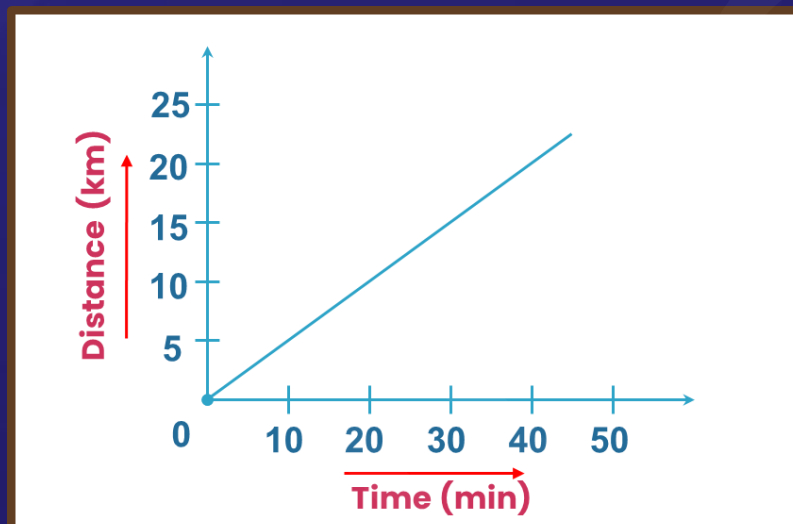
Distance-Time Graph for Non-Uniform Motion

For an object in non-uniform motion, the distance-time graph is not a straight line.