

(1) Translatory Motion:

TRANSLATORY MOTION

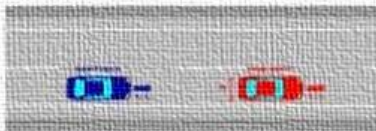
- In translational motion, a body moves along a straight line. The line may be straight or curved.
- For example, a car moving in a straight line is in translational motion and a train moving along a straight line also has translational motion.



(a) Rectilinear Motion:

▪ **Rectilinear motion:**

- The objects move along a straight line is called the rectilinear motion.
- Example: motion of a vehicle on a straight road, march-past of soldiers in a parade.



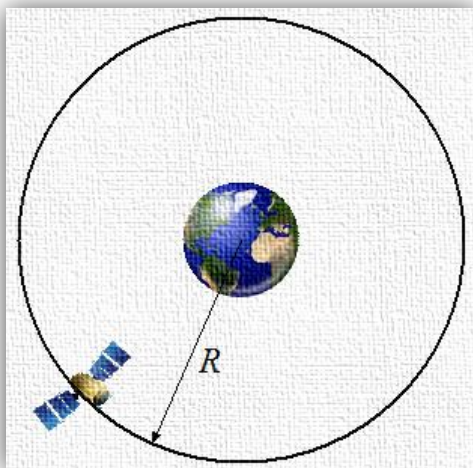
(b) Curvilinear Motion:

The motion of an object moving in a curved path is called *curvilinear motion*.



(c) Circular Motion:

Circular motion is a movement of an object along the circumference of a circle or rotation along a circular path.



(2) Rotatory Motion:

Figure: 1 Definition

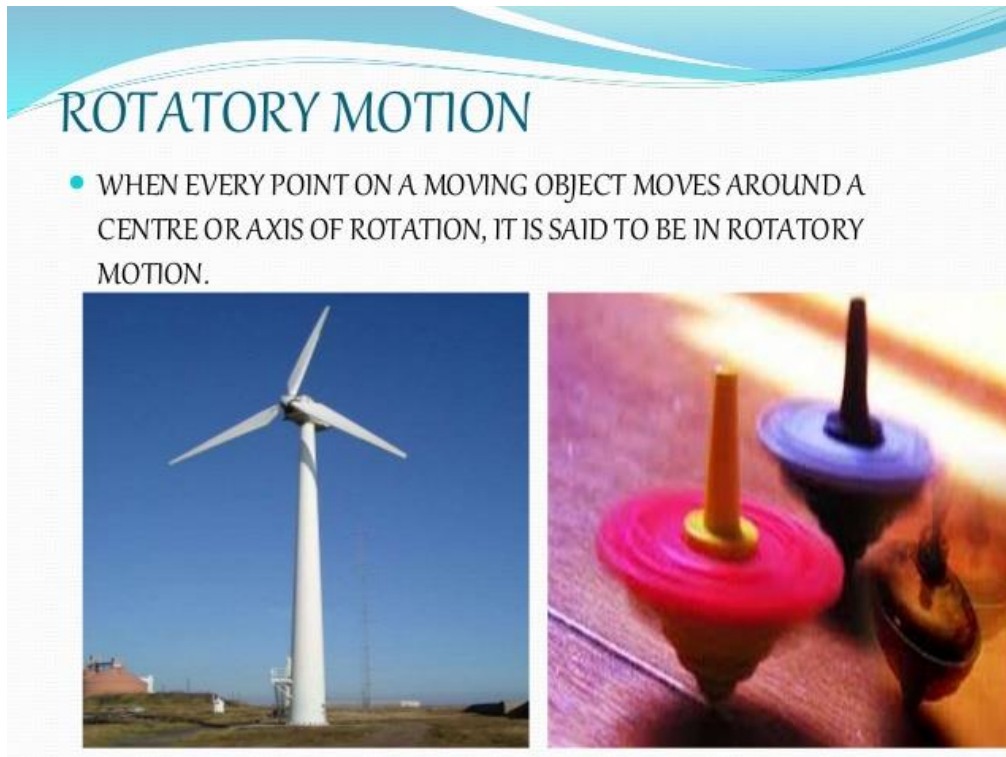
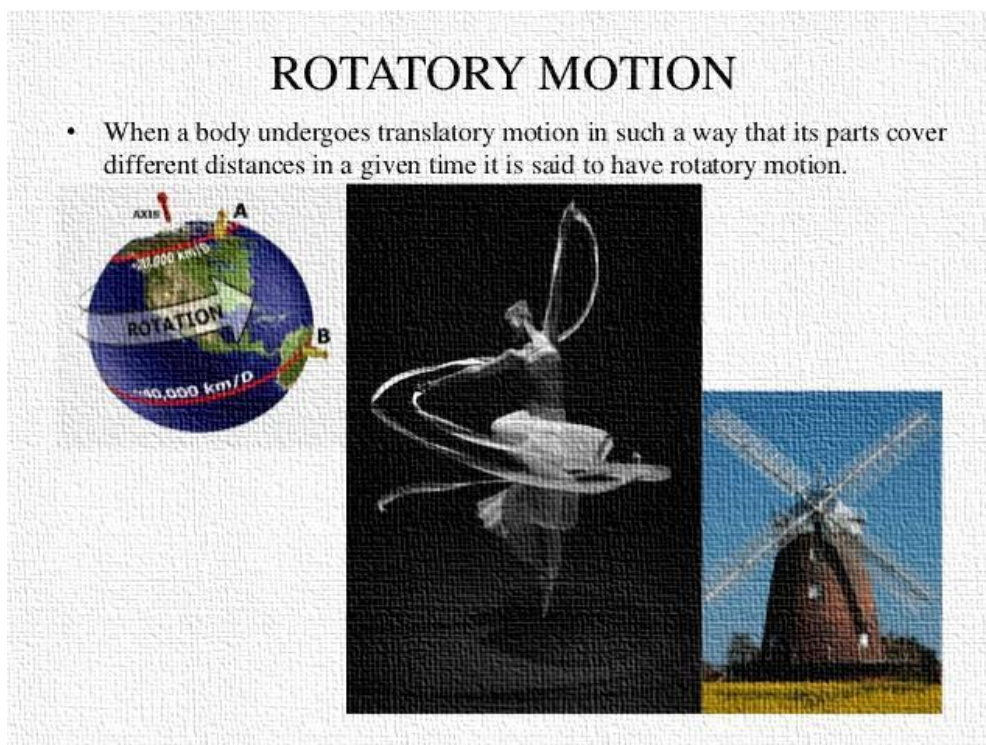


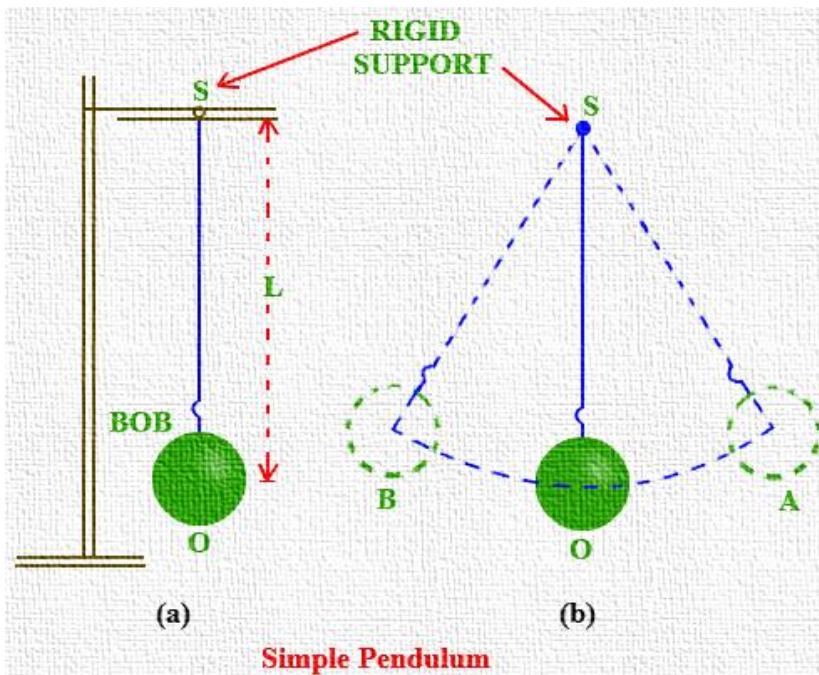
Figure: 2 Definition



(3) Oscillatory Motion:-

OSCILLATORY MOTION

- When a body moves to and fro about a fixed point it is said to be oscillatory motion.

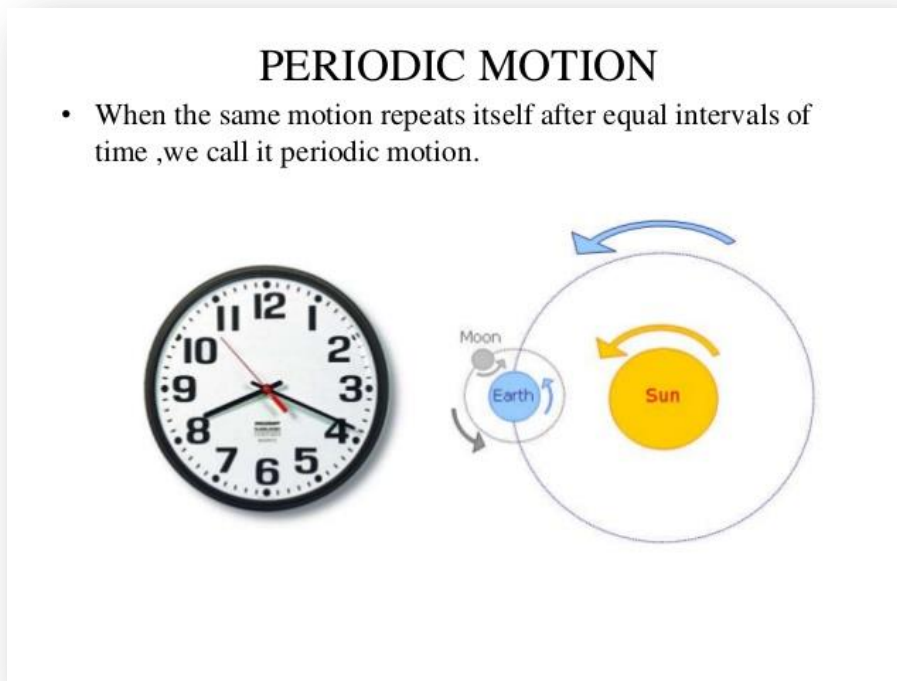


Simple Pendulum

(a) Bob at rest in mean position O.

(b) Bob in swinging motion between extreme positions A and B.

(4) Periodic Motion:-



(5) Uniform Motion:-

Uniform motion is the kind of motion in which a body covers equal distances in equal intervals of time.

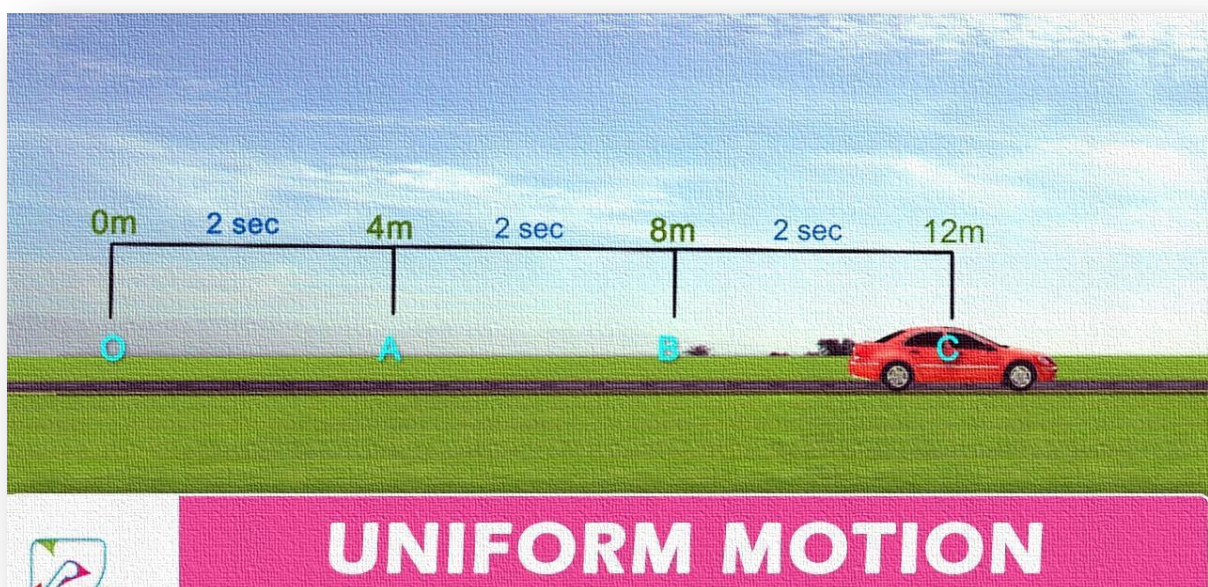
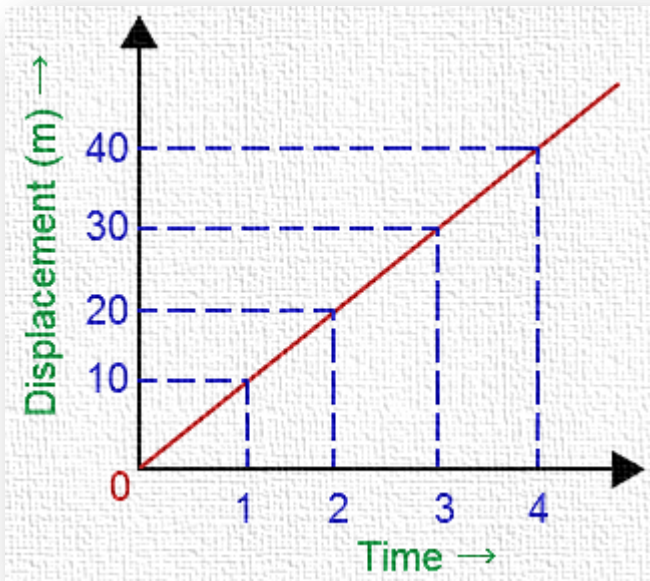


Figure: 1 – Graph of Uniform Motion is a straight line.



(6) Non Uniform Motion:-

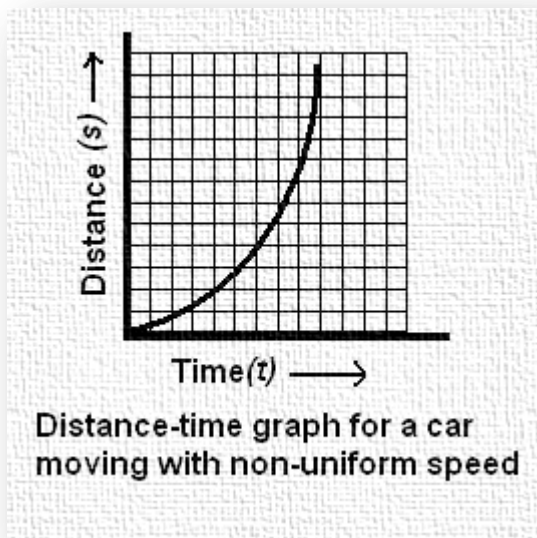
Non-Uniform Motion

If an object covers unequal distance in equal time of interval is said to be as non uniform motion.

Eg.
A person jogging , a car moving in a crowded place , a bowler throwing a ball , etc

The illustration shows a bowling ball with a speedometer overlay. The speedometer is labeled 'Bowling speed in km/h' and displays the following values: 140, 143, 135, 145, 132, and 130. The background of the speedometer shows a bowling alley scene with a bowler and a ball.

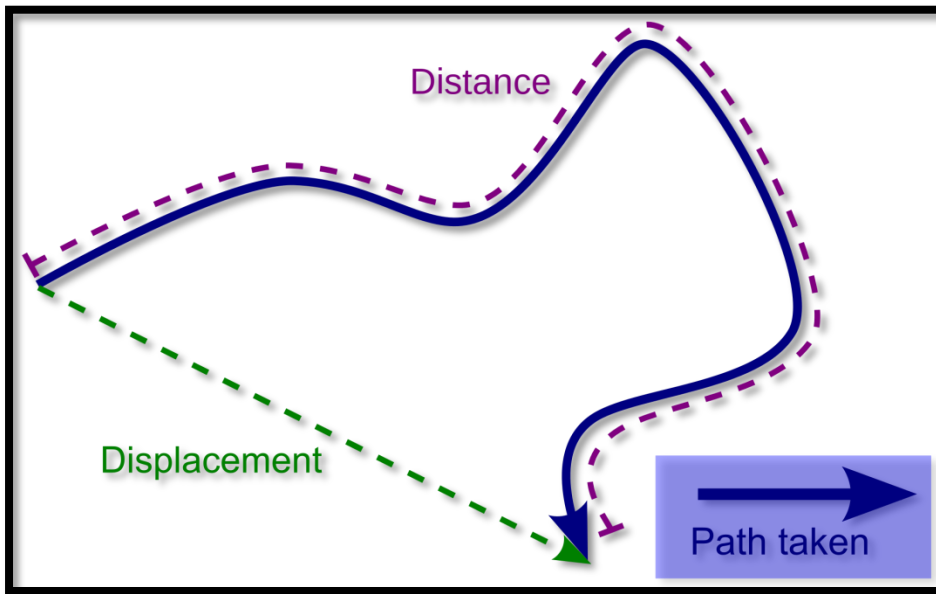
Figure: 1 – Graph of Non-Uniform Motion is not a straight line.



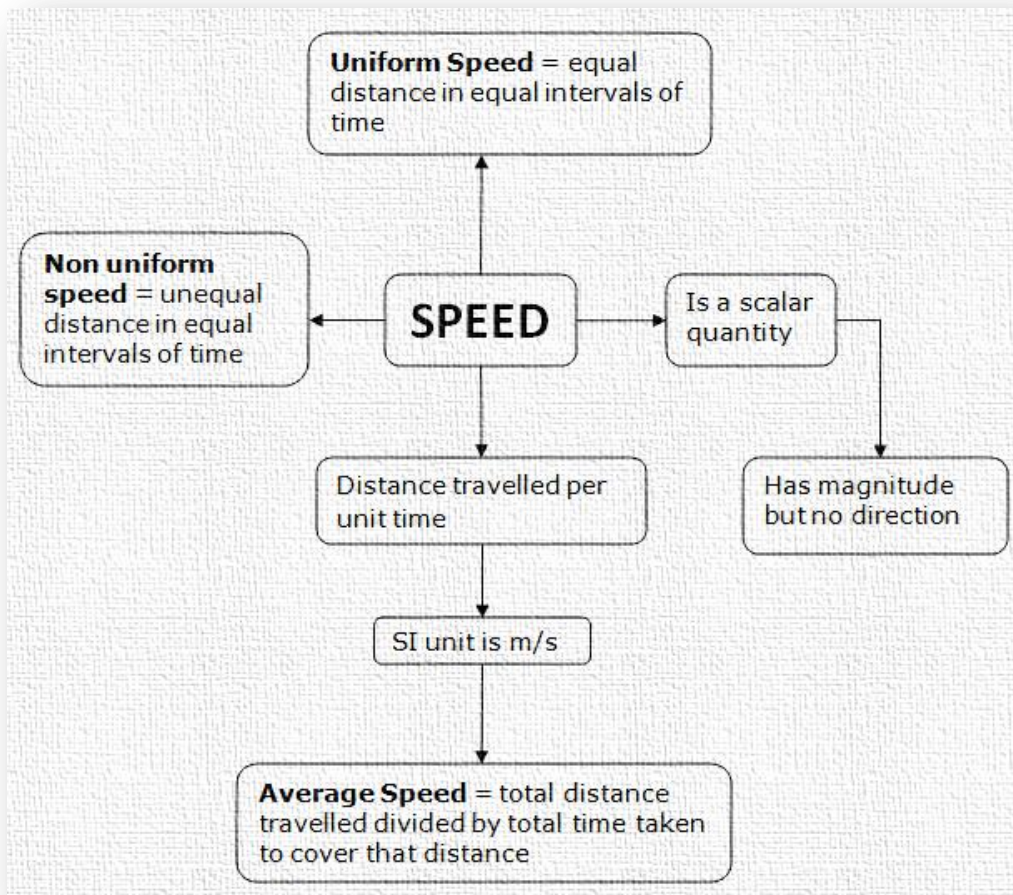
(7) Distance and Displacement:-

Distance	Displacement
Distance refers to the total length of travel irrespective of the direction of the motion.	Displacement refers to the distance moved in a particular direction. It is the object's overall change in position.
It is a scalar quantity. SI unit: metre (m) Other common units: kilometre (km), centimetre (cm)	It is a vector quantity. SI unit: metre (m) Other common units: kilometre (km), centimetre (cm)

Figure: 1



(8) Speed and Velocity:-

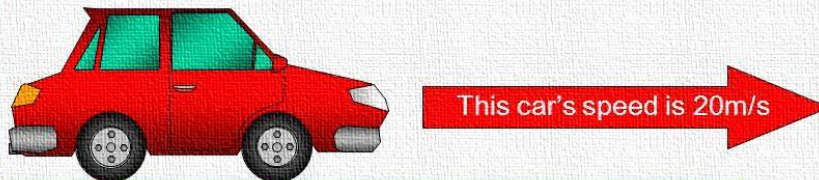


Velocity

- ▶ *Velocity* refers to both the speed and direction of motion of an object (a vector quantity).
- ▶ Two objects travelling with the same speed but in different directions have different velocities
- ▶ Motion at *constant velocity* means that both the speed and direction of an object do not change.
- ▶ In a car, we can *change the velocity three ways*: gas pedal to speed up, brake to slow down or steering wheel to change direction

Speed v Velocity

Simply, speed is the distance travelled per second ...



Velocity is the distance travelled per second in a specific direction

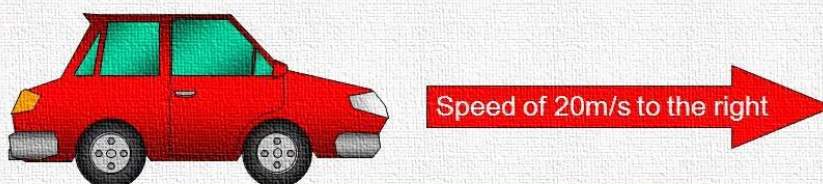



Figure: Difference between speed and velocity.

S. No.	SPEED	VELOCITY
1.	It is the distance covered by the body per unit time	It is the displacement of the body  per unit time
2.	Speed is a Scalar Quantity	Velocity is a Vector Quantity
3.	The average speed of a moving body can never be zero.	The average velocity of a moving body can be zero. (when Displacement = 0)
4.	Speed gives an idea about rapidity of motion of body.	Velocity gives an idea about rapidity as well as Position of body in motion.
5.	Speed of a moving body can never be negative.	Velocity of a moving body can be positive, negative or zero. (depending on point of reference)

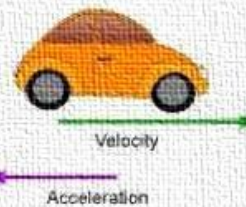
(9) Acceleration:

Acceleration

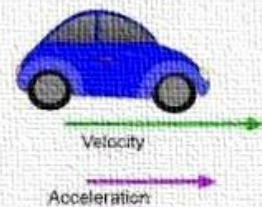
- **Acceleration** is the rate of change of **velocity** (speed with direction)
- Acceleration may be **positive** or **negative**:
Positive – accelerates in the **direction it is moving (speeds up)**

- Ex: riding your bike forward harder to speed up

This car is slowing down



This car is speeding up



- **Negative** – accelerates in the **opposite** direction to its movement (**slows down**)

- Ex: riding your bike and pushing the brake slows you down

Acceleration

= change in velocity



(10) Equations of Motion:-

$$v = u + at$$

$$s = ut + \frac{1}{2}at^2$$

$$s = \frac{1}{2}(u + v)t$$

$$v^2 = u^2 + 2as$$

a = acceleration

v = final velocity

u = initial velocity

t = time taken

s = displacement

NOTE: - *These equations are applicable only if the body is getting displaced in a straight path or horizontally.*