

NCERT Exemplar Solutions for Class 6 Science

Chapter 10: Motion and Measurement of Distances

Multiple Choice Questions

1. The distance between Delhi and Mumbai is usually expressed in units of:

- (a) decametre
- (b) metre
- (c) centimetre
- (d) kilometre

Solution:

(d) kilometre

Explanation: The distance between Delhi and Mumbai is approximately 1,400 km, which is a very large distance. For such long distances between cities, kilometres are the most appropriate unit of measurement as they provide manageable numbers for expression and calculation.

2. Which of the following does not express a time interval?

- (a) A day
- (b) A second
- (c) A school period
- (d) Time of the first bell in the school

Solution:

(d) Time of the first bell in the school

Explanation: Options (a), (b), and (c) represent durations or periods of time (intervals), while option (d) represents a specific moment or point in time. A time interval has a beginning and an end, whereas "time of the first bell" is just a specific instant.

3. A measuring scale (as shown in the geometry box) has a maximum length of 15 cm. Which of the following distances cannot be measured with this scale by using it only once?



- (a) 0.1 m
- (b) 0.15 m
- (c) 0.2 m
- (d) 0.05 m

Solution:

(c) 0.2 m

Explanation:

- $0.2 \text{ m} = 20 \text{ cm}$
- The scale is only 15 cm long
- Since $20 \text{ cm} > 15 \text{ cm}$, it cannot be measured in a single use
- All other options can be measured: $0.1 \text{ m} = 10 \text{ cm}$, $0.15 \text{ m} = 15 \text{ cm}$, $0.05 \text{ m} = 5 \text{ cm}$

4. A piece of ribbon folded five times is placed along a 30 cm long measuring scale. The length of the ribbon is between:



- (a) 1.15 m – 1.25 m
- (b) 1.25 m – 1.35 m
- (c) 1.50 m – 1.60 m
- (d) 1.60 m – 1.70 m

Solution:

(b) 1.25 m – 1.35 m

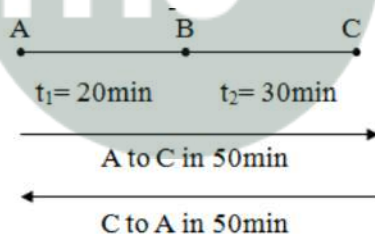
Explanation:

- From the figure, the folded ribbon extends from 2 cm to 27.5 cm on the scale
- Length of folded ribbon = $27.5 - 2 = 25.5$ cm
- Since it's folded 5 times, actual length = $25.5 \times 5 = 127.5$ cm = 1.275 m
- This falls in the range 1.25 m – 1.35 m

5. Paheli moves on a straight road from point A to point C, taking 20 minutes for AB and 30 minutes for BC. She returns the same way and repeats this 5 times. Her motion is:

- (a) only rectilinear motion
- (b) only periodic motion
- (c) rectilinear and periodic both
- (d) neither rectilinear nor periodic

Solution:

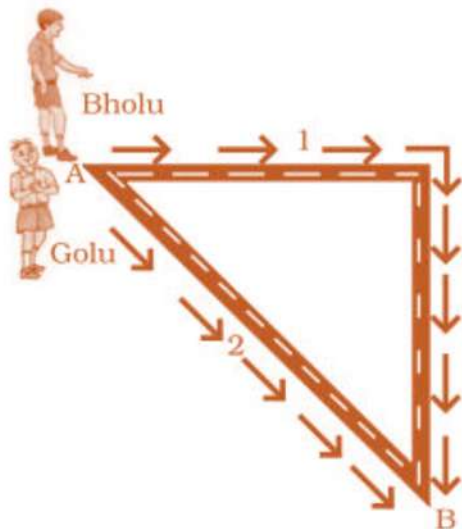


(c) rectilinear and periodic both

Explanation:

- **Rectilinear motion:** She moves along a straight road
- **Periodic motion:** She repeats the same pattern of movement at regular intervals (total time for one complete round = $50 + 50 = 100$ minutes)
- Since both conditions are satisfied, her motion is both rectilinear and periodic

6. Bholu and Golu start from point A and reach point B simultaneously, following paths 1 and 2 respectively. As compared to Golu, Bholu covers:



- (a) longer distance but with a lower speed
- (b) longer distance with a higher speed
- (c) shorter distance with a lower speed
- (d) shorter distance with a higher speed

Solution:

(b) longer distance with a higher speed

Explanation:

- Path 1 (Bholu's path) is clearly longer than Path 2 (Golu's path)
- Both reach point B at the same time
- Since $\text{Speed} = \text{Distance}/\text{Time}$, and time is same for both, the person covering more distance must have higher speed
- Therefore, Bholu has higher speed than Golu

7. Four wooden sticks A, B, C, and D are placed along a 30 cm scale. Which stick is 3.4 cm in length?



- (a) A
- (b) B
- (c) C
- (d) D

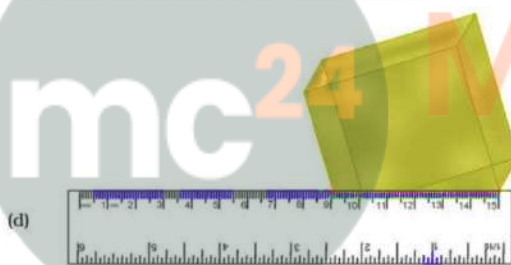
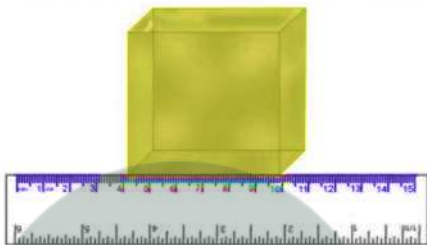
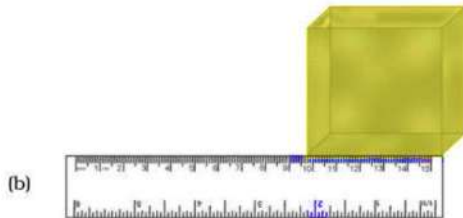
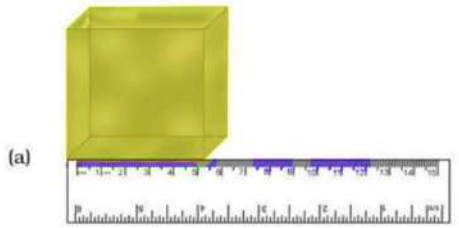
Solution:

(c) C

Explanation:

- From the figure, stick C extends from 7.0 cm to 10.4 cm on the scale
- Length of stick C = $10.4 - 7.0 = 3.4$ cm
- This matches exactly with the required length

8. Which figure shows the correct placement of a block along a scale for measuring its length?



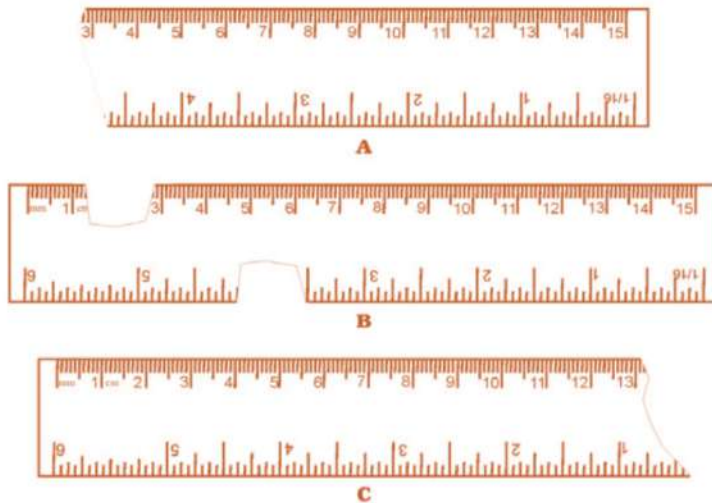
Solution:

(c)

Explanation: For accurate measurement, the object should be placed such that:

- One end of the object aligns with a clear marking on the scale
- The object lies flat against the scale
- Both ends of the object are clearly visible against the scale markings
- Option (c) shows proper alignment where both ends can be read accurately

9. You are provided three scales A, B, and C to measure a length of 10 cm. For correct measurement, you will use:



- (a) A only
- (b) B only
- (c) C only
- (d) Any of the three scales

Solution:

(d) Any of the three scales

Explanation: All three scales A, B, and C have markings that extend beyond 10 cm, so any of them can be used to measure a 10 cm length accurately. The choice depends on convenience and availability.

Short Answer Questions

10. Correct the following statements:

- (i) The motion of a swing is an example of rectilinear motion.
- (ii) 1 m = 1000 cm

Solution:

(i) Correction: The motion of a swing is an example of **periodic motion**, not rectilinear motion.

Explanation: A swing moves back and forth in an arc, repeating its motion after fixed intervals. This is periodic motion. Rectilinear motion involves movement along a straight line.

(ii) Correction: 1 m = **100 cm**

Explanation: The metre is divided into 100 equal parts called centimetres. Therefore, 1 metre = 100 centimetres, not 1000 centimetres.

11. Fill in the blanks:

- (i) Motion of an object or a part of it around a fixed point is known as _____ motion.
- (ii) A body repeating its motion after certain interval of time is in _____ motion.
- (iii) In rectilinear motion, object moves _____ line _____.
- (iv) SI unit of length is _____.

Solution: (i) **Circular** motion

(ii) **Periodic** motion

(iii) **Along a straight line**

(iv) **Metre**

12. Write one example for each type of motion:

(i) Rectilinear

(ii) Circular

(iii) Periodic

(iv) Circular and periodic

Solution: (i) **Rectilinear:** A car moving on a straight highway

(ii) **Circular:** Earth revolving around the Sun

(iii) **Periodic:** A child on a swing

(iv) **Circular and periodic:** Blades of a rotating ceiling fan

13. How would you measure the length of curved and straight iron bars in a grille to make payment to a contractor?



Solution:

For curved bars:

1. Use a flexible measuring tape or string
2. Place the string along the curve of the iron bar
3. Mark the start and end points on the string
4. Straighten the string and measure its length using a ruler or measuring tape

For straight bars:

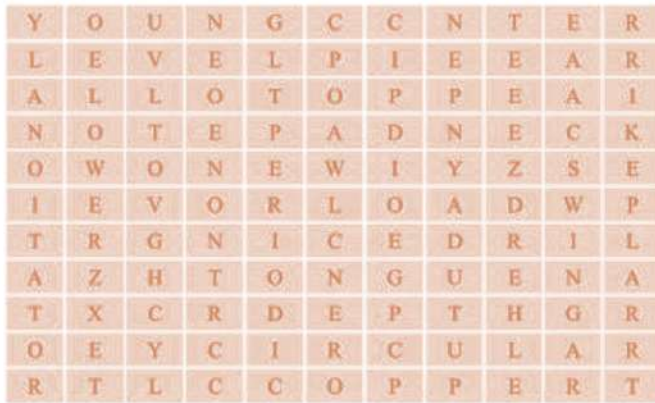
1. Use a measuring tape or ruler directly
2. Place one end at the starting point and read the measurement at the ending point

Alternative method for curved bars:

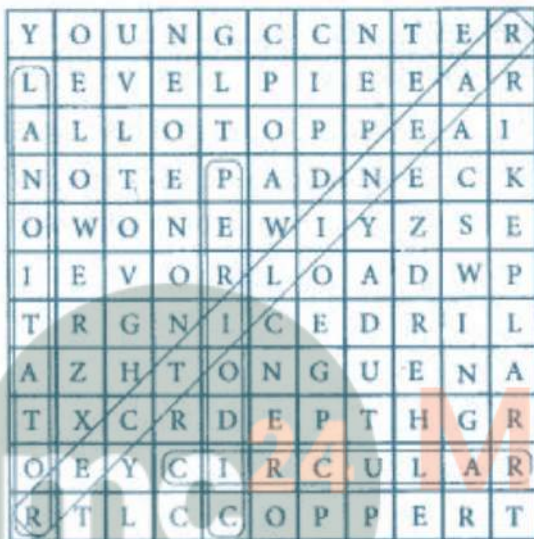
- Use a flexible measuring tape that can bend along the curve
- Digital calipers for small curved sections

This ensures accurate measurement for proper payment calculation.

14. Identify different types of motion from the word search puzzle.



Solution:



yclass24
Your Class. Your Pace.

The different types of motion that can be found in the word puzzle are:

1. **CIRCULAR** - Motion in a circle
2. **PERIODIC** - Motion that repeats after fixed intervals
3. **RECTILINEAR** - Motion along a straight line
4. **ROTATIONAL** - Motion around an axis

These represent the fundamental types of motion studied in mechanics.

15. Four children measure a 2m table using different methods. Who gets the most accurate measurement and why?

- (i) Sam - half metre thread
- (ii) Priya - 15cm scale
- (iii) Reena - hand span
- (iv) Salim - 5m measuring tape

Solution:

(iv) Salim using a 5m measuring tape

Reasons for highest accuracy:

1. **Single measurement:** Can measure the entire length in one go, eliminating cumulative errors
2. **Appropriate size:** The measuring tool is longer than the object being measured

3. **Standardized markings:** Professional measuring tape has accurate, standardized markings
4. **No repeated measurements:** Other methods require multiple measurements leading to accumulated errors

Why others are less accurate:

- Sam: Needs 4 measurements ($2\text{m} \div 0.5\text{m}$), each adding potential error
- Priya: Needs about 13 measurements ($200\text{cm} \div 15\text{cm}$), highest chance of error
- Reena: Hand span is not standardized and varies from person to person

16. Match the motions:

Column I → **Column II** (a) A moving wheel of a sewing machine → (ii) Rotational motion
 (b) Movement of tip of minute hand in one hour → (i) Circular motion
 (c) A moving swing → (iii) Periodic motion

Explanation:

- Sewing machine wheel rotates around its axis
- Minute hand tip traces a circular path
- Swing exhibits repeating back-and-forth motion

17. Why do trees appear to move while co-passengers appear stationary when traveling in a train?**Solution:**

This is due to **relative motion** and our **frame of reference**.

Trees appear to move because:

- Our reference point (the train) is moving
- Trees are stationary, but their position changes relative to us
- They appear to move in the opposite direction to our motion

Co-passengers appear stationary because:

- They are moving at the same speed and in the same direction as us
- Their position relative to us doesn't change
- We all share the same frame of reference (the moving train)

Key concept: Motion is always relative to the observer's frame of reference.

18. How are the motions of a bicycle wheel and an electric fan blade different?**Solution:****Bicycle wheel motion:**

- **Circular motion:** Rotates around its axle
- **Rectilinear motion:** Moves forward along the road
- **Combined effect:** Each point on the wheel follows a cycloid path

Electric fan blade motion:

- **Only circular motion:** Rotates around the central axis
- **No translational motion:** Remains in the same location
- **Fixed position:** The fan doesn't move from place to place

Key difference: Bicycle wheel has both rotational and translational motion, while fan blade has only rotational motion.

19. Why might three students get different measurements for the same corridor?

Solution:**Possible reasons for measurement differences:**

1. **Different measuring instruments:**
 - Varying accuracy levels
 - Different smallest divisions
 - Some may be non-standard or damaged
2. **Measurement technique errors:**
 - Not measuring along the shortest path
 - Incorrect positioning of measuring tool
 - Parallax errors in reading
3. **Starting and ending points:**
 - Different interpretations of where to start/end
 - Obstacles making exact endpoints unclear
4. **Human errors:**
 - Misreading the scale
 - Calculation mistakes
 - Rounding off differently
5. **Environmental factors:**
 - Temperature affecting tool expansion
 - Lighting conditions affecting visibility

20. Classify the motion of bicycle parts when riding on a straight road:**Solution:****(i) Rectilinear motion:**

- **Handle/Frame:** Moves in a straight line along the road
- **Seat:** Moves forward in straight line motion

(ii) Circular motion:

- **Pedals:** Rotate in circles around the crank axis
- **Chain:** Moves in circular path around gears (though it also has some translation)

(iii) Both rectilinear and circular motion:

- **Wheels:** Rotate around their axles (circular) while moving forward along the ground (rectilinear)
- **Spokes:** Rotate with the wheel while moving forward

Explanation: The wheel demonstrates the most interesting case where each point follows a cycloid curve - a combination of circular rotation and straight-line translation.

Key Concepts Summary**Types of Motion:**

1. **Rectilinear Motion:** Motion along a straight line
2. **Circular Motion:** Motion along a circular path
3. **Periodic Motion:** Motion that repeats after fixed intervals
4. **Rotational Motion:** Motion around a fixed axis

Measurement Principles:

- Use appropriate units for different scales of measurement
- Choose measuring instruments longer than the object when possible
- Minimize the number of measurements to reduce cumulative errors

- Ensure proper alignment and technique for accurate readings

Important Units:

- Length: metre (m), centimetre (cm), kilometre (km)
- Time: second (s), minute (min), hour (h)
- Always use SI units for scientific calculations

