6th – Measurement & Motion

Measurement is the process of comparing the unknown quantity means giving a number to something that is measurable, like length, mass, volume, etc.

Motion: When one object moves with respect to another, it is said to be in 'motion'.

History of transport: In ancient times, people had to walk, use boats or animals like horse to travel from one place to another. They used simple boat and raft made of tree trunks to travel across rivers. Later, invention of the wheel led to the development of several other modes of transport like cart, ship, train, car, and aero plane.

Measurement: Measurement is the process of finding the length, size, or quantity of a substance. A physical quantity (like length) to which to be measured with respect to some fixed quantity. A fixed quantity with respect to which a physical quantity is measured is called a unit. In early times, people used different body parts like hand span, cubit and fathom to measure length.

Foot, pace, and yard are some other units of length based on body parts.

Standard units of measurements: Units that have a fixed quantity and do not vary from person to person and place to place are called standard units. For example, the metric system, created by the French in 1790, is a standard set of units.

People in different countries may be using a different set of standard measurement units. For the sake of uniformity, scientist all over the world have adopted a common set of units. This system is called the international system of units or the SI units.

The SI unit of length is meter. Some common standard units of length are inch, millimeter, centimeter, and kilometer.

Depending on the size of the object, we need to measure; we have to choose an appropriate unit. For example, we use meters to measure the length of a piece of cloth, kilometer to measure the distance from one place to another. Centimeter (cm) and millimeter (mm) are used to measure shorter distances while kilometer (km) is used to measure longer distance.

Measurement of length:

10 millimeters = 1 centimeter (cm)
100 centimeters = 1 meter (m)
1000 meters = 1 kilometer (km)

The distance of something from one end to the other is called length. It can be measured using a ruler, a measuring tape, a meter rod, and so on, whichever is convenient for the required purpose. While measuring length using a ruler, we should take the following precautions:

1. Care should be taken to keep the ruler along the length of the object.
2. If the edge of the ruler is worn out or broken, the measurement should be started from any other mark that is fully clear.
3. Eyes should be exactly above the point where the measurement is to be taken. If your eyes are at different positions, you might get wrong readings.

Using a divider to measure length: A divider is used to measure the distance between two points.

Measuring the length of a curved line: The length of a curved line can be measured using a string. The string is placed along the curved line and its ends are marked on the string. The length of the string between the marked points is measured with a ruler.

Relevance of estimations: In many cases, it is important to make accurate measurements. However, in some cases, such accurate measurements are not necessary. For example, the distance between your school and your house need not be measured to the last millimeter. For example a rough idea of 'how much' of each ingredient is enough to cook a meal.This 'idea of how much' is called 'estimation'. Estimation skills will be very useful to you throughout your life.

Motion: When we say an object is moving. It is always with respect to another object. For example, when we say a vehicle is moving on a road, it is moving with respect to the trees and poles on the road, which are 'not moving'.

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For example: When the car is at position A, the distance between the car and the building is very small. As the car moves away from the building (position B), its distance from the building increase. Another way of saying this is that when the car moves, its position with respect to the building changes with time.

An object is said to be in motion if its position (with respect to another object) change with time.

Types of motion: There are different types of motion: translational, rotational, periodic, and non- periodic motion.

Translational motion: A type of motion in which all parts of an object move the same distance in a given time is called translational motion. Examples are vehicles moving on a road, a child going down a slide, and a bird flying in the sky. Translational motion can be of two types, rectilinear and curvilinear.

Rectilinear motion	Curvilinear motion
1.When an object in translational motion Moves in a straight line, it is said to be in rectilinear motion.	1. When an object in translational motion moves along a curved path, it is said to be in curvilinear motion.
2.Examples are a car moving on a straight road and a train moving on a straight track.	2. Examples are a stone thrown up in the air at an angle and a car taking a turn.

Rotational motion: When an object moves about an axis and different parts of it move by different distances in a given interval of time, it is said to be in rotational motion. Examples of objects undergoing rotational motion are blades of a rotation fan, merry-go-round.

Periodic motion: A type of motion that repeats itself after equal intervals of time is called periodic motion. Example of objects undergoing periodic motion are the to and fro motion of a pendulum, the earth (rotating on its axis), the hands of a clock.

Non- periodic motion: A motion that does not repeat itself at regular intervals or a motion that does not repeat itself at all is called non- periodic motion. Example of non-periodic motion are a car moving on a road, a bird gliding across the sky, and children playing in a park. In everyday life, we observe more than one type of motion, like

- Birds gliding across the sky (translational and non- periodic)
- Rotation of the earth on its axis (rotational and periodic)

Speed is a way of measuring how quickly something is moving or being done, or something moving fast

Calculation of Speed: we can calculate speed from the given formula.

Speed = Distance/ Time.

Q1. Find the speed when the body has covered 220km in 4hrs.

Q2. Calculate speed when car travels 3500km in 5 hours.