MOTION

01 REST

- If position of an object with respect to its surroundings doesn't change with time, we say that the object is at rest. Example: A tree and a building with respect to ground are at rest.

02 MOTION

- If position of an object with respect to its surroundings changes with time, we say that the object is in motion. Example- Position of a moving car with respect to ground changes with time.

03 REFERENCE POINT

- A point with respect to which the position of an object is described is called reference point. We choose a reference point according to our convenience.

04 DISTANCE

- Distance is the length of the actual path travelled by an object from one point to another point.

05 DISPLACEMENT

- Displacement is the length of the shortest path from the initial point to the final point. It is a vector quantity that has magnitude as well as direction.

06 SPEED

- It is time rate at which an object travels distance. The SI unit of speed is metre per second and represented as m/s.

07 AVERAGE SPEED

- The speed defined for a time-interval is known as average speed.

If an object travels a distance s in time t then its speed v is, $v = \frac{s}{t}$

08 VELOCITY

- The speed in a particular direction is called velocity. Thus, velocity has two type of variables speed and direction. It can be changed by changing the object's speed, direction of motion or both. Its SI unit is metre per second and represented as m/s.

If velocity of an object is changing at a uniform rate, then average velocity is average velocity = initial velocity(u) + final velocity$(v)/2$ or $V_{avg} = \frac{U + V}{2}$,

09 ACCELERATION

- The time rate of change of velocity is called acceleration. If the velocity of an object changes from an initial value u to the final value v in time t, the acceleration, $a = \frac{V - U}{t}$. The SI unit of acceleration is ms^{-2}.

If the change in velocity is equal in equal time intervals, the acceleration is called uniform acceleration. The motion of a freely falling object is a uniformly accelerated motion.If the change in velocity is unequal in equal time intervals, the acceleration is called non-uniform acceleration. if a bike travelling along a straight road increases its speed by unequal amounts in equal intervals of time, then the motion of the bike is called non-uniform accelerated motion.

10 UNIFORM MOTION

- If an object moves equal distance in equal time-intervals, the motion is called uniform motion. Example: A bike moving with constant speed.

11 UNIFORM CIRCULAR MOTION

- When an object moves on a circular path with a constant speed not velocity, the motion of the object is known as uniform circular motion. Example-Motion of Tip of needles in watch.

12 NON UNIFORM MOTION

- If an object moves unequal distance in equal time-intervals, the motion is called non-uniform motion. Example- Motion of car on a crowded road.

13 STRAIGHT LINE MOTION

- If an object moves along a straight line, this type of motion is known as straight line motion. Example: A bus moving on a straight road.

14 EQUATIONS OF MOTION

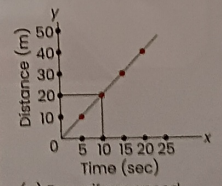
1st equation, $v = u + at$

2nd equation, $S = ut + \frac{1}{2}at^2$

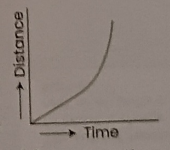
3rd equation, $v^2 = u^2 + 2aS$.

15 GRAPHICAL REPRESENTATION OF MOTION

1 Distance: Time Graph-In this graph, time is taken along the x-axis and distance are taken along the y-axis.

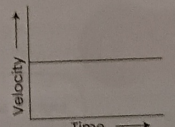


(a) For uniform speed The graph will be a straight line.

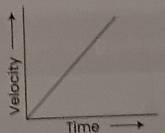


(b) For non-uniform motion- The graph will be non-linear that means it will be curved shape.

2 Velocity Time Graph: In this graph, time is taken along the x-axis and velocity are taken along the y-axis.



(a) For uniform motion



(b) For uniform accelerated motion