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. One centimetre is equal to:

(a) 1 millimetre

(b) 5 millimetres

(c) 10 millimetres

(d) 100 millimetres

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

(a) circular motion

(b) linear motion

(c) oscillatory motion

(d) none of these

Q3. India's ancient measurement unit 'angula' refers to:

(a) length of arm

(b) finger width

(c) palm length

(d) foot length

Q4. Which of these motions is periodic in nature?

(a) circular motion only

(b) oscillatory motion only

(c) both circular and oscillatory

(d) only linear motion

Q5. The full form of SI is:

(a) Scientific International

(b) System of International

(c) International System of Units

(d) Scientific Institute

Q6. 500 centimetres is equal to:
(a) 0.5 metres
(b) 5 metres
(c) 50 metres
(d) 5000 metres

Q7. While measuring length, the eye should be positioned:
(a) at an angle
(b) directly above the point
(c) far from the scale
(d) at any position

Q8. Motion of a merry-go-round is an example of:
(a) linear motion
(b) circular motion
(c) oscillatory motion
(d) random motion

Q9. An object at rest means its position:
(a) is changing with time
(b) is not changing with time
(c) changes very slowly
(d) changes very fast

Q10. Which is the most appropriate unit for measuring the thickness of a coin?
(a) kilometre
(b) metre
(c) centimetre
(d) millimetre

SECTION B - Short Answer Questions (2 marks each)

Q11. Define the term 'unit' as used in measurement. Why do we express length in two parts?

Q12. Convert the following:
(i) 3.2 metres into centimetres
(ii) 7500 metres into kilometres

Q13. Why are body parts like handspan not suitable as standard units of measurement?

Q14. Give two examples each of periodic and non-periodic motion from your surroundings.

SECTION C - Short Answer Questions (3 marks each)

Q15. If the zero mark of a scale is broken, can we still use it for measurement? Explain with an example.

Q16. Describe India's rich history in measurement systems. Mention at least three ancient Indian units of length.

Q17. Explain why motion and rest are relative terms. Support your answer with a suitable example.

SECTION D - Long Answer Question (5 marks)

Q18. Write a detailed note on the International System of Units (SI). Why was there a need to develop such a system? Explain the relationship between different units of length in the SI system.

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

Q19. Case Study 1:

Anish wants to make a Kabaddi court for the school sports day. The court dimensions are 13 m × 10 m with various internal lines. He has a 15-cm scale, a metre scale, and a measuring tape (10 metres long).

Based on this information, answer the following:

(a) Which measuring device should Anish use to mark the court dimensions? Why? (1 mark)

(b) Why is a reference point important when marking the court? (1 mark)

(c) If the measuring tape shows a total length of 13.5 m but he needs only 13 m, how should he measure? (1 mark)

(d) Can he use his handspan for this work? Justify your answer. (1 mark)

Q20. Case Study 2:

During a science exhibition, students set up different models showing various types of motion:

Model A: A toy car moving on a straight track

Model B: A planet model revolving around the sun

Model C: A pendulum swinging back and forth

Model D: A bouncing ball (moving up and down)

Based on this information, answer the following:

(a) Identify the type of motion shown by Model A. (1 mark)

(b) Which two models demonstrate periodic motion? (1 mark)

(c) Model C shows which type of motion? Give one more example of this motion. (1 mark)

(d) If you consider the table as a reference point, is Model B in motion or at rest? Explain. (1 mark)

DETAILED ANSWER KEY - PAPER 02

SECTION A - Answers to MCQs

Ans 1. (c) 10 millimetres

1 centimetre = 10 millimetres (1 cm = 10 mm)

Ans 2. (c) oscillatory motion

A swing moves to and fro about a fixed position, which is oscillatory motion.

Ans 3. (b) finger width

Angula, an ancient Indian unit, refers to finger width and is still used by traditional craftspeople.

Ans 4. (c) both circular and oscillatory

Both circular and oscillatory motions are periodic as they repeat their path after fixed intervals.

Ans 5. (c) International System of Units

SI stands for International System of Units.

Ans 6. (b) 5 metres

500 cm = 500 ÷ 100 = 5 metres

Ans 7. (b) directly above the point

The eye should be directly above the point being measured to avoid parallax error.

Ans 8. (b) circular motion

A merry-go-round moves along a circular path.

Ans 9. (b) is not changing with time

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

Ans 10. (d) millimetre

Millimetre is the most appropriate unit for measuring very small lengths like the thickness of a coin.

SECTION B - Answers to Short Answer Questions

Ans 11. Definition and expression of length:

Unit: A unit is a standard quantity used for measurement. It provides a reference for comparing and expressing measurements.

Two parts of length: Length is expressed in two parts - a number and a unit. For example, if a table is 3 metres long, then '3' is the number and 'metres' is the unit. The number tells us how many units, and the unit tells us what is being counted. This makes the measurement meaningful and universally understood.

Ans 12. Conversions:

(i) 3.2 m = 3.2 × 100 = 320 centimetres
(ii) 7500 m = 7500 ÷ 1000 = 7.5 kilometres

Ans 13. Why body parts are not suitable:

Body parts like handspan are not suitable as standard units because:

Reason 1: They vary from person to person. Different people have different handspan sizes.

Reason 2: Measurements made by different people using handspan will give different results for the same object, causing confusion and making comparisons impossible. Standard units ensure consistency and universal acceptance.

Ans 14. Examples of periodic and non-periodic motion:

Periodic Motion (repeats after fixed intervals):
1. Motion of Earth around the Sun
2. Motion of the hands of a clock

Non-Periodic Motion (does not repeat):
1. A ball rolling on the ground and stopping
2. A person walking on the road

SECTION C - Answers to Short Answer Questions

Ans 15. Using a broken scale:

Yes, we can still use a scale even if the zero mark is broken.

Method:
1. Start measuring from any other clear full mark on the scale, such as 1.0 cm or 2.0 cm.
2. Note the reading at both ends of the object.
3. Subtract the starting reading from the final reading.

Example:
If we want to measure a pencil using a broken scale:
- Place one end of the pencil at the 2.0 cm mark
- The other end reaches the 12.5 cm mark
- Length of pencil = 12.5 cm - 2.0 cm = 10.5 cm

This method gives accurate measurements even with a broken scale.

Ans 16. India's history in measurement:

India has a rich history of measurement systems dating back to ancient times.

Ancient Indian Units:
1. **Angula** - Finger width, still used by traditional craftspeople like carpenters and tailors
2. **Dhanusa** - A larger unit used for measuring longer distances
3. **Yojana** - Used for measuring very large distances, equivalent to several kilometres

Historical Evidence:
- These units are mentioned in ancient Indian literature
- They were used in measuring artefacts, architecture, and town planning
- Several objects with ruled markings (similar to scales) have been excavated from sites of the Harappan Civilisation
- The angula and its multiples show the systematic approach to measurement in ancient India

Ans 17. Motion and rest are relative:

Motion and rest are relative terms because they depend on the reference point chosen.

Explanation:
An object can be in motion with respect to one reference point and at rest with respect to another reference point at the same time.

Example:
Consider a passenger sitting in a moving train:

- **With respect to the train (reference point):** The passenger is at rest because their position inside the train is not changing.

- **With respect to trees outside (reference point):** The same passenger is in motion because their position relative to the trees is continuously changing.

Conclusion: This example clearly shows that motion and rest depend on the choice of reference point, making them relative concepts rather than absolute ones.

SECTION D - Answer to Long Answer Question

Ans 18. International System of Units (SI):

What is SI?
The International System of Units (SI) is a globally accepted system of standardized units for measurement. It ensures uniformity and consistency in measurements across the world.

Need for SI System:
1. **Different systems created confusion:** Several systems of units evolved with time in different parts of the world. When people started travelling and trading internationally, these different systems caused confusion.

2. **Need for universal communication:** Scientists, traders, and common people needed a common system to communicate measurements clearly.

3. **International agreement:** Different countries came together and agreed to adopt a set of standard units to facilitate global trade, science, and communication.

SI Unit of Length:
The SI unit of length is the **metre**, represented by the symbol **'m'**.

Relationship Between Different Units of Length:

1. Kilometre (km): Used for measuring large distances
1 kilometre = 1000 metres (1 km = 1000 m)
Example: Distance between cities

2. Metre (m): The base SI unit
1 metre = 100 centimetres (1 m = 100 cm)
Example: Height of a person, length of a room

3. Centimetre (cm): Used for smaller measurements
1 centimetre = 10 millimetres (1 cm = 10 mm)
Example: Length of a pencil, width of a book

4. Millimetre (mm): Used for very small measurements
1 millimetre = 0.1 centimetre (1 mm = 0.1 cm)
Example: Thickness of a coin, diameter of a wire

Complete Relationship:
1 km = 1000 m = 100,000 cm = 1,000,000 mm

Benefits of SI System:
- Universal acceptance ensures clear communication

- Facilitates international trade and science
- Eliminates confusion caused by different measurement systems
- Provides standard reference for all measurements

SECTION E - Answers to Case Study Based Questions

Ans 19. Case Study 1 - Answers:

(a) Anish should use the **measuring tape (10 metres long)**. This is because:
- The court dimensions are 13 m × 10 m, which are large measurements
- The measuring tape is long enough and flexible enough to measure these distances accurately
- A 15-cm scale or metre scale would be too small and inconvenient for such large measurements

(b) A reference point is important when marking the court because:
- It provides a fixed starting point from which all measurements are made
- It ensures that all lines of the court are properly aligned and positioned
- Without a reference point, the court dimensions would be inconsistent and the lines would not be straight or properly spaced

(c) If the measuring tape shows 13.5 m but he needs only 13 m:
- He should start measuring from the 0.5 m mark on the tape
- Then extend the tape up to the 13.5 m mark
- The distance between 0.5 m and 13.5 m = 13.5 - 0.5 = 13 m (required length)

(d) No, he cannot use his handspan for this work because:
- Handspan is not a standard unit and varies from person to person
- Sports courts require exact and precise measurements according to standard rules
- Using handspan would result in inaccurate measurements
- The court would not meet official standards and would be unsuitable for competitions

Ans 20. Case Study 2 - Answers:

(a) Model A (toy car on straight track) shows **linear motion** because the car moves along a straight line.

(b) The two models that demonstrate periodic motion are:
- **Model B** (planet revolving around sun) - repeats circular path
- **Model C** (pendulum) - repeats oscillatory motion

Both repeat their motion after fixed intervals of time.

(c) Model C shows **oscillatory motion**. The pendulum swings to and fro about a fixed position.
One more example: Motion of a swing in a playground, or motion of a guitar string when plucked.

(d) If we consider the table as a reference point, Model B (planet revolving around sun) is **in motion**.
Explanation:
- The planet model is continuously changing its position with respect to the table
- As it revolves around the sun, its distance and direction from any point on the table keeps changing
- Therefore, it is in motion with respect to the table (reference point)
