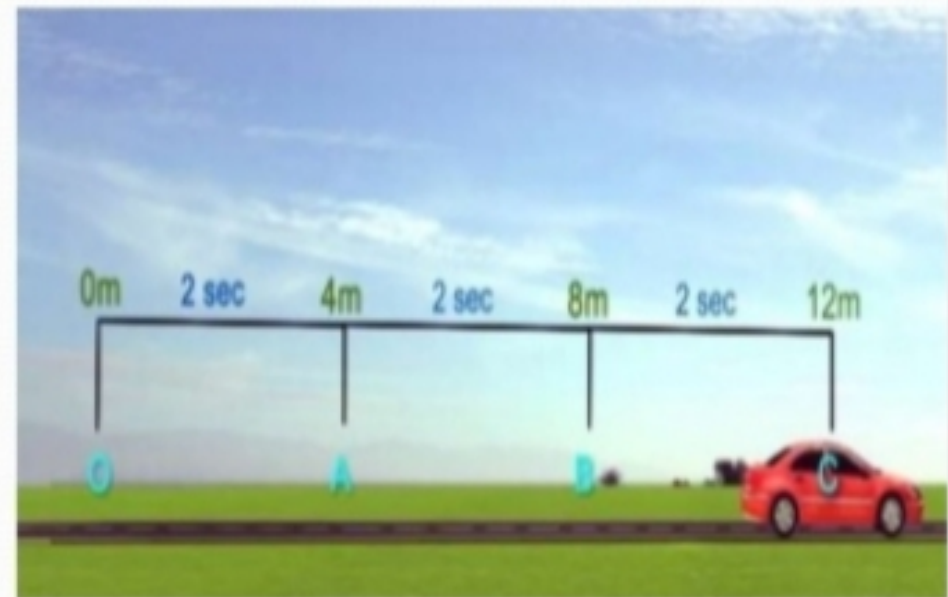
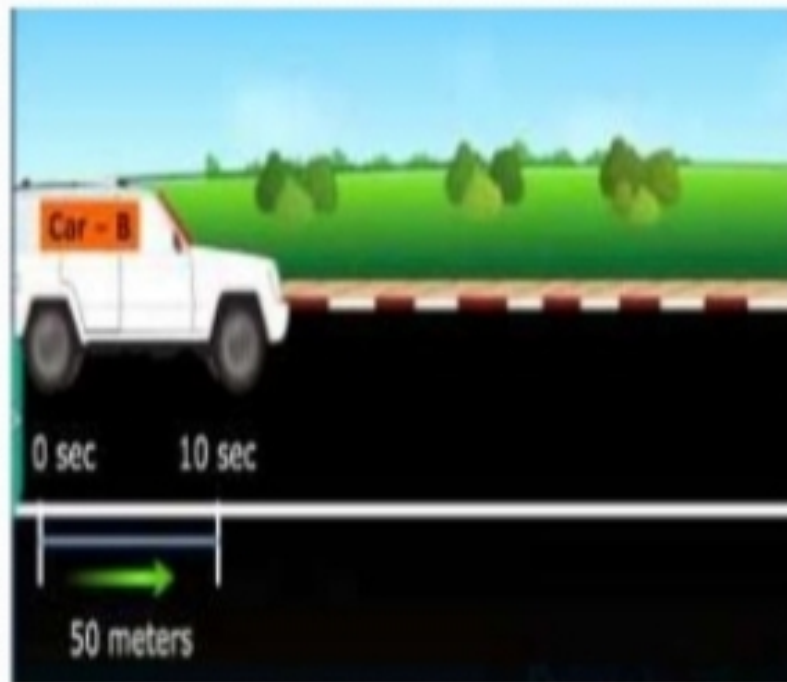




# Uniform motion

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



# Examples of uniform motion

- Car going along a straight road at a constant speed
- The train going along the tracks at a constant speed
- The movement of the fan
- Vibrating spring in a sewing machine
- Cooling fan running at a fixed speed

# Non-uniform motion

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



# Examples of non uniform motion

- The movement of an asteroid
- Car coming to a halt
- A bouncing ball
- The train coming to its terminating stop
- Dragging a box from a rough surface



## DIFFERENCE BETWEEN UNIFORM & NON-UNIFORM MOTION

- ◉ **Uniform motion**
- ◉ Travel equal distance in equal interval of time.
- ◉ The distance-time graph for a body having uniform motion is a straight line.
- ◉ **Non-uniform motion**
- ◉ Travel unequal distance in equal interval of time.
- ◉ The distance-time graph for a body having non-uniform motion is a curved line.

**For eg: a car running at a constant speed of 10m p/s .it means car covering distance a distance 10m p/s. so, Its motion will be in uniform motion.**

**For eg:the motion of a free falling body is an example of non-uniform motion.**

speed



- o To describe how fast something is moving, you need to know how far it travels in a given amount of time.
- o **Speed is the distance an object travels per unit of time.**

$$v_m = \frac{\text{distance}}{\text{time}} = \frac{As}{At}$$

- o In SI (International system) units, **the unit of speed is meters per second (m/s).**

The speed of an object can be calculated using this equation:

$$\text{speed} = \frac{\text{distance travelled}}{\text{time taken}}$$

- Distance travelled is measured in **metres (m)**.
- Time taken is measured in **seconds (s)**.
- Speed is measured in **metres per second (m/s)**.

The standard unit for speed in physics is **m/s**, but other units such as kilometres per hour (km/h) are more convenient when measuring the speed of vehicles.



A train takes 100 seconds to travel 1,500 m.  
What is the speed of the train?

$$\begin{aligned}\text{speed} &= \frac{\text{distance}}{\text{time}} \\ &= \frac{1,500}{100} \\ &= \mathbf{15\text{m/s}}\end{aligned}$$



# What is Average Speed?

It is the total distance travelled divided by total time taken.

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

Suppose a truck travels 60 Kilometer in first hour and 80 Kilometer in Second hour. What is Average Speed of Truck?

$$\begin{aligned}\text{Total Distance Travelled} &= 60 + 80 \\ &= 140 \text{ km}\end{aligned}$$

$$\begin{aligned}\text{Total Time Taken} &= 1 \text{ hour} + 1 \text{ hour} \\ &= 2 \text{ hour}\end{aligned}$$

Average Speed

$$\begin{aligned}&= \frac{\text{Total Distance}}{\text{Total Time}} \\ &= \frac{140}{2} \\ &= 70 \text{ km/hour}\end{aligned}$$

## + MASS AND WEIGHT

- Mass and weight are not the same thing. Although we often use the interchangeably, each one has a specific definition and usage.
- **Mass**- measure of the amount of matter in an object. The mass of an object is independent of its location. The basic unit form mass is **kilogram (kg)** .
- **Weight**- force of attraction between the object and the earth's gravity. The weight of an object can vary from place to place and changes with its location on the Earth.



---

## **EFFECT OF CHANGE IN PLACE ON MASS AND WEIGHT**

The mass of a body remains constant every where on the surface of earth or on any other heavenly body. But the weight of the body changes from place to place because it depends on the force of attraction of earth (or other heavenly body) on the body which differs from place to place. *For example*, the mass of a body is same on earth's surface as well as on moon's surface, but the weight of the body on moon's surface is  $\frac{1}{6}$ th of the weight of the body on earth's surface because the force of attraction of moon on that body is  $\frac{1}{6}$ th of the force of attraction exerted by the earth.

---



## ***Difference Between Mass and Weight***

### ***Mass***

- It is a measure of the number of atoms or amount of [matter](#) in an object.
- It is constant for a body and does not change with a place.
- Measured using a beam balance.
- It's S.I. unit is kilogram (kg).

### ***Weight***

- It is a force exerted by an object of fixed mass due to gravity.
- It is not constant for a body, but it changes from place to place.
- Measured using a spring balance.
- Its S.I. unit is Newton (N) and kilogram-force (kgf) where  $1 \text{ kgf} = 9.8 \text{ N}$

---

# Home Work

Distinguish between uniform and non-uniform motions, giving an example of each.

How do you determine the average speed of a body in non-uniform motion ?

Define the term weight and state its S.I. unit.

How are the units of weight, kgf and newton related ?

State three differences between mass and weight.

Which quantity : mass or weight, does not change by change of place ?

---