Chapter – 7

Motion and Measurement of Distance

2marks:

1. Give two examples each, of modes of transport used on land, water and air.

Answer:

Land – Train, Bus

Water – Ship, Boat

Air – Helicopter, Aeroplane

2. Why can a pace or a footstep not be used as a standard unit of length?

Answer:

Pace or a footstep cannot be used as a standard unit of length because it varies from person to person.

3. Arrange the following lengths in their increasing magnitude: 1 metre, 1 centimetre, 1 kilometre, 1 millimetre.

Answer:

1 millimetre, 1 centimetre, 1 metre, 1 kilometre

4. The height of a person is 1.65 m. Express it into cm and mm.

Answer:

1.65= 165 cm = 1650 mm

5. The distance between Radha's home and her school is 3250 m. Express this distance in km.

Answer:

1km = 1000 m

Hence, 3250 m = 3.25 kms

6. While measuring the length of a knitting needle, the reading of the scale at one end is 3.0 cm and at the other end is 33.1 cm. What is the length of the needle?

Answer:

Length of needle = 33.1 – 3 = 30.1 cm

7. Write the similarities and differences between the motion of a bicycle and a ceiling fan that has been switched on.

Answer:

Similarities – The blades of a fan and the wheels of a bicycle show circular motion

Differences – Bicycles move in rectilinear motion, but the fan does not move in rectilinear motion.

8. Why would you not like to use a measuring tape made of an elastic material like rubber to measure distance? What would be some of the problems you would meet in telling someone about a distance you measured with such a tape?

Answer:

An elastic measuring-tape will not give accurate measurements as it stretches in length and reduces in size when stretched. When we express measurements taken with elastic tape, we have to tell whether the tape was stretched. If yes, how much? Hence, it is very difficult to tell the measurement taken from an elastic tape.

9. Give two examples of periodic motion.

Answer:

a) A needle of a sewing machine

b) Pendulum

5marks:

1.Elaborate on the concept of motion and discuss its various types. Provide real-world examples to illustrate each type of motion.

Answer:

Motion is the change in position of an object with respect to its surroundings. There are three main types of motion: linear, circular, and periodic. Linear motion, exemplified by a car moving on a straight road, involves motion in a straight line. Circular motion, seen in the orbit of planets around the sun, involves movement along a circular path. Periodic motion, demonstrated by the swinging of a pendulum, repeats in a regular pattern.

2.Compare and contrast distance and displacement. Explain how vector quantities, such as displacement, have both magnitude and direction.

Answer:

Distance is the total path length traveled by an object, whereas displacement is the change in position from the starting point to the ending point in a straight line. Displacement is a vector quantity as it includes both magnitude (the distance between initial and final points) and direction (the straight-line path between these points). For example, if a person walks 5 meters east and then 3 meters west, the distance is 8 meters, but the displacement is 2 meters west.

3.Delve into the historical development of units for measuring distance. Discuss the evolution from ancient methods to modern standard units and their significance.

Answer:

The historical development of distance measurement involves various methods, from ancient units like the cubit to standardized modern units such as the meter. The metric system, adopted internationally, provides a standardized and decimal-based approach, ensuring consistency and ease of use in scientific measurements. Standard units, like the meter, kilo meter, and centi meter, enable accurate communication and comparison of distances on a global scale.

4.Explore the concept of speed and its relevance in different contexts. Provide examples of how speed is calculated and its implications in daily life.

Answer:

Speed is the rate at which an object covers distance. It is calculated using the formula: Speed = Distance/Time. In daily life, understanding speed is crucial in various scenarios. For instance, calculating the speed of a car helps in adhering to traffic regulations. Speed is also essential in sports, where athletes aim to achieve specific velocities, and in industries, where machinery efficiency is optimized based on speed calculations.

5.Investigate the applications of uniform motion in technological advancements. Provide examples where maintaining a constant speed is essential for efficient operations.

Answer:

Uniform motion, where an object covers equal distances in equal intervals of time, is integral in technological advancements. For instance, the constant rotational speed of hard disk drives is vital for data storage and retrieval. Similarly, maintaining a uniform speed is critical in various machinery and transportation systems to ensure stability, precision, and efficiency.

6.Explain the construction and interpretation of a distance-time graph. Illustrate how different types of motion are represented on the graph and discuss the significance of slope.

Answer:

A distance-time graph visually represents an object's motion. In uniform motion, the graph is a straight line, indicating equal distances covered in equal time intervals. Non-uniform motion is depicted by a curved line, signifying varying speeds. The slope of the graph at any point represents the object's speed; a steeper slope indicates higher speed, while a horizontal line implies the object is at rest.

7.Analyze the practical applications of motion and distance measurement in modern technologies. Provide examples of how these concepts contribute to innovations in fields such as robotics, navigation systems, and space exploration.

Answer:

Motion and distance measurement play pivotal roles in modern technologies. In robotics, precise control of motion enables robots to perform complex tasks. Navigation systems, like GPS, rely on accurate distance measurements for location tracking. In space exploration, understanding the motion of celestial bodies is fundamental for mission planning. These concepts contribute to innovations, shaping advancements in various technological domains.

2. Fill in the blanks:

(i) One metre is _____ cm.

(ii) Five kilometre is _____ m.

(iii) Motion of a child on a swing is _____.

(iv) Motion of the needle of a sewing machine is _____.

(v) Motion of wheel of a bicycle is_____.

(vi)_____ is the change in position of an object concerning its surroundings.

(vii)Displacement is a _____ quantity as it has both magnitude and direction.

(viii)The formula to calculate speed is _____.

(ix)Uniform motion occurs when an object covers _____ distances in _____ intervals of time.

Answer:

(i) One metre is **100** cm.

(ii) Five kilometres is **5000** m.

(iii) Motion of a child on a swing is **periodic.**

(iv) Motion of the needle of a sewing machine is **periodic**.

(v) Motion of the wheel of a bicycle is **circular**.

(vi)**Motion** is the change in position of an object concerning its surroundings.

(vii)Displacement is a **vector** quantity as it has both magnitude and direction.

(viii)The formula to calculate speed is **Speed=Distance/Time**

(ix)Uniform motion occurs when an object covers **equal** distances in **equal** intervals of time.

Multiple Choice:

1.What is the primary source of energy for living organisms in most ecosystems?

A) Soil

B) Air

C) Sunlight

D) Water

Answer:

C) Sunlight

2.Which of the following is a vector quantity?

A) Mass

B) Speed

C) Distance

D) Displacement

Answer:

D) Displacement

3.What is the formula for calculating speed?

A) Speed = Distance x Time

B) Speed = Time/Distance

C) Speed = Distance + Time

D) Speed = Distance/Time

Answer:

D) Speed = Distance/Time

4.Which biome is characterized by permafrost and a short growing season?

A) Rainforest

B) Tundra

C) Desert

D) Grassland

Answer:

B) Tundra

5.What is the role of decomposers in an ecosystem?

A) Convert sunlight into energy

B) Break down dead organic matter

C) Produce oxygen

D) Contribute to photosynthesis

Answer:

B) Break down dead organic matter

6.Which unit is commonly used for measuring large distances like the distance between cities?

A) Centimeter

B) Meter

C) Kilometer

D) Millimeter

Answer:

C) Kilometer

7.What is the term for the change in position of an object with respect to its surroundings?

A) Rest

B) Stationary

C) Motion

D) Inertia

Answer:

C) Motion

8.In a distance-time graph, a straight line indicates:

A) Non-uniform motion

B) Acceleration

C) Uniform motion

D) Rest

Answer:

C) Uniform motion

Summary:

The chapter on "Motion and Measurement of Distance" is related to the dynamic nature of objects and the quantification of spatial changes. Motion is elucidated as the alteration in an object's position concerning its surroundings, with distinctions made between scalar and vector quantities. The importance of precise distance measurement is emphasized, tracing the historical development of units from ancient methods to modern standardized metrics.

The calculation of speed, an integral aspect of motion, is explored, offering practical applications in daily life and various fields. Uniform motion, characterized by consistent displacement over time, finds relevance in technological advancements. The construction and interpretation of distance-time graphs are detailed, providing a visual representation of an object's motion. Practical applications in modern technologies, from robotics to space exploration, underscore the significance of comprehending motion and distance measurement in the realm of scientific inquiry and technological progress.