UNIQUE STUDY POINT

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Class: VI	**Subject:** Science	**Session:** 2025-26
Chapter: 05 - Measurement of Length and Motion	**Time:** 1½ Hours	**Max. Marks:** 40

General Instructions:

1. All questions are compulsory.
2. This question paper contains 20 questions divided into five sections A, B, C, D and E.
3. Section A contains 10 MCQs of 1 mark each.
4. Section B contains 4 questions of 2 marks each.
5. Section C contains 3 questions of 3 marks each.
6. Section D contains 1 question of 5 marks.
7. Section E contains 2 Case Study Based questions of 4 marks each.

SECTION A - Multiple Choice Questions (1 mark each)

Q1. Which of the following is the correct conversion?

(a) 1 m = 10 cm

(b) 1 m = 100 cm

(c) 1 m = 1000 cm

(d) 1 m = 10000 cm

Q2. The motion of a pendulum is an example of:

(a) circular motion

(b) linear motion

(c) oscillatory motion

(d) random motion

Q3. Measuring tape is preferred for measuring the girth of a tree because it is:

(a) long

(b) flexible

(c) cheap

(d) colorful

Q4. Which unit would be most appropriate to measure the distance between Indore and Delhi?

(a) millimetre

(b) centimetre

(c) metre

(d) kilometre

Q5. Motion that repeats itself after a fixed interval of time is called:

(a) periodic motion

(b) random motion

(c) irregular motion

(d) complex motion

Q6. 3000 metres is equal to:
(a) 0.3 km
(b) 3 km
(c) 30 km
(d) 300 km

Q7. An object is said to be in motion when its position:
(a) does not change
(b) changes with respect to time
(c) remains constant
(d) is fixed

Q8. The blades of a windmill show:
(a) linear motion
(b) circular motion
(c) oscillatory motion
(d) no motion

Q9. The smallest division on a 15-cm scale is:
(a) 1 cm
(b) 1 mm
(c) 0.5 cm
(d) 0.5 mm

Q10. Which ancient civilization used scales with ruled markings?
(a) Roman
(b) Egyptian
(c) Harappan
(d) Mayan

SECTION B - Short Answer Questions (2 marks each)

Q11. Define oscillatory motion. Give two examples from your daily life.

Q12. Convert the following:
(i) 4500 centimetres into metres
(ii) 1.25 kilometres into metres

Q13. What is the advantage of using SI units over local or traditional units?

Q14. State any two situations where you need to measure curved lengths in daily life.

SECTION C - Short Answer Questions (3 marks each)

Q15. Explain how you can measure the length of a curved line using a thread and a scale. Draw a diagram to support your answer.

Q16. Differentiate between rest and motion. Explain with a suitable example how the same object can be at rest and in motion at the same time.

Q17. Describe any three ancient Indian units of measurement. Why are they not used as standard units today?

SECTION D - Long Answer Question (5 marks)

Q18. Classify the following motions as linear, circular, or oscillatory. Also mention which of these are periodic:

(a) Motion of a bicycle on a straight road
(b) Motion of a door on its hinges
(c) Motion of a metal strip when pressed and released
(d) Motion of Earth around the Sun
(e) Motion of a ball rolling down a slope
(f) Motion of a string of a guitar when plucked
(g) Motion of a car moving in circles in a parking lot
(h) Motion of water flowing in a straight pipe
Justify your classification with proper reasoning.

SECTION E - Case Study Based Questions (4 marks each)

Q19. Case Study 1:
Three students Anish, Padma, and Hardeep measured the length of the same table using their handspans. Their results were:
Anish: Slightly more than 13 handspans
Padma: 13 handspans
Hardeep: 14 handspans

Then they measured the same table using a metre scale and all got the result as 1.35 metres.

Based on this information, answer the following:
(a) Why did they get different measurements with handspans? (1 mark)
(b) Why did they get the same measurement with the metre scale? (1 mark)
(c) Whose handspan is the smallest among the three? How can you tell? (1 mark)
(d) What does this activity teach us about the need for standard units? (1 mark)

Q20. Case Study 2:
During a school trip, students observed various things in motion:
- Cars moving on a highway
- A Ferris wheel at a fair
- Flags fluttering in the wind
- An escalator moving up
- Their bus moving on the road

Based on this information, answer the following:
(a) Which of these shows circular motion? (1 mark)
(b) With respect to what reference point are the cars on the highway in motion? (1 mark)
(c) Are the students in motion or at rest with respect to their own bus? Explain. (1 mark)
(d) The escalator shows which type of motion? Give one more example of this type of motion. (1 mark)

DETAILED ANSWER KEY - PAPER 04

SECTION A - Answers to MCQs

Ans 1. (b) 1 m = 100 cm

1 metre is equal to 100 centimetres.

Ans 2. (c) oscillatory motion

A pendulum moves to and fro about a fixed position, showing oscillatory motion.

Ans 3. (b) flexible

Measuring tape is flexible and can follow the curved surface of the tree trunk.

Ans 4. (d) kilometre

Kilometre is the most appropriate unit for measuring large distances between cities.

Ans 5. (a) periodic motion

Motion that repeats after fixed intervals is called periodic motion.

Ans 6. (b) 3 km

3000 m = 3000 ÷ 1000 = 3 kilometres

Ans 7. (b) changes with respect to time

An object is in motion when its position changes with respect to a reference point with time.

Ans 8. (b) circular motion

The blades of a windmill rotate in a circular path.

Ans 9. (b) 1 mm

The smallest division on a 15-cm scale is 1 millimetre.

Ans 10. (c) Harappan

Objects with ruled markings (scales) have been excavated from Harappan Civilisation sites.

SECTION B - Answers to Short Answer Questions

Ans 11. Oscillatory Motion:

Definition: When an object moves to and fro about a fixed position, its motion is called oscillatory motion.

Examples from daily life:
1. Motion of a swing in a playground
2. Motion of a cradle with a baby

Ans 12. Conversions:

(i) 4500 cm = 4500 ÷ 100 = 45 metres
(ii) 1.25 km = 1.25 × 1000 = 1250 metres

Ans 13. Advantages of SI units:

Advantage 1: SI units are universal and recognized worldwide, making communication and trade easier between different countries.

Advantage 2: SI units provide consistency and accuracy. Unlike local units which vary from place to place, SI units are the same everywhere, eliminating confusion and ensuring precise measurements.

Ans 14. Situations requiring curved length measurement:

Situation 1: A tailor needs to measure the waist, chest, or hip size of a person to stitch clothes. These body measurements follow curves and require flexible measuring tape.

Situation 2: Measuring the circumference of a circular object like a wheel, a plate, or a tree trunk requires measuring along a curved path.

SECTION C - Answers to Short Answer Questions

Ans 15. Measuring length of a curved line:

To measure the length of a curved line using a thread and scale:

Materials Required:
- A piece of thread or string
- A metre scale or ruler
- The curved line to be measured

Procedure:
Step 1: Take a piece of thread that is longer than the curved line.

Step 2: Place one end of the thread at the starting point of the curved line.

Step 3: Carefully place the thread along the entire curved line, ensuring it follows all the curves without leaving any gaps or taking shortcuts.

Step 4: Mark or hold the point on the thread where the curved line ends.

Step 5: Remove the thread carefully and straighten it on a flat surface.

Step 6: Measure the length of the thread from the starting mark to the ending mark using a scale.

Result: The length of the straightened thread gives the length of the curved line.

Applications: This method is used to measure decorative borders, curved edges in architecture, and the length of winding paths.

Ans 16. Difference between rest and motion:

Rest:
An object is said to be at rest if its position does not change with respect to a reference point with time.

Motion:
An object is said to be in motion if its position changes with respect to a reference point with time.

Example showing both simultaneously:

Consider passengers sitting in a moving train:

At Rest (Reference Point: Train):
With respect to the train, the passengers are at rest because:
- Their position inside the train does not change
- They remain seated in the same seats

- The distance between passengers and train walls remains constant

In Motion (Reference Point: Station or Trees):
With respect to the railway station or trees outside, the same passengers are in motion because:
- Their position relative to the station/trees is continuously changing
- They are moving away from the starting station
- The distance between passengers and objects outside keeps increasing

Conclusion:
This example proves that rest and motion are relative concepts that depend entirely on the choice of reference point. The same object can be at rest with one reference point and in motion with another reference point at the same time.

Ans 17. Ancient Indian units of measurement:

Three Ancient Indian Units:

1. Angula (Finger Width):
- Represented the width of a finger
- Used in measuring small lengths
- Still used by some traditional craftspeople like carpenters and tailors
- Mentioned in ancient Indian literature for architecture and artefacts

2. Dhanusa (Bow Length):
- Based on multiples of angula
- Used for measuring medium to large lengths
- Named after the bow used in archery
- Used in town planning and land measurement

3. Yojana:
- Used for measuring very large distances
- Equivalent to several kilometres
- Mentioned in ancient texts for travel distances
- Used in astronomy and geography

Why they are not used as standard units today:

Reason 1 - Lack of Uniformity:
These units varied from region to region and person to person. For example, angula depended on individual finger width, making measurements inconsistent.

Reason 2 - Need for Universal Standards:
In the modern globalized world, we need universal standard units that are recognized internationally. Ancient units could not fulfill this requirement as they were localized and not scientifically standardized.

Reason 3 - Precision Requirements:
Modern science, engineering, and trade require very precise and reproducible measurements. Ancient units based on body parts cannot provide this level of precision and accuracy.

SECTION D - Answer to Long Answer Question

Ans 18. Classification of motions:

(a) Motion of a bicycle on a straight road:
Type: Linear Motion
Periodic: No (Non-periodic)
Reasoning: The bicycle moves along a straight path. It is not periodic because it does not repeat the same motion

after fixed intervals - it keeps moving forward.

(b) Motion of a door on its hinges:
Type: Oscillatory Motion (or Rotational motion about a fixed axis)
Periodic: Can be periodic (if opened and closed repeatedly)
Reasoning: The door swings back and forth about the fixed hinges, showing oscillatory motion. If it opens and closes repeatedly at regular intervals, it becomes periodic.

(c) Motion of a metal strip when pressed and released:
Type: Oscillatory Motion
Periodic: Yes (Periodic)
Reasoning: The metal strip vibrates up and down about its fixed position repeatedly, showing periodic oscillatory motion until it comes to rest.

(d) Motion of Earth around the Sun:
Type: Circular Motion
Periodic: Yes (Periodic)
Reasoning: The Earth moves along a nearly circular path (elliptical) around the Sun. It completes one revolution in 365 days and repeats this path continuously, making it periodic.

(e) Motion of a ball rolling down a slope:
Type: Linear Motion
Periodic: No (Non-periodic)
Reasoning: The ball moves along a straight or nearly straight line down the slope. It is not periodic as it does not repeat its path - it just rolls down once and stops.

(f) Motion of a string of a guitar when plucked:
Type: Oscillatory Motion
Periodic: Yes (Periodic)
Reasoning: The guitar string vibrates to and fro about its fixed position very rapidly. This oscillation is periodic and produces sound due to the regular repetition of motion.

(g) Motion of a car moving in circles in a parking lot:
Type: Circular Motion
Periodic: Yes (Periodic)
Reasoning: The car moves along a circular path. If it continues moving in the same circle repeatedly, it is periodic circular motion.

(h) Motion of water flowing in a straight pipe:
Type: Linear Motion
Periodic: No (Non-periodic)
Reasoning: Water flows along the straight pipe in one direction, showing linear motion. It is not periodic as it continuously flows forward without repeating its path.

Summary Table:
Linear Motion: (a), (e), (h) - None periodic
Circular Motion: (d), (g) - Both periodic
Oscillatory Motion: (b), (c), (f) - (c) and (f) periodic

Important Note: Both circular motion and oscillatory motion can be periodic in nature as they often repeat their paths after fixed intervals.

SECTION E - Answers to Case Study Based Questions

Ans 19. Case Study 1 - Answers:

(a) They got different measurements with handspans because:

- Handspan size varies from person to person
- Anish, Padma, and Hardeep have different hand sizes
- Larger handspans cover more distance, requiring fewer spans, while smaller handspans require more spans for the same length
- Handspan is not a standard unit, so measurements are inconsistent

(b) They got the same measurement with the metre scale because:
- The metre scale is a standard measuring instrument
- The size of divisions on a metre scale is fixed and does not vary
- Everyone uses the same standard unit (metres and centimetres)
- Standard units ensure consistency and accuracy in measurements

(c) Hardeep has the smallest handspan among the three.
How we can tell:
- Hardeep needed 14 handspans to measure the table
- Anish needed slightly more than 13, and Padma needed exactly 13
- Since the table length is the same for all (1.35 m), the person who needs more handspans must have a smaller handspan
- More handspans required = Smaller handspan size

(d) This activity teaches us that:
- Non-standard units like handspan give different results for different people
- This creates confusion and makes it impossible to communicate measurements clearly
- Standard units are essential for:
* Ensuring consistency in measurements
* Enabling clear communication
* Facilitating trade and science
* Providing accurate and reproducible results
- Standard units like metre, centimetre are the same for everyone, everywhere, making them reliable for all measurements

Ans 20. Case Study 2 - Answers:

(a) The **Ferris wheel** shows circular motion. It rotates in a large circle, with all the passengers moving along circular paths.

(b) The cars on the highway are in motion with respect to the following reference points:
- Trees along the roadside
- Buildings near the highway
- Kilometre stones on the road
- Any stationary object on or near the highway
The position of cars keeps changing with respect to these fixed objects, hence they are in motion.

(c) The students are **at rest** with respect to their own bus.
Explanation:
- The students are sitting inside the bus
- Their position inside the bus is not changing
- The distance between students and the bus walls remains constant
- Although the bus is moving, the students' position relative to the bus (reference point) is fixed
- Therefore, with respect to the bus, they are at rest
- However, with respect to objects outside (trees, buildings), they are in motion

(d) The escalator shows **linear motion**. It moves in a straight line upward (or downward).
One more example of this type of motion:
- A lift/elevator moving up or down in a building
(Other acceptable answers: A moving walkway at an airport, a conveyor belt, an object falling straight down)

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