

CHAPTER – 2 MEASUREMENT [SOLUTIONS]

Test Your Understanding [Page no. 25]

1. The height of a person is 1.09 m. Express it in cm.

- (a) 0.109 cm (b) 0.0109 cm
(c) 10.9 cm (d) 109 cm

Answer : (d) 109 cm

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

- (a) 3.250 km (b) 32.50 km
(c) 3240 km (d) 0.3250 km

Answer : (a) 3.250 km

3. The distance between Anushka's home and Devika's home is 1425 m. This distance is equal to :

- (a) 14.25 km (b) 142.5 km
(c) 1.425 km (d) 0.1425 km

Answer : (c) 1.425 km

4. The height of a man is 1.56 m. This height is equal to :

- (a) 1560 mm (b) 156 mm
(c) 15.6 mm (d) 1560 cm

Answer : (a) 1560 mm

5. A worldwide system of measurements in which the units of base quantities were introduced is called :

- (a) prefixes
(b) International system of units
(c) sexasigmal system
(d) None of above

Answer : (b) International system of units

Test Your Understanding [Page no. – 30]

1. The girth of a tree can be measured by using a.....

- (a) plastic ruler (b) metre scale
(c) metre rod (d) measuring tape

Answer : (d) measuring tape

2. Smallest division which is found in a measuring tape is.....

- (a) 1 mm (b) 10 mm
(c) 5 mm (d) 0 mm

Answer : (a) 1 mm

3. If we have to measure the length of a field, which type of measuring instrument will you use?

- (a) Metre scale (b) Measuring tape
(c) Ruler (d) None of above

Answer : (b) measuring tape

Test Your Understanding [Page no. – 35]

1. The measurement of small time intervals became possible with the development of

- (a) sand clock (b) sundial
(c) pendulum clock (d) water clock

Answer : (c) Pendulum clock

2. The regular vibrations of which of the following electrically driven crystals are used for measuring time very accurately?

- (a) Calcite crystals (b) quadric crystals
(c) Chrome crystals (d) Quartz crystals

Answer : (d) Quartz crystals

3. The clocks and watches which are used for measuring time are based on :

- (a) rectilinear motion (b) circular motion
(c) periodic motion (d) rotational motion

Answer : (c) Periodic motion

4. The sundial is a device for measuring :

- (a) speed (b) distance
(c) time (d) height

Answer : (c) Time

5. Which among the following is the smallest unit of time?

- (a) Second (b) Millenium
(c) Nanosecond (d) Microsecond

Answer : (c) Nanosecond

Test Your Understanding [Page no. – 40]

1. Tania is searching a vacation destination, and she sees that the average summer temperature in Patna, Bihar is around 26°C . What is the average temperature in degrees Fahrenheit?

- (a) 79°F (b) -3°F
(c) 45°F (d) 58°F

Answer : (a) 79°F

2. The device used for measuring temperature is called :

- (a) tachometer (b) odometer
(c) thermometer (d) barometer

Answer : (c) thermometer

3. The expansion of one of the following liquids is used for measuring the temperature in ordinary thermometers. This liquid is :

- (a) alcohol (b) water
(c) glycerol (d) mercury

Answer : (d) mercury.

4. Which of the following features are that of a clinical thermometer?

- A. Short temperature range
B. Wide temperature range
C. Alcohol filled glass bulb
D. Constriction in glass tube
(a) A and B (b) B and C
(c) A and D (d) B and D

Answer : (c) A and D

5. The normal temperature of a healthy person is 37° on :

- (a) Kelvin scale (b) Roemer scale
(c) Fahrenheit scale (d) Celsius scale

Answer : (d) Celsius scale

6. Digital thermometers available these days for measuring temperature use :

- (a) alcohol (b) water
(c) mercury (d) none of these

Answer : (d) None of these

Test Your Understanding [Page no. – 41]

1. Calculate the area of the rectangle if one square represents 1 cm^2 of area.

- (a) 2 cm^2 (b) 9 cm^2
(c) 50 cm^2 (d) 24 cm^2

Answer : (d) 24 cm^2

2. Find the area of the shaded region. (Each square is 1 m^2).

- (a) 21 m^2 (b) 35 m^2
(c) 34 m^2 (d) 13 m^2

Answer : 21 m^2

3. Which of the following figure represent area of 24 cm^2 if one box represents the area of 2 cm^2 ?

There is a mistake in the question.

EXERCISE

A. CHOOSE THE CORRECT OPTION :

1. The S.I. unit of mass is.....

- (a) newton (b) kilogram
(c) newton/kilogram (d) pound

Answer : (b) kilogram

2. Mass is measured by.....

- (a) beam balance (b) microbalance
(c) measuring tape (d) all of these

Answer : (a) Beam balance.

3. Which of the following is a physical quantity?

- (a) Second (b) Metre
(c) Mass (d) Hour

Answer : (c) Mass

4. The reference standard used for the measurement of a physical quantity is called

- (a) standard quantity (b) dimension
(c) constant (d) unit

Answer : (d) unit

5. In which of the following system, scientific data can be exchange between different parts of the world?

- (a) M.K.S. (b) C.G.S.
(c) F.P.S. (d) S.I.

Answer : (d) S.I.

6. The mass of the body depends only on.....

- (a) temperature (b) pressure
(c) quantity of matter contained in the body
(d) location of the body from the observer

Answer : (c) quantity of matter contained in the body.

7. Temperature can be expressed as a derived quantity in terms of.....
(a) length and mass (b) mass and time
(c) length, mass and time (d) None of these
Answer : (d) None of these

8. One quintal is equal to :
(a) 10 kg (b) 100 kg
(c) 1000 kg (d) 1000 g
Answer : (b) 100 kg

B. Write T for true and F for false statements :

1. Area of a regular surfaces can be measured using a graph paper.
Answer : True

2. The mass remains constant at all places.
Answer : True

3. The S.I. unit of area is metre.
Answer : False

4. Temperature of human body is measured by laboratory thermometer.
Answer : False

5. In ancient times, time was measured by the position of the sun and the moon.
Answer : True

6. Worn out metre scale can be used for measurement.
Answer : False

C. Fill in the blanks :

1. The length of forearm from elbow to finger tips is called.....
Answer : Cubit

2. Every measurement consists of a number and a.....
Answer : unit

3. One metre is.....mm.
Answer : 1000 mm

4. There are.....fundamental physical quantities.
Answer : 4

5. 1 kilometre is equal to.....metres.
Answer : 1000 m

6. The first two digits in a 24 hour time format represent the number of.....
Answer : Hour

7. If the departure time of a train on a railway ticket is printed as 20:35, then it will depart.
Answer : 8 : 35 P.M.

8. The lower fixed point in a laboratory thermometer is the same as that of.....
Answer : Ice point

9. The hotness of an object is determined by its.....
Answer : Temperature

10. Temperature is measured in degree.....
Answer : Celsius

11. Temperature of a boiling water cannot be measured by a.....thermometer.
Answer : Clinical

D. Match the following lengths with the appropriate unit which can be used to express the quantity.

| Lengths | Units |
|-----------------------------------|-------|
| 1. Length of men | a. km |
| 2. Distnace between Mumbai to Goa | b. mm |
| 3. Thickness of a coin | c. cm |

Answer : 1 = cm
2 = km
3 = mm

E. Answer the following questions in short.

1. Explain why hand span cannot be used as a standard unit of length.

Answer : Because this technique did not give the correct measurement as the size was not fixed.

2. What is cubit? Explain why cubit cannot be used as a standard unit of length.

Answer : An ancient measure of length which is approximately equal to the length of a forearm.

1 Cubit = 18 inches

1 Cubit = 44 cm

But, it cannot be used as a standard unit of length because the size of the forearm is not fixed.

3. Why a foot-step cannot be used as standard unit of length?

Answer : A foot-step cannot be used as a standard unit of length because the length of foot-step of different person is different.

4. What is meant by saying that the length of a table is 2 metres?

Answer : Here, '2 metre' is signifying the length or the size of the table. In a particular way, we can say that the table is 2 m long.

5. Name two devices which are commonly used for measuring length.

Answer : Metric rulers, scales, measuring tapes and vernier calliper.

6. What type of scale (device) would you use to measure your chest?

Answer : Measuring tape.

7. What type of measuring device would you use to measure :

a. the girth of a tree?

b. a piece of cloth?

Answer : (a) Measuring tape.

(b) Metre rod.

8. State whether the following statement is true or false :

Length of a curved line cannot be measured with a metre scale directly.

Answer : True.

9. Name the unit of length which you would like to use to express the distance between two cities : Delhi and Mumbai

Answer : Kilometre (km).

10. Name the unit of length which should be used to express the thickness of a coin.

Answer : Millimetres (mm).

11. Name two things which can be used to measure the length of a curved line,

Answer : The length of a curved line can be measured by using a thread and a scale.

12. What is the smallest length which can be measured accurately by using a metre scale?

Answer : 1 mm (one millimetre) is the smallest length which can be measured accurately by using a metre scale.

13. 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 : Here,

Reading at the beginning point = 3.0 cm

Reading at the end point = 33.1 cm

$$\begin{aligned}\text{Measurement,} &= \text{final reading} - \text{initial reading} \\ &= 33.1 \text{ cm} - 3.0 \text{ cm} \\ &= 30.1 \text{ cm}\end{aligned}$$

14. Choose the smallest and biggest units of length from the following :

(i) cm (ii) m

(iii) km (iv) mm

Answer : Smallest unit of length = (iv) mm

Biggest unit of length = (iii) km

15. Name one unit of length which is bigger than a metre.

Answer : Kilometre (km) is bigger unit of length than a metre.

16. Name two units of length which are smaller than a metre.

Answer : Centimetre (cm) and millimetre (mm) are smaller units of length than a metre.

17. Write the full names of the following units of measurement :

- (a) cm
- (b) km
- (c) mm
- (d) m

Answer : (a) cm = Centimetre

(b) km = kilometre

(c) mm = millimetre

(d) m = metre

18. Write the abbreviations for the following units :

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

Answer : (a) centimetre = cm

(b) metre = m

(c) kilometre = km

(d) millimetre = mm

19. a. How many centimetres are there in a metre?

b. How many millimetres are there in a centimetre?

c. How many millimetres make one metre?

d. How many metres make one kilometre?

Answer : (a) 1 m = 100 cm

(b) 1 cm = 10 mm

(c) 1000 mm = 1 m

(d) 1000 m = 1 km

20. State the unit in which temperature is commonly measured.

Answer : Kelvin (K) is the S.I. unit of temperature which is commonly used for measuring temperature.

21. What is the normal temperature of human body on Celsius scale?

Answer : 37.0°C

22. What is the usual temperature range of a laboratory thermometer?

Answer : - 10°C to 110°C

23. Name the liquid which is commonly used in making thermometers.

Answer : Mercury.

24. What prevents the mercury level in the glass tube of a clinical thermometer from falling on its own when its bulb is removed from the mouth of a patient?

Answer : Because of the presence of kink near the bulb of the thermometer, which prevents the level of mercury from falling when taken out from the mouth of a patient.

25. What is the name of the thermometer which has a temperature range :

(a) from - 10°C to 110°C?

(b) from 35°C to 42°C?

Answer : (a) Laboratory thermometer

(b) Clinical thermometer.

26. A clinical thermometer has usually two temperature scales marked on its glass tube. Name these two temperature scales.

Answer : (i) Celsius scale of temperature.

(ii) Fahrenheit scale of temperature.

27. What is the range of a clinical thermometer on Fahrenheit scale?

Answer : 94 – 108 Fahrenheit.

28. What is the normal temperature of human body on Fahrenheit scale?

Answer : 98.6 degrees Fahrenheit.

29. What is the name of those thermometers which do not use mercury?

Answer : Spirit thermometers and digital thermometers.

30. Name the thermometer which can automatically record the highest and lowest temperatures reached during the whole day.

Answer : Six's thermometer (or maximum or minimum thermometers).

31. Which physical quantity was measured by using sundial in ancient times?

Answer : A sundial measures time by the position of the shadow cast by the sun.

32. Name the standard unit of time. Name three units of time used in everyday life.

Answer : Second is the standard unit of time. The three units of time are second, minute and hour.

33. How many seconds are there in one hour? Name two devices which were used for measuring time in ancient times before pendulum clocks were made.

Answer : 1 hour = 60 minutes

1 minute = 60 seconds.

1 hour = 60 x 60 seconds

1 hour = 3600 seconds

In ancient times, people used some natural events which repeated regularly after fixed time intervals, i.e., sunrise or moon positions to measure time.

34. Name the device whose periodic motion was used for making clocks till recently. Name two natural units of time which were used for measuring time in olden days.

Answer : Pendulum.

Sunrise and Sunset are two natural units of time which were used for measuring time in olden days.

35. Name the material which is used for measuring time in electronic clocks and watches. Name the two most common time-measuring devices.

Answer : Quartz.

Quartz clocks and quartz watches are the most common time measuring devices.

F. Answer the following questions in detail.

1. What is meant by a 'standard unit of measurement'? why is it necessary to have standard units of measurement? Name the S.I. unit of length. Write its symbol.

Answer : A unit of measurement which has a fixed value which does not change from person to person or place to place, is called a standard unit of measurement.

It is necessary to have standard units of measurements for the sake of uniformity in measurements.

SI unit of length is metre denoted by symbol **(m)**.

2. The height of a person is 1.65 m. Express it in cm and mm.

Answer : (a) Height in cm :

1 meter = 100 cm

= 1.65 x 100 cm

= 165 cm

(b) Height in mm :

1 meter = 1000 mm

= 1.65 x 1000 mm

= 1650 mm.

3. State the precautions which should be taken while using a metre scale to measure the length of an object (like a postcard).

Answer : Precautions that should be taken while using a metre scale to measure the length of an object :

(i) Keep the ruler exactly along the **length** to be measured.

(ii) Avoid using worn out portions of the ruler.

(iii) Keep the eye vertically above the point where the **measurement** is to be taken.

4. The distance between two stations of Delhi Metro is 2.460 km. Express this distance in (a) m, and (b) cm.

Answer : Given distance= 2.460 kilometre

1 kilometre = 1000 m

1 metre = 100 cms

Thus, 1 km = 1000x100 cm

So, 2.46 km = 2.46x 100000= 246000cm

5. The length of a table is measured to be 1745 mm. How much is this length in metres?

Answer : Given,

Length of table : 1745 mm

Length of table in 'm' = 1745/1000

= 1.745 m

6. The length of a book rack is 2.15 m. Express this length in (a) cm, and (b) mm.

Answer : Given,

Length of book rack = 2.15 m.

(a) Length in 'cm' = 2.15 x 100

= 215 cm

(b) Length in 'mm' = 2.15 x 1000

= 2150 mm

7. A student lives at a distance of 2280 m from his school. Express this distance in km.

Answer : Given,

Distance = 2280 m

Distance in 'km' = 2280/1000

= 2.28 km

8. What is a clinical thermometer? What is the range of a clinical thermometer? Explain why a clinical thermometer cannot be used to measure high temperatures.

Answer : A clinical thermometer is used for measuring the body temperature of the humans and animals.

It measures temperature of range from 35 degree Celsius to 42 degree Celsius.

The main reason behind it is the measuring range of clinical thermometer is very less.

Hence it's inconvenient to measure high degree of temperature.

kink, so mercury falls on its own which does not.

9. (a) What is a simple pendulum? Define the time-period of a simple pendulum.

(b) In an experiment to measure the time-period of a simple pendulum, the time for 20 complete oscillations was found to be 36 s.

What is the time-period of this pendulum?

Answer : (a) A simple pendulum consists of a small metal ball (called bob) suspended by a long thread from a rigid support, such that the bob is free to swing back and forth.

The time period of a simple pendulum is the time taken by the pendulum bob to make one complete oscillation.

(b) Time for 20 complete oscillations = 36 s

Time for 1 complete oscillations = $36/20$ s

So, time period of the pendulum = 1.8 s

10. (a) What is a thermometer? Name the thermometer used by doctors and nurses to measure the temperature of human body.

(b) Can we use a laboratory thermometer to measure human body temperature? Give reason for your answer.

Answer : (a) A thermometer is an instrument used for measuring the temperature of one's body. The thermometer used by doctors and nurses to measure the temperature of human body is clinical thermometer (medical thermometer) ranging from 35-42 degree Celsius.

(b) Laboratory thermometer cannot be used to measure the temperature of a human body because the range of a laboratory thermometer is high generally from -10°C to 110°C , while as normal body temperature in humans is only 37°C .

Also laboratory thermometer does not have a