

## Motion in one dimension

Physical Quantity:- Quantities which can be measured are called physical quantities

eg:- Height, weight, Temperature

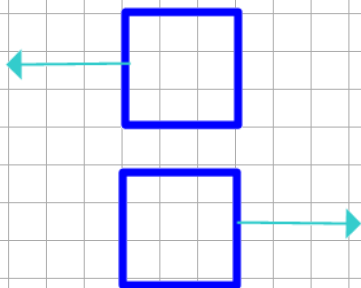
Non physical quantity:- Taste, anger, etc which cannot be measured.

Physical quantities

Vector

They have both magnitude and direction

eg:-



Direction of force

applied is important to determine the direction of motion

∴ We say Force is a Vector quantity

Scalar

They can have magnitude only.

eg:- Temperature

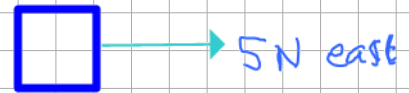
Scalar quantities are represented by numerical value and unit

eg:-  $\underline{5}$   $\underline{\text{ft}}$  2 inches  
Numerical Value      unit

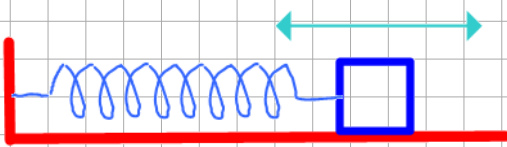
Vector quantities are represented by numerical value, unit and direction

Force

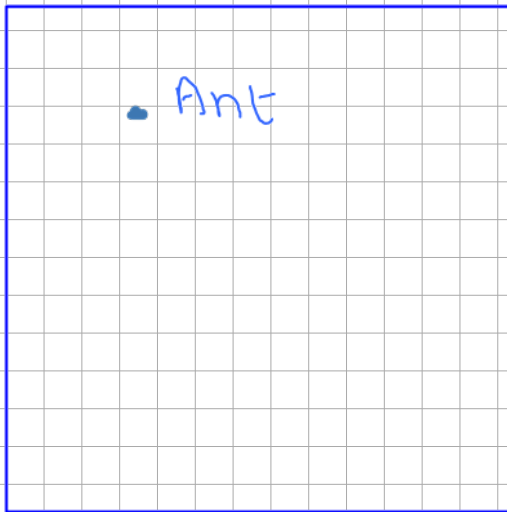
$\underline{5\text{ N}}$   $\underline{\text{east}}$   
magnitude      direction



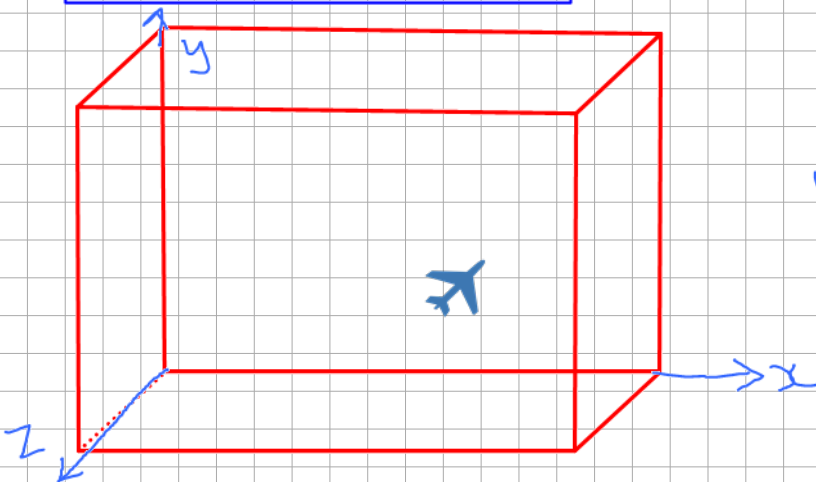
### MOTION IN ONE DIMENSION



one dimensional motion  
Motion is restricted to one axis

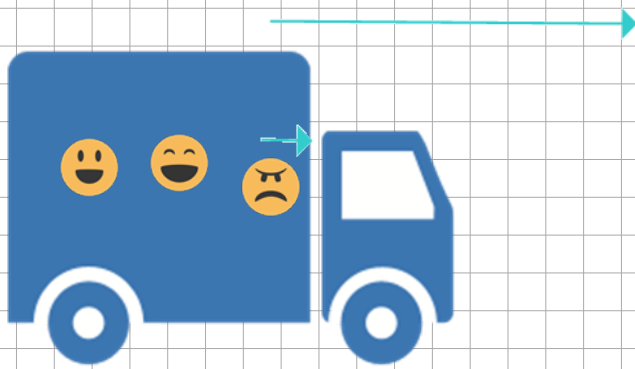


Ant crawling on the floor  
Motion is restricted to two axis / dimensions



Motion in 3 dimensions

## Rest and Motion

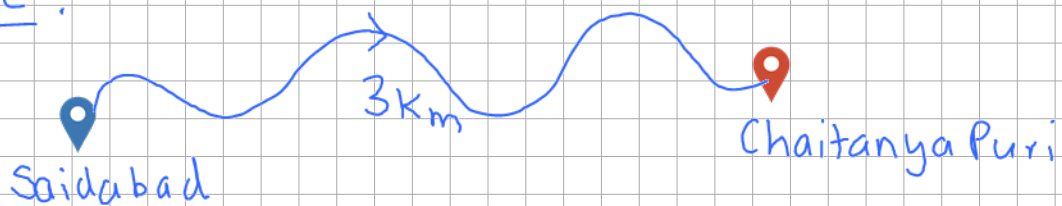


😊 Relative to person on ground all 3 persons in the truck are in motion.

Rest and motion are relative terms.

1st Physical quantity

Distance :-



The length of path covered is called distance.

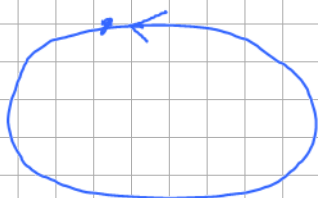
This is a scalar quantity.

SI unit (System International) metre (m)

eg:-



Distance covered = 40m



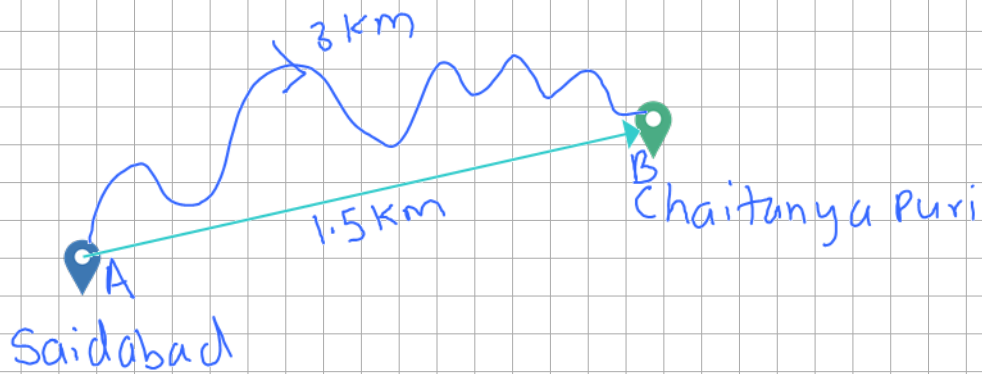
Distance covered  $\neq 0$

## 2<sup>nd</sup> physical quantity

### Displacement

**The shortest distance from the initial to the final position of the body, is the magnitude of displacement and its direction is from the initial position to the final position.**

Displacement is a vector quantity



Vector quantity is shown by an arrow above it as shown

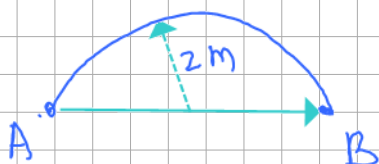
$$\vec{S} = \underbrace{1.5 \text{ km}}_{\text{magnitude}} \underbrace{\text{along AB}}_{\text{direction}}$$

SI unit is m

eg:-



$$\text{Displacement} = \underbrace{20\text{m}}_{\text{mag}} \underbrace{\downarrow}_{\text{dir}}$$

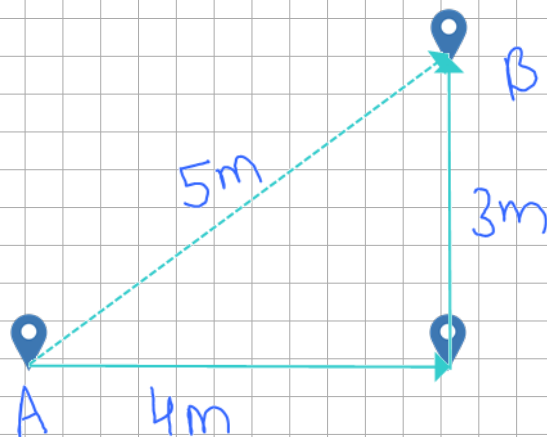


Semicircle of radius 2m

$$\text{Displacement} = \underbrace{4\text{m}}_{\text{mag}} \underbrace{\text{east}}_{\text{dir}}$$

$$\text{Distance covered} = \pi r = \pi \times 2 = \underline{\underline{2\pi}} \text{ m}$$

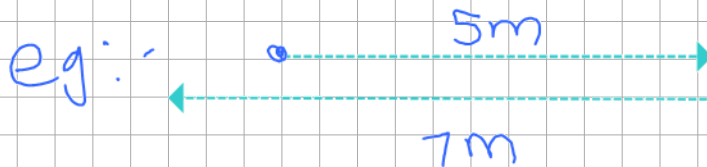
Eg:-



$$\text{Distance} = 7 \text{ m}$$

$$\text{Displacement} =$$

$$\underbrace{5 \text{ m}}_{\text{mag}} \text{ along } \underbrace{AB}_{\text{dir}}$$



Find disp and dist.

$$\text{dist} = 12 \text{ m}$$

$$\text{disp} = -2 \text{ m}$$



### Home work

1. On an expedition, you walk 40 m due south and then 30 m due west. Determine how far and in what direction are you from your starting point.

2. If a person walks 1 km north, 5 km west, 3 km south, and 7 km east, find the resultant displacement vector.

3. A body moves over one fourth of a circular arc in a circle of radius  $r$ . Find the magnitude of distance travelled and displacement

4. What is the displacement of the point of the wheel initially in contact with the ground, when the wheel rolls forward half a revolution will be (radius of the wheel is  $R$ )?