Motion

Slow and fast motion

How do we detect out of the two objects that which one moves faster or slower than the other? You know that the answer to this question is the 'speed' of an object. When we compare the motion of the two objects we always observe that which one moves faster or slower and to compare this motion we use speed as a criterion. If an object has higher speed then it will take less time to cover a given distance whereas an object with less speed takes more time to cover the given distance.

Displacement is the distance covered by an object in a particular direction

The S.I unit of displacement or distance is a meter (m).

Rest and Motion

When you are sitting in a moving train, you are moving relative to the trees, mountains, farms, railway tracks etc.but you are at rest in respect to the other persons sitting alongside you in the same coach. So, a continuous change in the position of a body relative to other bodies is called mechanical motion. Now, when you are in a moving car everything you see outside is moving backward. But for the people within the car, everything inside is at rest. So, we can say that rest and motion are relative terms.

A stationary object is the one which doesn't change its position with respect to others.

Displacement and Distance

- Distance is the actual length of part traveled by a body in a certain interval of time. Displacement is the distance covered by an object in a particular direction.
- Displacement is a vector quantity which means that it possesses direction along with the magnitude. Whereas distance is a scalar quantity as it possesses magnitude only.

Relations between Distance, Time and Speed

You can understand the relation of distance, time and speed through the statement shown below.

Speed can be defined as the distance traveled by an object per unit time. The speed of an object becomes velocity when the quantity of the direction is added to it.

speed can be written as

Speed = Distance / Time [s = d/t]

Speed is a scalar quantity whereas velocity is a vector quantity. The S. I unit of speed/velocity is m/s or meters per second. Other units are- km/h/, km/min etc.

Types of speed

Uniform speed- If a body travels an equal distance in an equal interval of time then the speed of the object is said to be uniform speed.

Non-uniform speed- If a body travels uniqueual distance in equal intervals of time, then the speed of the body is said to be a non- uniform speeded.

The rate of change of velocity or when the speed of the body increases, then the amount by which the speed increases per second of the time is called acceleration. The S.I unit of the acceleration is m/s^2

Instantaneous speed

It is the speed of a body in motion at a particular instant. It is given by

S_{Inst} = Lim ?d/?t (? t--0)

Average speed

The total distance traveled by the body by the time taken to cover the distance is the average speed. It is given by-

S_{av}= Total distance travelled / total time taken to cover the distance

