

Motion, Distance and Time

Class 6 Science

Complete Study Notes

Learning Objectives

In this chapter, students will understand the basic concepts of motion, distance, and time. They will learn about different types of motion, calculate speed and average speed, understand the relationship between distance, time, and speed, use standard SI units, interpret distance-time graphs, and solve numerical problems involving motion. These concepts help students understand how objects move in everyday life and form the foundation for higher studies in physics.

Introduction to Motion, Distance and Time

The chapter Motion, Distance and Time introduces students to the science of movement and measurement. Every object around us is either at rest or in motion. Whether it is a walking person, a moving vehicle, or the Earth revolving around the Sun, motion is a part of our daily lives.

This chapter explains how distance, time, and speed are connected and how these concepts help us describe the movement of objects accurately. Students also learn about measuring time, interpreting graphs, and solving practical problems related to motion.

Motion and Its Types

Motion is the change in the position of an object with time. Different objects move in different ways depending on their path and surroundings.

- **Straight-line motion** occurs when an object moves along a straight path, such as a train moving on a straight track.
- **Circular motion** is observed when an object moves around a fixed point, such as the hands of a clock or a ceiling fan.
- **Periodic motion** is a motion that repeats itself at regular intervals, such as the swinging of a pendulum.

Understanding different types of motion helps students identify and classify movements seen in everyday life.

Distance, Time and Speed

Distance is the total length of the path travelled by an object, while time measures the duration taken to complete the journey. Speed tells us how fast an object is moving and is calculated by dividing the distance travelled by the time taken.

Standard Units (SI Units):

- The standard SI unit of distance is the **metre (m)**.
- The SI unit of time is the **second (s)**.
- The SI unit of speed is **metres per second (m/s)**.

Students also learn about average speed, which represents the total distance travelled divided by the total time taken during the entire journey.

Understanding these concepts allows students to solve practical problems involving travel, transportation, and everyday movement.

Measuring Time and Distance-Time Graphs

People have measured time in different ways throughout history, from observing the movement of the Sun to using pendulums and modern clocks. Accurate time measurement is essential for calculating speed and understanding motion.

Students also learn how to interpret distance-time graphs, which visually represent the relationship between distance and time. A steeper graph indicates faster motion, while a horizontal line shows that the object is at rest.

Distance-time graphs help students analyze motion in a simple and visual manner.

Speed Formula and Practical Applications

The relationship between speed, distance, and time can be expressed using a simple mathematical formula:

$$\text{Speed} = \text{Distance} \div \text{Time}$$

This formula is widely used to calculate the speed of moving objects. Students also learn how speedometers in vehicles measure speed and how unit conversions, such as converting kilometres per hour to metres per second, are performed.

These calculations help students understand the practical applications of mathematics in science and daily life.

Practice Questions

1. Define motion and name three types of motion.
2. What is the SI unit of speed?
3. Calculate the speed of an object that travels 120 metres in 20 seconds.
4. Differentiate between speed and average speed.
5. What does a horizontal line on a distance-time graph represent?

Answer Key

- **ANSWER 1:** Motion is the change in the position of an object with time. The three common types of motion are straight-line motion, circular motion, and periodic motion.
- **ANSWER 2:** The SI unit of speed is metres per second (m/s).
- **ANSWER 3:** Using the formula,
Speed = Distance $\div$ Time
= $120 \div 20 = 6$ m/s
Therefore, the speed of the object is 6 m/s.
- **ANSWER 4:** Speed is the distance travelled per unit time at a particular moment or during a journey, whereas average speed is calculated by dividing the total distance travelled by the total time taken.
- **ANSWER 5:** A horizontal line on a distance-time graph indicates that the object is at rest because its distance does not change with time.