Chapter 10

Motion

Points to study

10.1 Motion
10.2 Types of motion
10.3 Measurement of distance
10.4 Unit of length

You have seen children walking to school, monkeys climbing on trees, running horses, crawling snakes, fishes swimming in aquariums, ponds.

Living beings move from one place to another by running, walking jumping and swimming etc. Similarly, you may too have seen spinning tops, oscillating pendulum of a wall clock, cars running on roads and the hands of clocks taking rounds. All these objects are also in motion.

10.1 MOTION

By observation you can decide whether an object is in motion or in state of rest. You may have noticed that the flying bird, crawling ant, moving bus, running children, and in all the above examples position of objects change with time.

The change in position of an object with time is called motion.

10.2 Different Types of Motion

You may have enjoyed sliding on slides, swinging on swings, and also rotating in giant wheels in fairs. Don't you think that your different experiences involved different types of motion? Infect there are different types of motions. Straight line motion, circular motion, periodic motion, rotational motion, vibratory motion, etc. are different types of motion.

(A) Straight Line Motion (Linear Motion)

Activity - 1

Take a stone and drop it from some height. Observe carefully that the stone falls downwards in a straight line.

The figures 10.1(a), 10.1(b) and 10.1(c) represents the motions of vehicle on a road, a boy sliding on a slide and a train running on a straight track, respectively. In all these situations, the objects are in straight line motion. Similarly, the march past parade of soldiers and athletes running in an athletic meet are also the examples of straight line motion.

Can you tell some more examples of straight line motion?

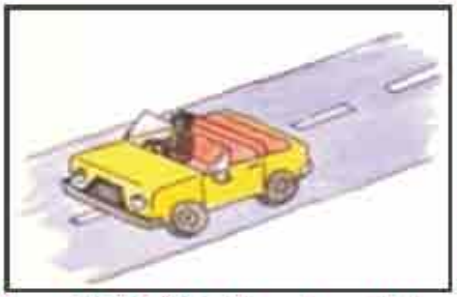

Figure 10.1 (a) Motion of a vehicle on a straight road

Figure 10.1 (b) Children sliding on a slide

Figure 10.1 (c) Motion of a train on a straight track

The motion in a straight line is called as linear motion.

(B) Circular Motion

Activity - 2

Take a piece of thread. Tie a small stone at one end. Hold the other end of the thread in your hand and whirl it round. You will observe that the stone moves in a circular path.

Figure 10.2 Circular motion

You may have seen bull of a bull crusher {kolhu ka bail} taking rounds in a circular track. You may also have seen a moving giant wheel. Can you tell what kind of motion is shown by the bull of a bull crusher and a giant wheel?

The motion of an object on a circular track is called circular motion.

(C) Periodic Motion

You must have observed the pendulum of a clock and children playing on a swing. In these cases, the motion of the pendulum and that of the swing repeats itself after a certain amount of time. This type of motion is called as periodic motion.

The type of motion which repeats itself after a certain amount of time is called as periodic motion.

Figure 10.3 (a) Motion of the pendulum of a clock

Figure 10.3 (b) Motion of a child on a swing

(D) Vibratory Motion

Activity - 3

Take a long thread. Hold one end of the thread and ask your friend to hold the other end. Hold the thread tightly. Stretch it downwards and release it. Observe the motion of the thread carefully. You will observe that the thread is vibrating.

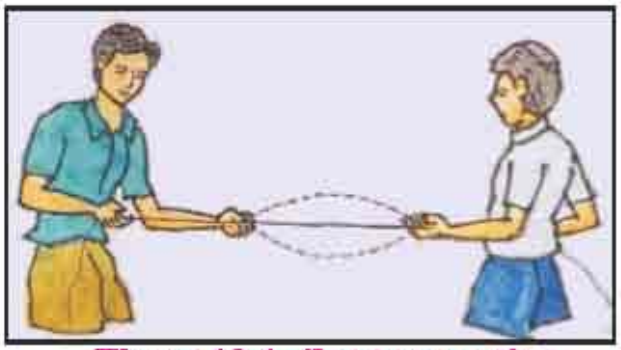

Figure 10.4 vibratory motion

The motion in which the object vibrates is called as vibratory motion.

In vibratory motion the object repeats its motion in a certain amount of time. Thus, vibratory motion is an example of periodic motion.

(E) Rotational Motion

Activity - 4

Stand your bicycle on its stand. Now start paddling the bicycle. Observe carefully the rear wheel of the bicycle. The rear wheel of the bicycle is rotating on its axel (axis). This type of motion which is shown by the rear wheel of the bicycle is called as rotational motion. The motion of a spinning top and that of a potter's wheel are some more examples of rotational motion.

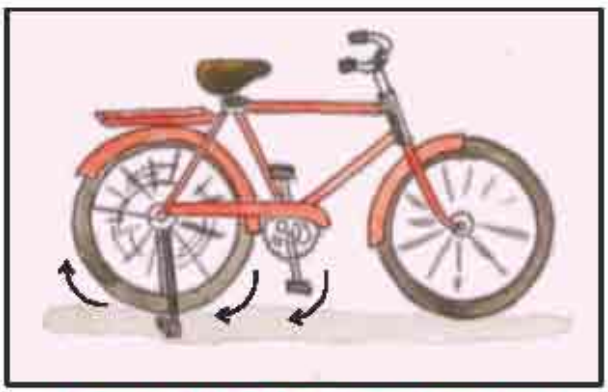

Figure 10.5 Rotational motion

Figure 10.6 (a) Motion of a spinning top

Figure 10.6 (b) Motion of a potter's wheel

The motion around a certain fixed axis is called as rotational motion.

Now give an example of a situation in which both straight line motion and rotational motion are involved.

When you ride a bicycle on a straight road then the motion showed by the wheels of the bicycle is rotational motion and the motion of the bicycle on the road is straight line motion.

10.3 Measurement of Distance

In ancient times, the distance between two places was measured by footsteps. Short distances were measured by fingers {ungal} and hand spans. Are these methods of measurement correct? Let us find out.

Activity - 5

Take out your science textbook. Measure it in fingers. Draw table 10.1 on the blackboard and write down the measurements of the science textbook.

Table 10.1

S.No.	Name of the student	Length of the textbook	
		In fingers	In centimeters

Observe the table carefully. Have all the students written down the same length of the book?

Now measure the length of the textbook by your ruler in centimeters and write down in the table. Does the length of the textbook measured by the students in centimeters is same?

Activity - 6

You would have played the game of kabaddi in your school. Measure the length and breadth of its ground in foot-spans and in meters. Write it down in the Table 10.2

Table 10.2

S. No.	Name of the student	Length		Breadth	
		Foot-spans	Meters	Foot-spans	Meters
1.					
2.					
3.					
4.					
5.					
6.					

Observe the table carefully. You will find that the length and breadth measured by the students in foot spans is different while the length and breadth measured in meters by the students is same.

Meter ruler is a standard measure. The chances of wrong measurements by it are low. From the above activities it is clear that the different sizes of foot-spans and fingers etc. of different persons result in inaccurate measurements.

10.4 Unit of Length

All countries over the world use a unit system that is known as the "International System of Units" (S.I. units). The S.I. unit of length is meter. Each meter (m) is divided into hundred equal divisions, each division is called as the centimeter (cm). Each centimeter is further divided into ten smaller divisions and each smaller division is known as the millimeter (mm).

1 meter = 100 centimeters

1 centimeter = 10 millimeters

1 meter = 1000 millimeters

For measuring large distances, we use a bigger unit called the kilometer (km).

1 kilometer = 1000 meters

We know that we can measure a straight line by using a ruler. But what if the line is curved?

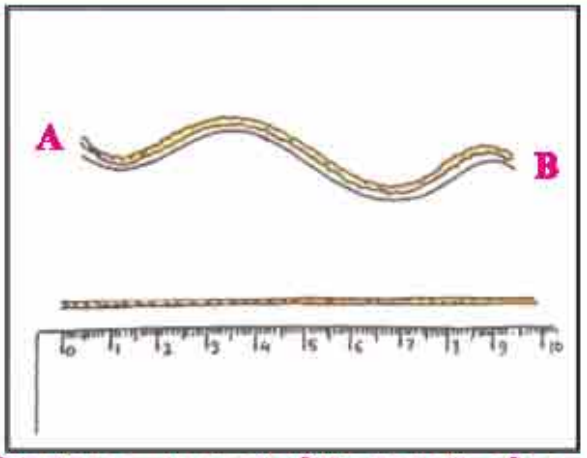

Figure 10.7 Measurement of the length of a curved line

Activity - 7

To measure the length of the curved line 'AB' (Fig. 10.7), take a long thread. Take one end of the thread and put it on the point 'A' of the curved line. Now move the thread along the curved line. Hold the other end of the thread when it reaches the point 'B'. Now stretch the thread along a meter ruler and measure it. This will be the length of the curved line.

What have you learnt

1. The change in the position of an object with time is called as motion.
2. Motion is of different types. Straight line motion, circular motion, rotational motion, vibratory motion, etc. are some examples of different types of motion.
3. The motion in a straight line is called as straight line motion.
4. When an object takes round in a circular path, then its motion is said to be as circular motion.
5. The motion which repeats itself after a certain amount of time is called as periodic motion.
6. The motion in which the object vibrates is known as vibratory motion.
7. If an object is in motion around a certain fixed point (axis), then its motion is said to be as rotational motion.
8. All the countries of the world have accepted a standard system of units which is known as the 'International System of Units' (S.I. Units).
9. The S.I. unit of length is meter. The 1/100th part of a meter is called as centimeter and the 1/10th part of the centimeter is called as millimeter.

Exercises

Tick the correct answers from the following -

1) An example of circular motion: -
   a) Motion of a train b) Motion of the bull of a bull-crusher
   c) Motion of the strings of a violin d) Motion of a butterfly ( )
2) Which of the following motions does not repeat itself after certain time interval?
   a. A fruit falling from a tree
   b. The beating of the heart
   c. Rotation of the Earth on its axis
   d. The motion of the pendulum of a wall clock ( )
3) The S.I. unit of length is -
   a) Kilometer b) Meter c) Second d) Gram ( )
4) An example of vibratory motion is -
   a) Motion of a swing b) Motion of a wheel
   c) Motion of a bus d) Motion of strings of violin ( )

Fill in the blanks -

1) The motion of the pendulum of a wall clock is.....
2) The motion of the wheel of a car is an example of ..... motion.
3) The motion of a truck moving on a straight road is ..... motion.
4) 1 kilometer is equal to..... meters.

Match the following columns -

Column 1	Column 2
1. Periodic motion	a) Motion of a potter's wheel
2. Circular motion	b) Motion of the strings of a violin
3. Straight line motion	c) Motion of a swing
4. Vibratory motion	d) Motion of a ball dropped from a height

Short answer type questions -

1) Give two examples of straight line motion.
2) What is motion? Write its different types.
3) What is the difference between the motion of a spinning top and the motion of the bull of a bull-crusher?
4) What type of motion is exhibited by a swing when you are swinging on it?

Long answer type questions -

1) How can you measure the length of a curved line? Explain step by step.
2) Explain periodic motion with the help of examples.
3) In present day parks, there are many instruments of playing games. What type of motion do they show?

Creative work

I. Observe the events happening in your surroundings carefully and make a list of objects in motion. Now classify them according to the type of motion they show in the table below -

S. no.	Type of motion	Name of the objects
1.	Straight line motion	
2.	Vibratory motion	
3.	Circular motion	
4.	Periodic motion	
5.	Rotational motion	

II. You can make your own ruler. Follow the given steps -

- Cut a long strip of cardboard.
- Paste a strip of graph paper on the cardboard strip.

Now measure the lengths and breadths of different objects around you by your cardboard ruler!

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