

# Science of Grade-7 (CBSE)

## CHAPTER - 12

### MOTION AND TIME



# 1) Motion :-

Motion :- is the change in position of an object with time.

There are different types of motions. They are :-

i) Motion along a straight line (Rectilinear motion) Eg :-

Motion of a car on a straight road.

ii) Periodic motion. Eg :- Motion of a pendulum.

iii) Circular motion. Eg :- Motion of the earth around the sun.

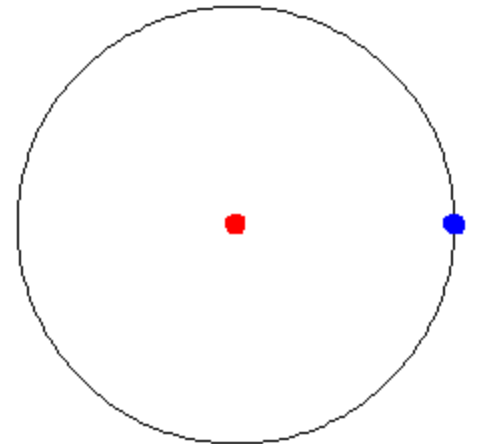
Motion along a straight line



Periodic motion



Circular motion



## 2) Speed :-

Speed :- The distance covered by an object in a unit time is called the speed of the object.

Eg :- If a car covers a distance of 100 kilometres in one hour and a bus covers a distance of 50 kilometres in one hour, then the speed of the car is more than the speed of the bus.

Since the speed of most objects are not constant, the speed is the average speed.

Total distance covered

Speed = -----

Time taken

Uniform motion :- If the speed of an object is constant, it is in uniform motion.

Non uniform motion :- If the speed of an object keeps changing, it is in non uniform motion.



### 3) Measurement of time :-

Time is measured by using clocks or watches. Clocks and watches make use of periodic motion.

**Wall clocks**



**Table clock**



**Watches**



**Digital clocks**

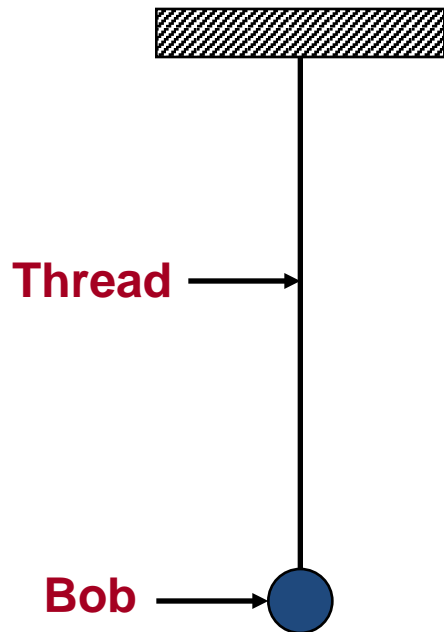


## 4) Simple pendulum :-

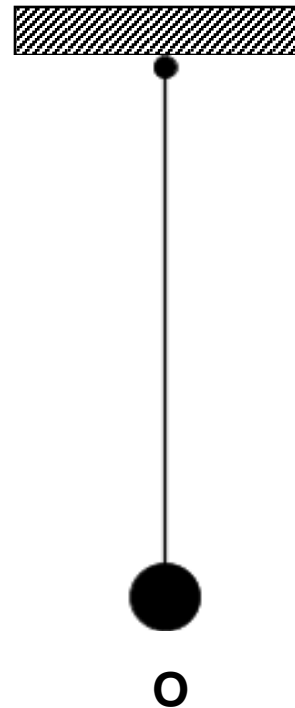
A simple pendulum has a small metallic bob suspended from a stand by a thread.

If the bob is taken to one side and released, it moves to and fro. The to and fro motion of the simple pendulum is called periodic motion or **oscillatory motion**.

A simple pendulum



A



B



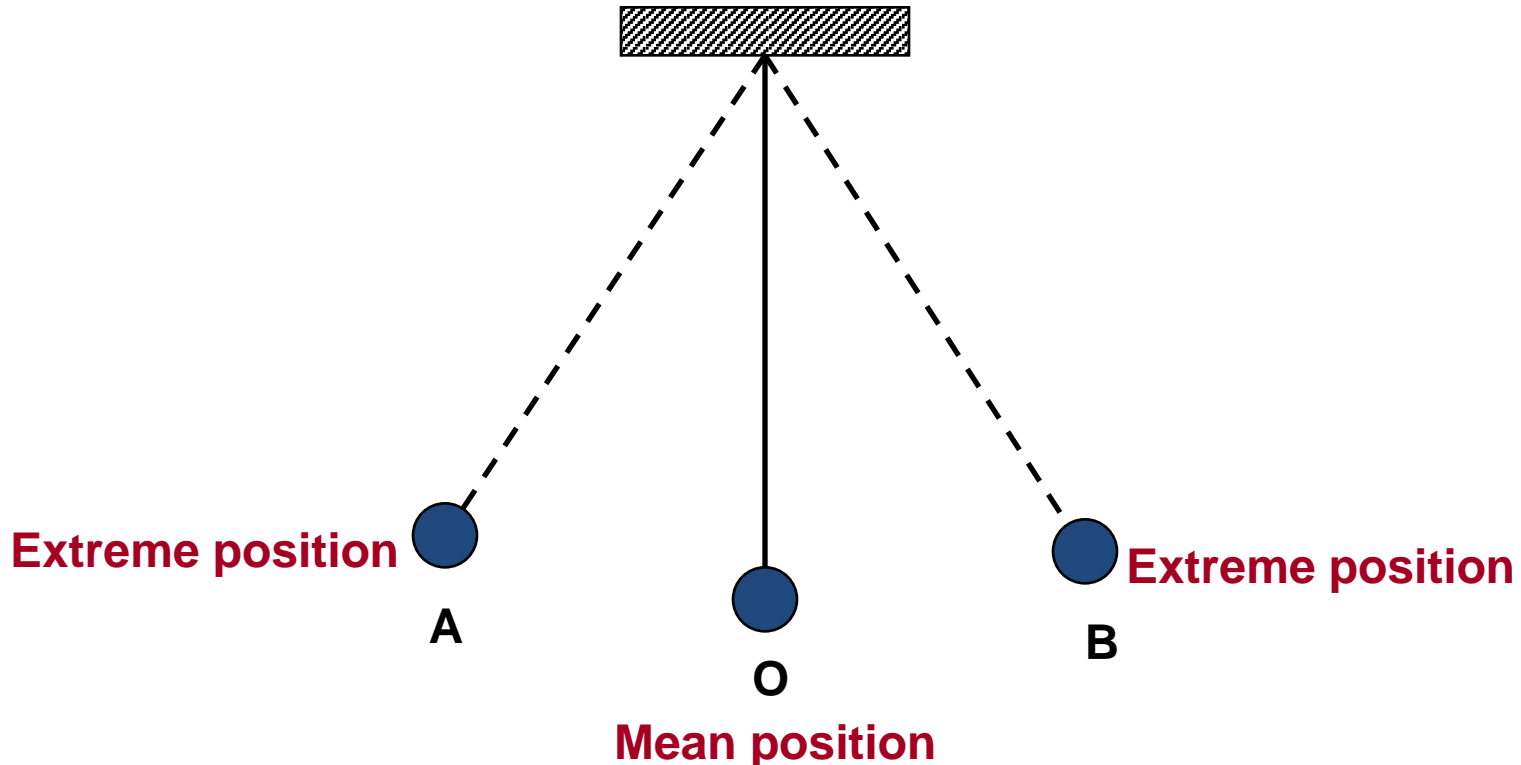
## Oscillation :-

When the bob moves from the mean position O to A and to B and back to O, it is called one oscillation.

When the bob moves from one extreme position A to the other extreme position B and back to A, it is called one oscillation.

## Time period :-

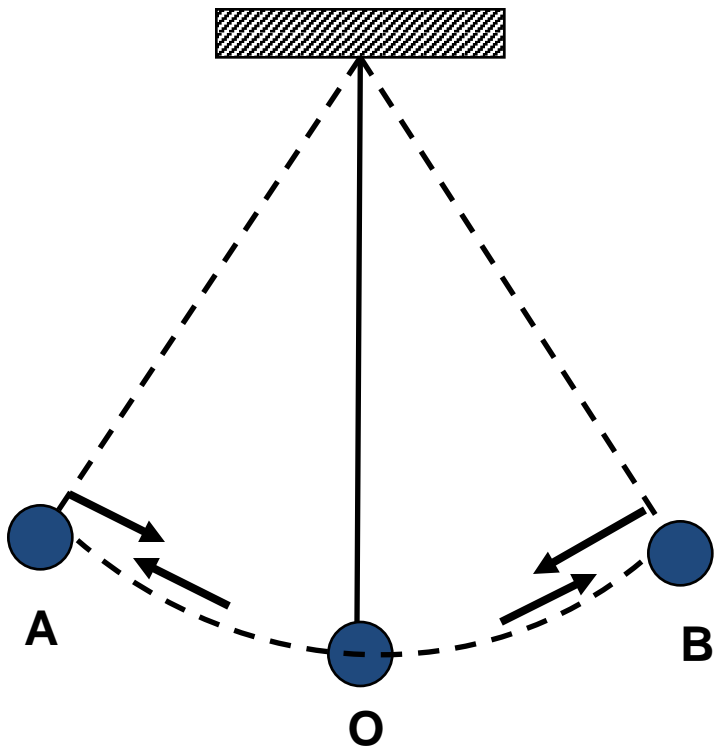
The time taken by the pendulum to complete one oscillation is called its time period.



## Activity :- To measure the time period of a simple pendulum.

Set up a simple pendulum with a thread of length about one meter. Move the bob to one side and release the bob. Measure the time taken to complete 20 oscillations using a stop watch or stop clock. Record the observations in the table. Repeat the activity three times and record the observations. Find the time taken for one oscillation.

The time period is nearly the same in all cases.



Sl.No.	Time taken for 20 oscillations	Time period
1		
2		
3		



## 5) Units of time and speed :-

a) The basic unit of time is second (s).

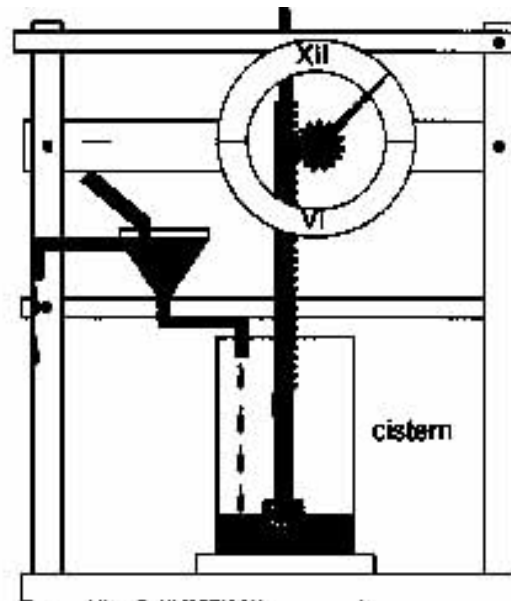
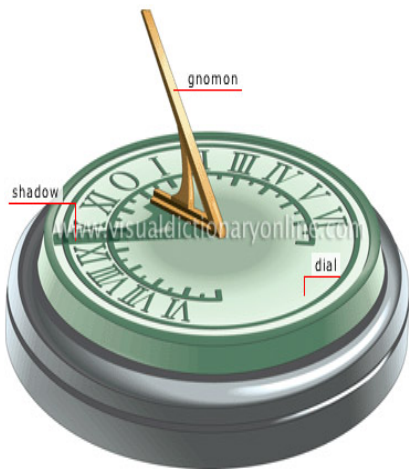
The larger units of time are minutes (min), hours (h) etc.

b) The basic unit of speed is metre per second (m/s).

A larger unit of speed is kilometre per hour (km/h).

## 6) Ancient time measuring devices :-

Some ancient time measuring devices were Sun dials, Water clocks and Sand clocks.

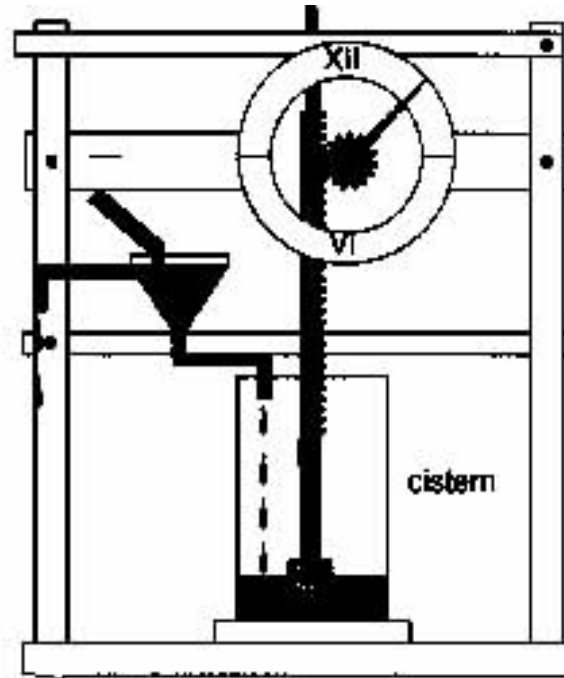




**SUN DIAL**



**WATER CLOCK**



**SAND CLOCK**



## 7) Measuring speed :-

The speed of an object can be measured if we know the distance covered by the object and the time taken.

Eg :- If a car covers a distance of 100 kilometres in two hours, then the speed of the car is :-

Distance covered – 100 km

Time taken – 2 hr

Distance      100

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}} = \frac{100}{2} = 50 \text{ km/h}$$

If we know the speed of the car and the time, we can find the distance covered by it.

Distance = Speed x Time

$$= 50 \times 2 = 100 \text{ km}$$

If we know distance covered by the car and the speed, we can find the time taken.

Distance      100

$$\text{Time} = \frac{\text{Distance}}{\text{Speed}} = \frac{100}{50} = 2 \text{ hr}$$



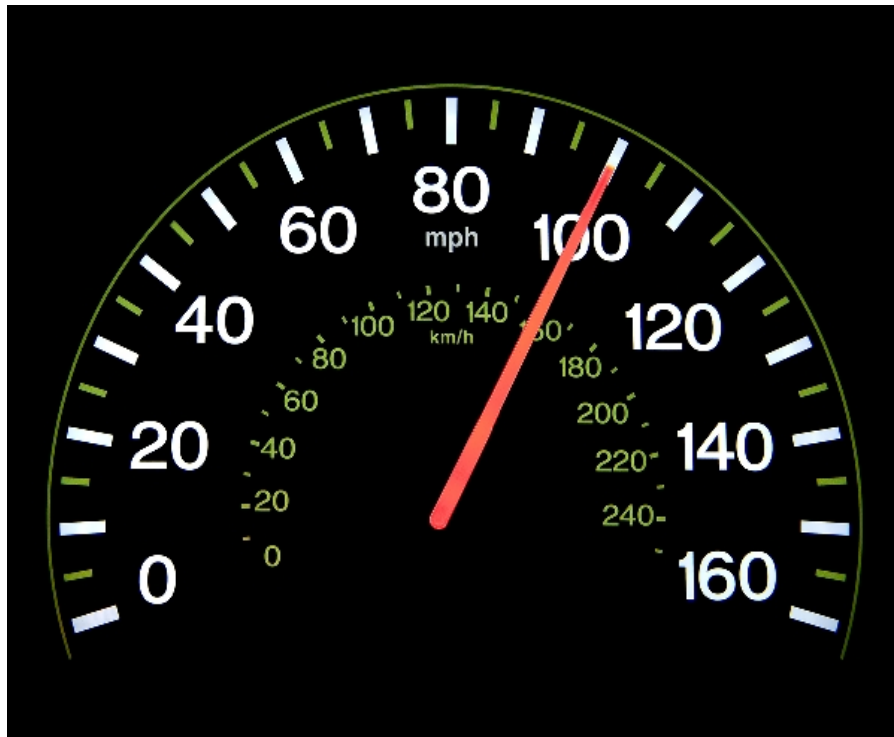
## 8a) Speedometer :-

Speedometer is a device which measures the speed of vehicles in km/h.

## b) Odometer :-

Odometer is a device which measures the distance covered by a vehicle.

**Speedometer**



**Speedometer and Odometer**

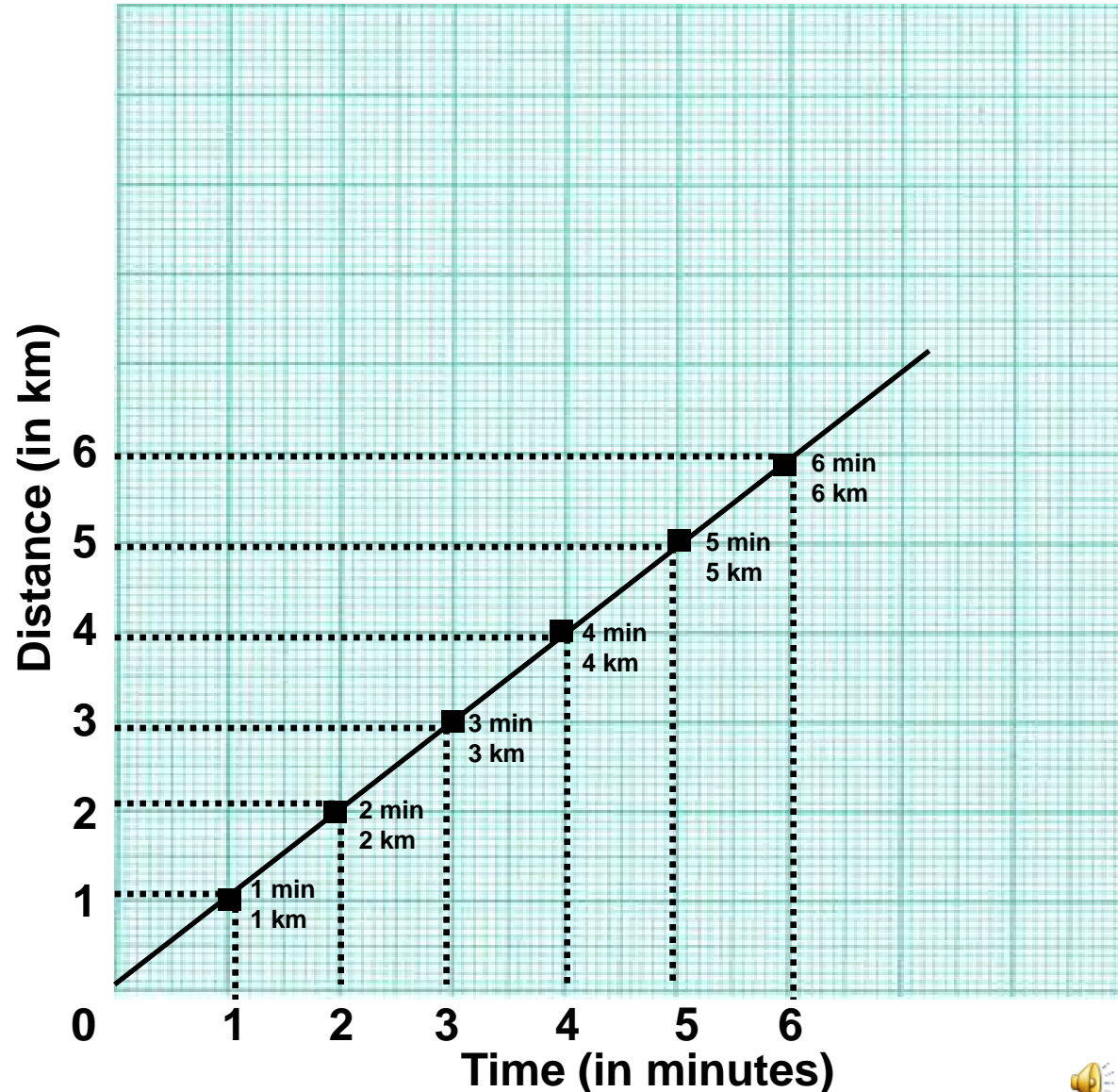


## 9) Distance – Time graph :-

The distance distance travelled by a car and the time taken is shown in the table below.

Sl.No.	Time	Distance
1	0	0
2	1 min	1 km
3	1 min	2 km
4	3 min	3 km
5	4 min	4 km
6	5 min	5 km

If the distance – time graph is a straight line, then the object is moving with constant speed. If the speed keeps changing, the graph can be of any shape.



## Questionnaire of this chapter

1. Classify the following as motion along a straight line, circular or oscillatory motion.
  - (i) Motion of your hands while running.
  - (ii) Motion of a horse pulling a cart on a straight road.
  - (iii) Motion of a child in merry-go-round.
  - (iv) Motion of a child on a see-saw.
  - (v) Motion of the hammer of an electric bell.
  
2. Which of the following are not correct?
  - (i) The basic unit of time is second.
  - (ii) Every object moves with a constant speed.
  - (iii) Distance between two cities is measured in kilometers.
  - (iv) The time period of a given pendulum is not constant.
  - (v) The speed of a train is expressed in m/h.
  
3. The distance between two stations is 240 km. A train takes 4 hours to cover this distance. Calculate the speed of the train.



4. The odometer of a car reads 57,321.0 km when the clock shows the time 8.30 AM. The odometer reading was changed to 57,336.0 km. calculate the speed of the car in km/min during this time. Express the speed in km/h also.

### MCQs

5. Which of the following relations is correct?

- (i) Speed= Distance x Time.
- (ii) Speed =Distance/time
- (iii) Speed =time/distance
- (iv)Speed=1/(distancextime)

6. The basic unit of speed is :

- (i) Km/min
- (ii) m/min
- (iii) km/h
- (iv) m/s

7. A car moves with a speed of 40 km/h for 15 minutes and then with a speed of 60 km/h for the next 15 minutes. The total distance covered by the car is :

- (i) 100 km (ii) 25 km (iii) 15 km (iv) 10 km



## Answers

1. Classification of motion

(i) Oscillatory motion

(ii) Straight line

(iii) Circular motion

(iv) Oscillatory motion

(v) Oscillatory motion

(vi) Straight line.

2. (ii), (v).

3. Distance = 240 km

Time = 4 h

Speed = distance/time

$$= 240 \text{ km}/4 \text{ h}$$

$$= 60 \text{ km/h}$$

4. Odometer reading at 8.30 AM = 57321.0 km

Odometer reading at 8.50 AM = 57336.0 km

Distance travelled = 15 km

Time taken = 20 min.

Speed = distance / time

$$= 15 \text{ km}/20 \text{ min.}$$

$$= 0.75 \text{ km/h}$$

$$= 0.75 \times 60$$

$$= 45 \text{ km/h.}$$

5.(ii) Speed =Distance/time

6.(iv) m/s.

7. (ii) 25 km

