Motion and Measurement of Distances

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

Answer: Land transport: Bus, train
Water transport: Boat, ship
Air transport: Aeroplane, Helicopter

Question 2: Fill in the blanks:

(i) One metre is _____ cm.

(ii) Five kilometres 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_____.

Answer. (i) One metre is 100 cm.

(ii) Five kilometres is 5000 m.

Explanation:
We know that 1 km = 1000 m
∴ 5 km = 1000 × 5 = 5000 m

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

Explanation: Motion which repeats itself after certain intervals is called periodic motion. Since the motion of a swing also repeats after regular intervals so, the motion of child on a swing is periodic.

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

Explanation: The needle of a sewing machine while moving up and down, repeats its motion after regular intervals so it possesses periodic motion.

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

Explanation: When an object moves in such a way that its distance from a fixed point remains the same, it is said to have circular motion. Since, the wheel of a bicycle rotates about its central part which remains fixed as the bicycle moves hence, the wheel possesses circular motion.

Question 3: Why can a pace or a footstep not be used as a standard unit of length?

Answer: A pace or a footstep not be used as a standard unit of length because the size of pace and footstep vary from person to person. This will lead to confusion while measuring the lengths by different persons. We should use standard units like International System of Units (SI Units).

Question 4: 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.

Question 5: The height of a person is 1.65 m. Express it into cm and mm.

Answer: We know that 1 metre = 100 cm and 1 metre = 1000 mm

So, 1.65 m = 1.65 × 100 = 165 cm

and 1.65 m = 1.65 × 1000 = 1650 mm

Thus, height of person in cm = 165 cm

And height of person in mm = 1650 mm

Question 6: The distance between Radha's home and her school is 3250 m. Express this distance into km.

Answer: The distance between Radha's home and her school is 3250 m.

Question 7: 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 the knitting needle is the difference between two readings.
Thus, length of knitting needle = 33.1– 3.0 = 30.1 cm

Question 8: Write the similarities and differences between the motion of a bicycle and a ceiling fan that has been switched on.

Answer: Similarities between the motion of a bicycle and a ceiling fan:
(i) The blades of a fan and the wheels of a bicycle are fixed at a point.
(ii) Both have circular motion about their respective fixed points.

Differences between the motion of a bicycle and a ceiling fan:
(i) A bicycle has linear motion, whereas the blades of a ceiling fan do not have linear motion.
(ii) The motion of the blades of a fan is periodic, whereas the motion of a bicycle is rectilinear motion.

Question 9: Why could you not use an elastic measuring tape to measure distance? What would be some of the problems you would meet in telling someone about a distance you measured with an elastic tape?

Answer: An elastic measuring tape is stretchable. It cannot be used to measure distances because the length of the tape may change on stretching. As a result, the measured length would not be correct.

If you measure the length of an object twice using an elastic tape, then you may get different values of the same length each time. This is because elastic tapes are stretchable.

Question 10: Give two examples of periodic motion.

Answer: Rotation of Earth, Pendulum, vibrating wire of guitar, etc.

Short Questions and Answers

Question 1. Name the invention which made a great change in modes of transport.

Answer: Invention of wheel.

Question 2. Which power was used to pull vehicles in ancient times?

Answer: Animals were used to pull vehicles in ancient times.

Question 3. Define rest and motion.

Answer: An object that does not change its positions with time is said to be at rest. An object that changes its positions with time is said to be in motion.

Question 4. Why is it important to know how far a place is?

Answer: It is important to know how far a place is, so that we can have an idea how we are going to reach that place – walk, take a bus or train, a ship, an aeroplane or even a spacecraft.

Question 5. What does your P.T. teacher use to measure the length of the playground?

Answer: My P.T. teacher has plastic made tape scale to measure the length. Its total length is 100 metre. It can be rounded up in round box.

Question 6. What is estimation?

Answer: To guess the dimensions of an object without actual measuring is known as estimation. It is difficult to make near about correct estimate. It needs a lot of experience.

Question 7. Explore and find out what kind of scale is used by cloth merchants, tailors, carpenters and mechanics to measure length.

Answer: Cloth merchants use iron/steel metre scale.
Tailors use plastic metre scale tape.
Carpenters use plastic metre tape and iron metre scale both.

Question 8. Differentiate between distance and displacement.

Answer: Distance: The total length travelled from one point to another.
Displacement: It is the shortest distance travelled from one point to another.

Question 9. What is measurement?

Answer: Measurement is the technique developed for correct judgement of dimensions of various objects.

Question 10. What do you understand by unit?

Answer: A quantity adopted as a standard of measurement of a physical quantity is called unit.

Question 11. Name the two parts which must be mentioned to state the results of a measurement.

Answer: Magnitude and unit are the two parts which must be mentioned to state the results of a measurement.

Question 12. What type of measuring device would you use to measure the girth of a tree?

Answer: Measuring tape is suitable to measure the girth of a tree.

Question 13. What is the system used for measurements nowadays?

Answer: S.I. system.

Question 14. Name the unit of length, which should be used to express the thickness of a coin.

Answer: Millimetre (mm).

Question 15. Name the unit of length, which you would like to use while expressing the distance between Delhi and Lucknow.

Answer: Kilometre (km).

Question 16. Name the SI unit of length.

Answer: Metre (m).

Question 17. What is the convenient unit to measure the distance between two cities or villages?

Answer: Kilometre (1 km = 1000 m).

Question 18. Which unit should be used to express thickness of coin or wire?

Answer: Very small length like thickness of coin or wire is expressed in millimetres (mm).
1 mm = 10^{-3} m or 10^3 mm = 1 m.

Question 19. Why a cubit cannot be used as the standard unit of length?

Answer: Length of hand and cubit are not same for all the people. So these cannot be used as the standard unit of length.

Question 20. Define cubit and foot.

Answer: Cubit is the length between the tip of the elbow and the middle finger. The length of the foot of a person is called foot.

Question 21. Fill in the blanks:
(a) 1 cm = _____ mm.
(ft) 1 dm = _____ metre.
(c) 1 kilometre = _____ metre.
(d) 1 metre = _____ centimetre.

Answer:
(a) 10
(b) 1/10
(c) 1000
(d) 100

Question 22. Fill in the blanks with < or > sign.
(a) 1 decametre _____ 1 decimetre.
(b) 1 millimetre _____ 1 centimetre.
(c) 1 hectometre _____ 1 kilometre.
(d) 1 decimetre _____ 1 centimetre.

Answer:
(a) 1 decametre > 1 decimetre.
(b) 1 millimetre < 1 centimetre.
(c) 1 hectometre < 1 kilometre.
(d) 1 decimetre > 1 centimetre.

Question 23. List three uses of metre.

Answer: Metre can be used as a unit to measure

1. the length of a room
2. the height of a tree or a building or
3. the length and breadth of a playground.

Question 24. Can you measure the length of a pencil with metre-scale?

Answer: No, length of pencil cannot be measured with metre scale. To measure the length of a pencil, a small scale, like six inches plastic scale should be used. This length should be expressed in centimetres.

Question 25. A 30 cm scale has one end broken. The mark at the broken end is 2.6 cm. How would you use it to measure the length of your pencil?

Answer: Put one end of the pencil at nearest full mark say 3.0 cm in this case. Take the reading of the other end. Now subtract 3 from the previous reading and this will be the required length of pencil.

Question 26. State two precautions, which should be taken while using a metre scale to measure the length of an object.

Answer: Two precautions are:

1. Place the scale in contact with the object along its length.
2. Most important, eye should be correctly positioned above the point to be measured to make a correct measurement.

Question 27. How will you find the thickness of a thin wire?

Answer: Take a round pencil and wrap the given wire round the pencil making 25 turns forming a coil. Measure the length of the so formed coil. Divide the total length of the coil by number of turns. This is the thickness of the wire.

Question 28. Which device we can use to measure the length of a curved line?

Answer: Thread.

Question 29. Using a thread how will you find the circumference of a one-rupee coin.

Answer: Firstly, fix one end of the thread, place the coin adjacent to that point, roll the thread exactly once around the coin. Then find the length of the thread by using a scale, which is the required circumference of the coin.

Question 30. Is the hour hand of a wall clock at rest or in motion?

Answer: The hour hand of the wall clock is in motion because it is changing its position.

Question 31. Is your classroom at rest or in motion?

Answer: Our classroom is said to be at rest according to the definition of motion.

Long Questions and Answers

Question 1. What precaution should be taken while buying something?

Answer: While buying clothes, pipes, laces, it should be checked whether the scale is correct or not. A correct metre has signs (↔) on both the ends in addition to the stamp of the weight and measure department. The metre scale may have been cut off. In such a case short measurement is resulted.

Question 2. If you are sitting in a moving bus, are you at rest or in motion?

Answer: If we are sitting in a moving bus, we are not changing our position in comparison to things inside the bus. According to the definition of motion, we are not moving. The bus is moving. In other words, we can say that we are in motion in comparison to outside trees and other buildings and stationary in comparison to things inside the bus.

Question 3. What is circular motion?

Answer: Movement of an object along a circular path is called circular motion. Direction of moving body always changes in circular motion. For example, the moon moves around the earth, the earth moves around the sun. Bull is moving around a central pole.

Question 4. Define rotatory motion with a suitable example.

Answer: The motion in which a body moves along a circular path about a fixed point or axis without changing its position is called rotatory motion. For example, Potter's wheel and the spinning top.

Question 5. Define periodic motion.

Answer: The motion which repeats after a regular interval of time is called periodic motion. For example, motion of tip of arm of a clock and motion of a swing are periodic motions. Motion of the earth and the moon.

Question 6. How will you measure the length of any curved line?

Answer: To measure the length of curved lines we have to use divider. Let there be a curved line AB. Open the legs of the divider to cover some convenient distance, say 5 mm. Place one leg of the divider at one end of the curved line. Put the other leg on the line. Now count the number of times the divider has to be taken along the line to cover the entire length of line AB. At the end, some portion of line may be left out, being less than the distance between the two legs. Measure it separately by adjusting the divider. Multiply the number of complete steps by the distance

between the two legs. Add the length of the remaining distance to this length. You will get the total length of curved line.

Question 7. What is translatory motion? What are its types?

Answer: The motion in which a body moves as a whole and every point on it moves the same distance is called translatory motion.
Translatory motion is of three types:
(i) Linear motion
(ii) Curvilinear motion
(iii) Random motion.

Question 8. Give examples of periodic and oscillatory motions.

Answer: Examples of periodic motion are:

- motion of moon around the earth
- heart-beat in a healthy person
- motion of earth around the sun

Examples of oscillatory motion are:

- motion of pendulum of wall clock
- a child on a swing
- motion of heart muscles in a healthy person.

Question 9. Describe the method you would use to find the thickness of a sheet of paper of your science book.

Answer: It is not easy to measure the thickness of a single sheet of paper by using metre scale. The method used to find the thickness of a single sheet is as follows:

Take 100 sheets of paper together. Find their combined thickness by using a centimetre scale. Divide the total thickness by the number of sheets. It is the thickness of a single sheet.

For example: If the thickness of 100 sheets = 1.5 cm.
Thickness of a single sheet = Total thickness ÷ Number of sheets
= 1.5 ÷ 100
= 0.015 cm.