

P.N.
①

CLASS - VII

SUBJECT - SCIENCE

CHAPTER - MOTION AND TIME (PART-II)

Measurement of Time

A duration or moment in which things occur is known as time. With the help of clocks and watches, we generally measure time. It is very difficult to think that how did the people in ancient time measure times as they did not have clocks or watches.

In order to measure the time, ancient people used some natural events which repeated regularly after fix time interval. Eg → they found that the sun rises every day in the morning. So, the time between one sunrise and the next one was known as a day.

In a similar manner, time from one full moon to the next full moon was called a month.

A year was fixed as the time taken by the earth to complete one revolution of the sun.

Many time measuring devices were used in different parts of the world before the pendulum clock became

popular. Sundials, water clocks and sand clocks are some examples of such devices.

Sundial

A sundial measures time by the position of the shadow cast by the sun.

Sand Clock

The device which uses the flow of sand from one glass bulb to another in order to measure time is known as a sand clock.

Water Clock

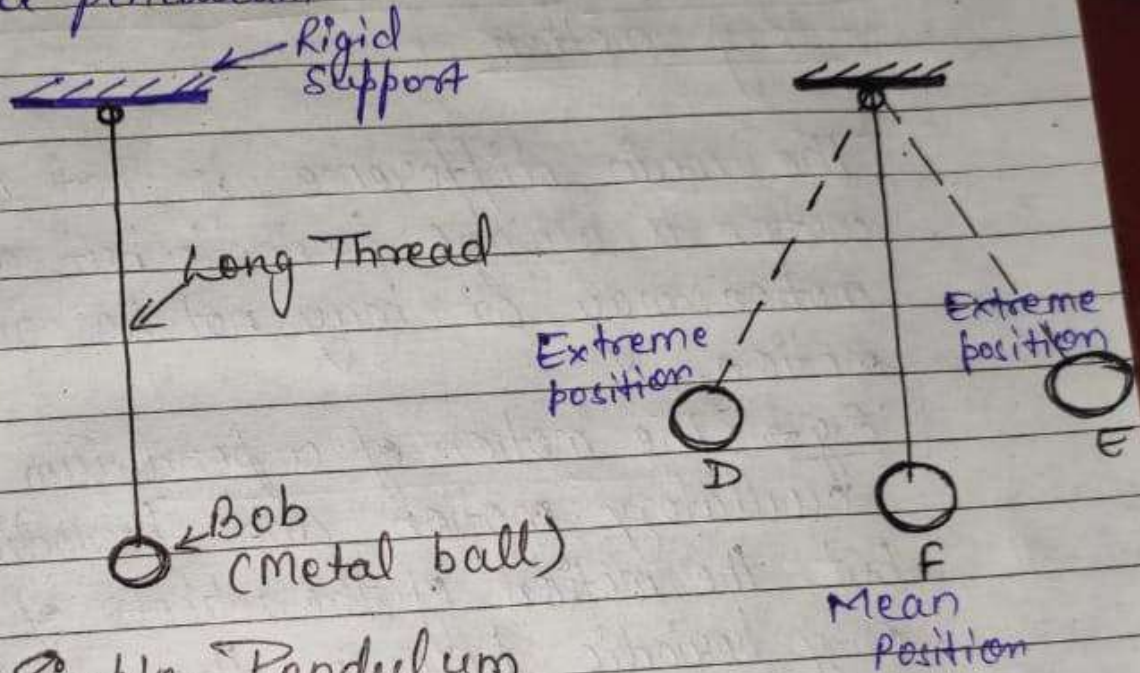
A device which uses the rate at which water drip from one vessel to another measure time interval is known as a water clock.

Simple Pendulum

A simple pendulum consists of a small metal ball called bob which is suspended by a long thread from rigid support such that bob is free to

swing back and forth.

The to and fro motion of a simple pendulum is an example of periodic or oscillatory motion. Galileo was the first person to study the motion of a pendulum.



Simple Pendulum

Motion of a Simple Pendulum

NOTE

Periodic Motion

It is defined as the motion that repeats itself after fixed interval of time.

Oscillatory Motion

It is defined as the to and fro motion of the body about its fixed position.

E.g. → Vibrating strings, swinging of the swing etc.

Difference Between Periodic and Oscillatory motion

The main difference is that oscillatory motion is always periodic but a periodic motion may or may not be oscillatory motion.

E.g. → The motion of a pendulum is both oscillatory motion and periodic motion but the motion of the wheels of a car is only periodic because the wheels rotate in a circular motion.

Motion of a Simple Pendulum

A pendulum completes every swing or every oscillation in exactly the same time provided its length should be kept constant. The pendulum is said to have completed one oscillation when its bob starts from its mean position F, moves to D, to E and back to F.

The pendulum also completes one oscillation when its bob moves from one extreme position D to the other extreme position E and come back to D. So, the time taken by the pendulum to complete one oscillation is called its time period.

The time period of a pendulum depends on its length. The length of a pendulum is the length of thread from the point of suspension to the centre of the bob.

NOTE

Galileo experimented with various pendulums to verify his observation. He found that same time was taken always to complete one oscillation by a pendulum of a given length. This observation led to the development of pendulum clocks. Winding clocks and wristwatches are refinements of the pendulum clocks.

Units of Time

Second is the basic unit (or standard unit) of measuring time and it is represented by symbol s. The larger units of time are minute and hour.

$$\text{i.e. } 1 \text{ hour} = 60 \text{ min}$$

$$1 \text{ min} = 60 \text{ s}$$

Bigger units of time are — day, month and year.

i.e. $1 \text{ day} = 24 \text{ h}$, $1 \text{ month} = 30 \text{ days}$
 $1 \text{ year} = 12 \text{ months}$.

NOTE Nowadays, most clocks or watches have an electric circuit with one or more cells. These clocks are called quartz clocks. The time measured by quartz clocks is much more accurate than that by the clocks available earlier.

HOME ASSIGNMENT

Short answer question —

- ① Define time.
- ② Define —
 - (a) day
 - (b) month
 - (c) year
- ③ Who was Galileo?
- ④ How sundial works?
- ⑤ Give one example of each —
 - (a) Periodic Motion
 - (b) Oscillatory Motion.
- ⑥ Define Time period.
- ⑦ What are the different units of time?
- ⑧ What are quartz clocks?

P.N.
7

PAGE NO.:

DATE: / /

- 9) On which factor does the time period of a pendulum depend?
- 10) Show the extreme and mean position of a simple pendulum on a diagram.

Long Answer question-

- 1) How was time measured in ancient times?
- 2) Differentiate: Sand Clock and Water clock.
- 3) Differentiate: Periodic Motion and Oscillatory motion.
- 4) Explain the motion of a simple pendulum with a diagram.
- 5) How Galileo developed pendulum clocks?
- 6) Why, quartz clocks are most oftenly used rather than pendulum clocks?