MOTION AND MEASUREMENT OF DISTANCE

TRANSPORT SYSTEM EVOLUTION:

- Transport is the mechanism by which a thing is carried from one place to another.
- In the earlier times land transport was done using animals or human backs, while water transport was done on hollow wooden logs or simple wooden boats.

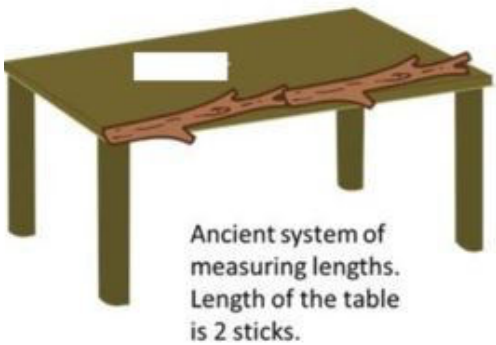
- After the invention of wheels, bullock carts, chariot, camel carts were developed where animals used to pull vehicles.

- Transport then evolved in 19th and 20th century to bus, trains, cars, airplane, jets, steam and motor boats etc.

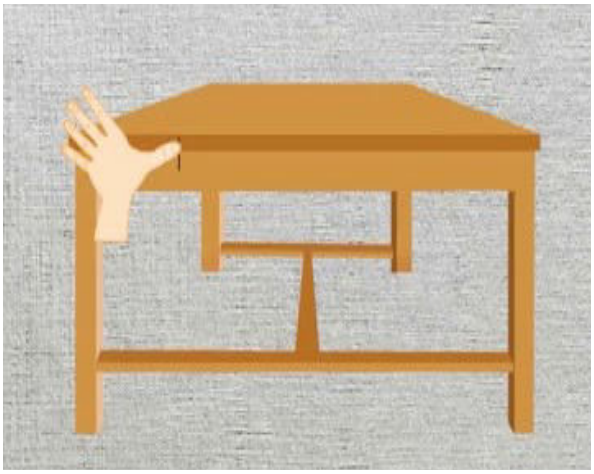
LENGTH AND DISTANCE

Length tells us how long an object is.

- Before the invention of scales, length was measured with the help of random wooden sticks, hands, threads.



Ancient system of measuring lengths. Length of the table is 2 sticks.



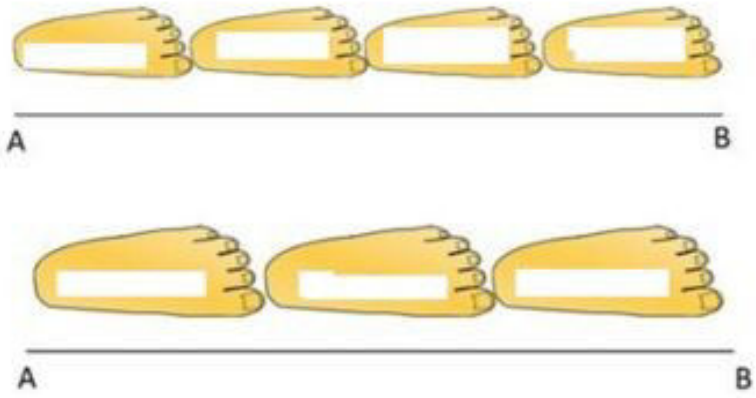
Distance gives the information about how far two things are.

- Distance were measured in days or time taken to reach from one place to another.

MEASUREMENT

Measurement is comparison of an unknown quantity with a known quantity.The known quantity is called UNIT.

- Measurement consists of two parts, a number (quantity) and a unit. Depending upon the unit, the number changes.
  For example: Distance between point A and B is 4.5 km or 2.79 miles.
- If the length or distance is measured by the length of foot of a person, then the same length or distance will have different values as the length of foot of different people differ slightly.
- In ancient times, cubit (length from elbow to finger tips), foot, distance between outstretched arm and chin were taken as the unit of length.



When measured by human feet, the measurement of same distance varies based on length of individual foot.

STANDARD UNIT OF MEASUREMENT

Scientists all over the world have accepted a set of standard units for measurement. This system of units is called International System of Units (SI units).

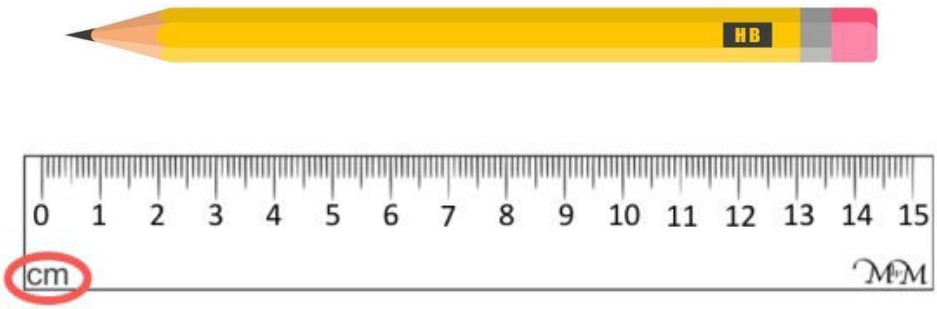
- In 1790s, the French created a standard unit of measurement called the Metric System.
- SI unit of length is meter (m), while for large distances; the unit is kilometre (km).

1 km = 1000 m (metre)
1 m = 100 cm (centimetre)
1 cm = 10 mm (millimetre)

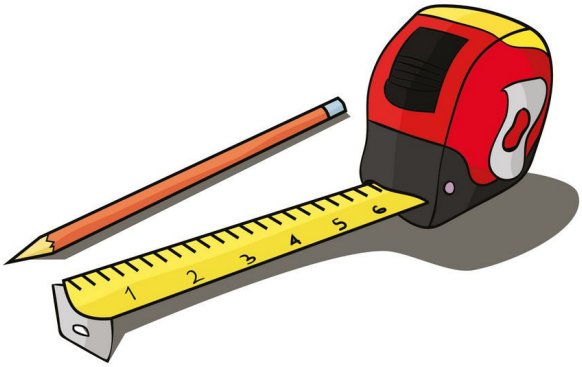
TAKING CORRECT MEASUREMENT

Below are some steps that need to be followed for taking correct measurements.

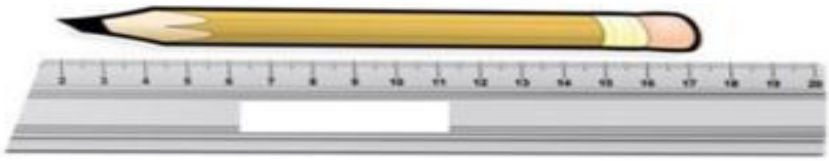
- For measuring lengths of smaller objects like pencil, a 15 cm scale should be used



- For measuring length of a curved surface like a tree trunk, measuring tapes are useful.

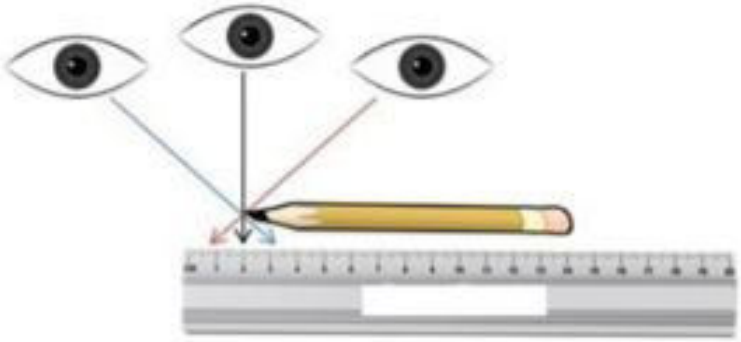


- Use a whole (non-broken) instrument. If using an instrument with broken edges, start from the portion where the instrument is complete.



In case of a broken scale, take the reading from a number from where the scale is fine. i.e. from 2 onwards.

- Keep your eye at the correct position for taking the reading. Incorrect position may lead to slightly incorrect reading.



Viewing from 3 different angles. Blue and red arrows denote that if viewed from sides, the measurement will be slightly incorrect.

MEASURING LENGTH OF A CURVED LINE

A curved line or surface cannot be measured by a straight scale, a measuring tape or thread must be used instead.

To measure a curved line using a thread, follow the below steps:

- Tie a knot at one end of the thread.
- Place the thread at the beginning of the line and try to measure a small initial portion of the line which is relatively straight.
- Place your thumb at the other end of the measured portion and measure the next straighter portion.
- Repeat the above steps till the end of the line is reached. Make a knot at the end of the line.
- Now, straighten the thread and measure the length of the two knots on the scale.

Measure a curved line. Take small portions of the line and measure using the thread. First measure from A to 1, then 1 to 2, then 2 to 3, and so on, using the same thread.

MOVING THINGS AROUND US

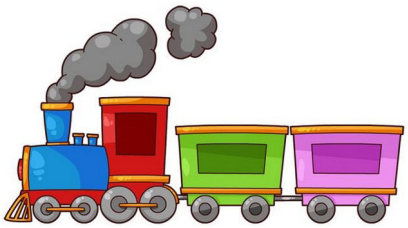
Objects which are moving around us are said to be in motion, whereas the objects which are not moving are said to be at rest.

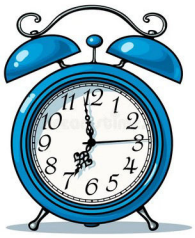
- Any change in the position of the object with time can be termed as MOTION.

- A Motion can be termed as slow or fast based on the distance it covers in a specific amount of time. More distance covered means the motion is fast and vice versa.

- Motion can be of the complete object or of the parts within it.

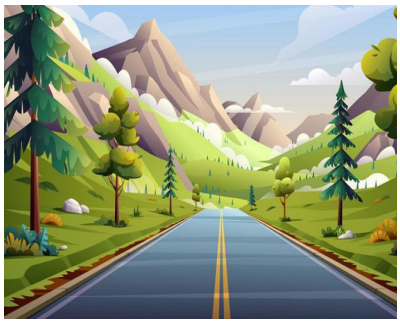
- Objects like train, bird, hands of the clock, ants are moving objects.





- Objects like house, bench, roads, mountains are non-moving or stationary objects.





TYPES OF MOTION

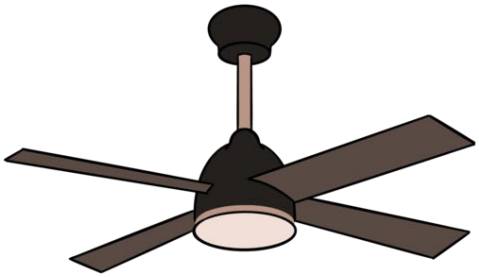
Motion is classified into various types based on the path they follow.

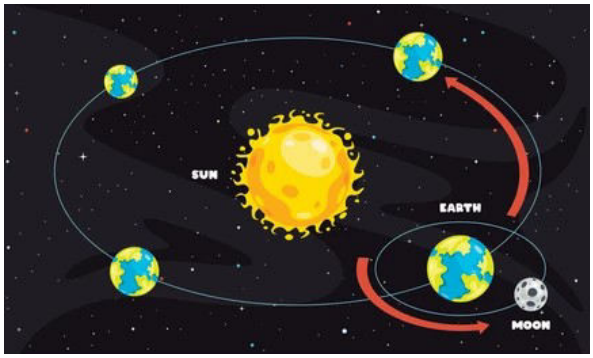
- ***Rectilinear Motion –*** This is a motion where objects move along a straight line.

Example – March past of soldiers, sprinting in race, falling stones etc.


- ***Circular Motion –*** This is a motion where objects move along a straight line.

  Examples – Hands of a clock, blades of fan, rotation of Earth around sun etc.





- ***Rotational Motion –*** A type of circular motion where an object spins on its own axis,

  Example – Rolling ball, blades of helicopter

- ***Periodic Motion –*** A type of motion where object repeats its motion after a fixed interval of time.

  Example – Pendulum of a clock, motion of child on a swing etc.