

Class VII

Subject: SCIENCE

Title of the Book: Science Textbook for Class VII

Chapter 13: Motion and Time

General Instructions:

1. Question –Answers to be done in Science Classwork notebook
2. Assignment to be done in the Assignment notebook.
3. N.C.E.R.T link to read the chapter:

http://ncertbooks.prashanthellina.com/class_7.Science.Science/Ch_13.pdf

Introduction:

You have learnt about different types of motion i.e rectilinear motion, circular motion, periodic motion etc.

It is a common experience that motion of some objects is fast while that of some others is slow.

Explanation:

Time

Time is defined as period between two events.

The basic unit of time is second.

People used instruments such as sundials, water clock etc. to measure time. Water clock worked on the principle of regulated flow of water.

The movement of the shadow of a rod struck upright in the ground, whose shadow changed direction with the movement of the sun across the sky, was used to make crude sundials.

Time period of a simple pendulum

Any object that is moving is said to be in motion. A body is said to be uniform motion when it travels equal distances in equal intervals of time.

In order to measure time, we need a motion that repeats itself in equal intervals (periodic motion).

A small mass that is suspended from a fixed point and allowed to swing freely under the influence of gravity is called a pendulum.

When a bob moves from one position and comes back to the same position, it is said to complete one oscillation, and the time taken to complete one oscillation is called the time period of the pendulum.

The time period of a pendulum depends only on the length of the pendulum used.

$$\text{Time period} = \text{Total Time} / \text{Number of Oscillations}$$

Measuring Speed

Objects may travel fast or slow. When we say a body moves fast (or slow) we refer to its speed.

The speed of an object is defined as the distance travelled by it in unit time.

The SI unit of speed is meter per second (m/s).

Speed = Distance travelled / Time taken to travel the distance.

Speedometer is used to measure speed and distance travelled by a vehicle is given by a device called odometer.

A flat parallel line to the time axis means the body is at rest.

The slope of a distance time graph gives its speed.

Activity:

To plot the distance vs time graph for uniform motion.

1. Take the speed at which the body moves as 10m/s.
2. Calculate the distance travelled by the body at the end of 1, 2 and 3 seconds etc. (i.e. every second).
3. Take time on the x axis and distance travelled on the y axis.
4. Plot the distance vs time graph on the centimeter graph sheet taking 1cm=1s.
5. Repeat steps 2-4 for a speed of 50m/s and 5m/s on the same graph sheet.
6. Observe the graphs obtained for different speeds.

Observation:

A straight line graph is obtained.

Conclusion

The motion is uniform type of motion.

Question and Answer:

Q1. A simple pendulum takes 32s to complete 20 oscillations. What is the time period of the pendulum?

Ans. Time taken by the pendulum to complete 20 oscillations is 32s.

Time period of the pendulum, $t=?$

Time taken by the pendulum to complete one oscillation is defined as time period.

Therefore,

$t = \text{total time} / \text{number of oscillations}$

$$= 32 / 20$$

$$t = 1.6 \text{ s}$$

Q2. The distance between two stations is 240 km. a train takes 4 hours to cover this distance. Calculate the speed of the train.

Ans. Distance between two stations = 240km

Time taken by the train to cover the distance = 4 hours

Speed = distance/time

$$\text{Speed} = 240 / 4 = 60 \text{ km/hr.}$$

Therefore, the speed of the train is 60km/hr.

Q3. Salma takes 15 minutes from her house to reach her school on a bicycle. If the bicycle has a speed of 2m/s, calculate the distance between her house and her school.

Ans. Time taken by Salma to travel from her house to her school on a bicycle = 15 minutes

$$= 15 \times 60 = 900 \text{ s}$$

We need to find the distance between her house and the school.

Speed = distance/time

Therefore, distance = speed x time

$$\text{Distance} = 2 \text{ m/s} \times 900 \text{ s}$$

$$\text{Distance} = 1800 \text{ m} = 1.8 \text{ km}$$

Thus, the distance between her house and the school is 1.8km.

Q4. The odometer of a car reads 57321.0km. when the clock shows the time 8:30 a.m. What is the distance moved by the car, if at 08:50 a.m. the odometer reading has changed to 57336

km? Calculate the speed of the car in km/min during this time. Express the speed in km/hr. also.

Ans. Initial reading of the odometer is 57321.0 km

Initial time is 8:30 a.m.

Final reading is 57336.0 km

Total distance travelled = final reading of the odometer – initial reading of the odometer

$$= 57336.0\text{km} - 57321.0\text{km}$$

$$= 15\text{km}$$

Total time taken = final time – initial time

$$= 8:50 \text{ a.m.} - 8:30 \text{ a.m.}$$

$$= 20 \text{ minutes}$$

Speed = distance/time

$$= 15\text{km}/20 \text{ min (1/3hr)}$$

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

Assignment

Q1. Fill in the blanks:

1. _____ is the SI unit of time (second/minute).
2. An instrument used to measure time is called a _____ (pendulum/clock).
3. The distance travelled by a body in unit time is called _____ (speed/motion).
4. _____ is a change in the position of a body with respect to time (time/motion).
5. The unit of speed is _____ (metre per second/second per minute).

Q2. Choose the correct answer

1. Which of these is not a unit of time?
a) second b) light year c) hour d) century
2. The time period of a simple pendulum depends on :
a) the length of the string used b) the mass of the bob c) both a and b d) none of these
3. Which of these is a unit of speed?
a) meter /second b) kilometer/hour c) second/meter d) both a and b

Q3. A school bus covers a distance of 7200m in 1800s. Calculate its speed.

Q4. What is the time period of a simple pendulum?

Q5. The metallic bob in the pendulum is called_____.

Q6. 72km/hr. is the same as _____m/s.

Q7. Who invented simple pendulum?

Q8. Differentiate between uniform and non-uniform motion.

Q9. A pendulum takes 20 seconds to complete 10 oscillations. Calculate its time period.

Q10. By looking at the graphs given below what can you say about the state of motion of an object? What type of motion of the object is depicted by each one of the following graphs?

