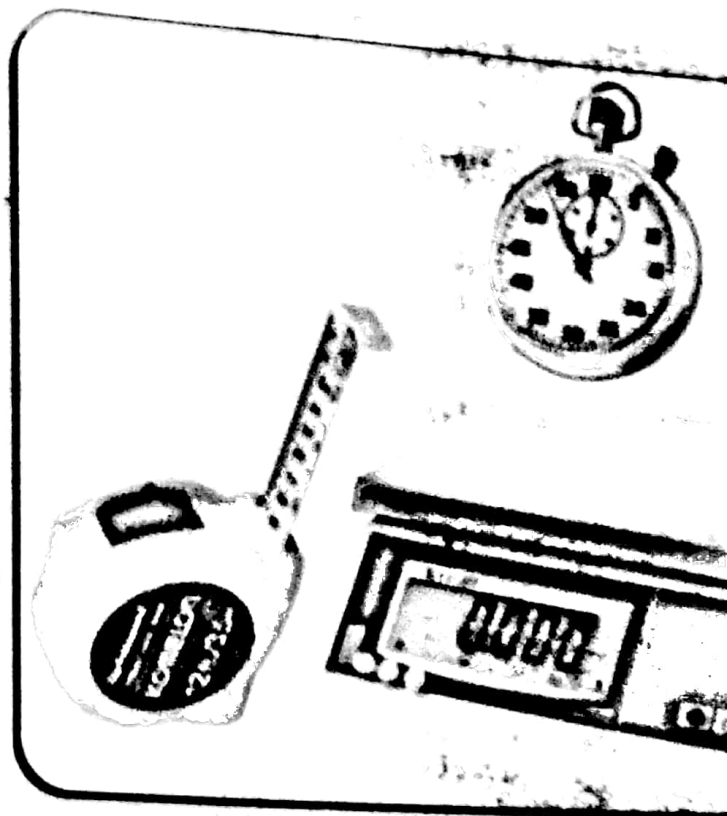


Chapter

8

MEASUREMENT OF PHYSICAL QUANTITIES



STUDENTS' LEARNING OUTCOMES

After studying this chapter, students will be able to:

- ☑ Define a physical quantity with examples.
- ☑ Apply the prefixes milli, kilo, centi, and interpret the units.
- ☑ Interconvert smaller units and bigger units.
- ☑ Select and use measuring instruments.
- ☑ Interpret SI units in daily life.
- ☑ Investigate why it is desirable for Scientists to use the SI units in their work.
- ☑ Measure the volume of liquid by reading correct meniscus.

QUESTIONS

Encircle the correct option.

- (i) An electronic balance is used to measure:
a. electric current
c. mass
b. length
d. volume
- (ii) SI unit of mass is:
a. kilogram
b. kilometre
c. pound
d. ounce
- (iii) Which of the following liquids makes the meniscus opposite to the others?
a. Mercury
b. Water
c. Alcohol
d. Petrol
- (iv) Which of the following is SI unit of volume?
a. m
c. m³
b. m²
d. kg
- (v) A mass of 2 kg is equal to:
a. 1,000 g
b. 2,000 g
c. 2,500 g
d. 3,000 g
- (vi) Which of the following relation is correct relation?
a. 1 min = 60 h
c. 1 mL = 1 cm³
b. 1 m = 1,000 cm
d. 1 min = 30 s
- (vii) A length of 50 mm is equal to:
a. 0.5 m
b. 0.05 m
c. 0.005 m
d. 0.0005 m
(divided 50 by 1000)
- (viii) 25 cm³ is equal to:
a. 25 mL
b. 2.5 mL
c. 0.25 mL
d. 250 mL
- (ix) One kilometre is equal to:
c. 1,000 m
a. 100 m
b. 500 m
d. 10,000 m

- (x) Pipettes are commonly used for:
- a. making solutions
 - b. measuring the volume**
 - c. transferring a measured volume
 - d. measuring mass

Match the Words of column A with those of column B.

| A | B |
|--------|-------------------|
| Mass | Metre rule |
| Length | Flask |
| Volume | Digital watch |
| Time | Standard quantity |
| Unit | Balance |

8.3 Short answer questions.

(i) **Define a physical quantity.**

Ans. Physical Quantity

The quantities which can be measured are called physical quantities. length, mass and time.

(ii) **Define the term prefix.**

Ans. Prefix

The words or letters added before SI units are called properties e.g.

milli (m), centi (c), kilo (k) etc.

(iii) **What is a metre rule?**

Ans. Metre Rule

It is a one metre long graduated stick. It is used to measure the length of an object or distance between two points.

(iv) **How many millilitres are there in one dm^3 ?**

Ans. $1\text{dm}^3 = 1\text{L} = 1000\text{mL}$

(v) **How many seconds are there in one solar day?**

Ans. There are 86400 seconds in one solar day.

8.4 Descriptive questions.

(i) **What are SI units? Explain.**

Ans. The system of units recommended by the scientists in an international conference held in 1960 near Paris is known as SI systems international units, abbreviated as SI.

- (a) SI units of length is metre (m)
- (b) SI units of mass is kilogram (kg)
- (c) SI units of time is second (s)
- (d) SI units of volume is cubic metre (m^3)

Describe the importance of SI units.

Importance of SI Units

Various standard units are used in different parts of the world. People especially business communities and scientists of different countries face problem of converting the units into one another. This problem was adopting.

The length of a wooden rod is 25.5 cm. What is this length in:

- (a) millimetres? (b) metres?

Solution:

Length in mm = ?

(1cm = 10mm)

$$\frac{25.5}{10} \times 10 = 225 \text{ mm}$$

So, (1cm = 10mm)

(a)

(b) length in m = ?

(1m = 100cm)

$$\frac{25.5}{100} \times \frac{1}{10} = \frac{225}{1000} = 225\text{m}$$

The mass of an iron plate is 1,950 g. What is this mass in kilograms?

Solution:

Mass of iron plate in kg

$$= \frac{1950}{1000} = 1.95\text{kg}$$

Convert in minutes.

(a) 3,600s

(b) 2 h

(a) (1 min = 60 sec)

$$\frac{3600}{60} = 60 \text{ min}$$

(b) (1 h = 60 min)

$$2 \times 60 = 120 \text{ min}$$

Describe the use of measuring cylinder.

Use of Measuring Cylinder

It is used to measure the volume of a liquid. It has a scale in millilitre (ml) or cubic centimeter (cm^3). Therefore it is also called graduated cylinder. In laboratory 100ml to 2500ml measuring cylinder are used.

(vii) Write short notes on measuring flask and pipette.

Ans. Flask

Flasks are laboratory vessels (containers). They are made of plastic or glass. They are of different sizes and shapes. In school laboratory, 50ml, 100ml, 250ml, 500ml, 1000ml flask are used for making solutions.

Pipette

Pipettes are used to transfer a measured volume of liquid from one container to the other. They are of different sizes and shapes. In laboratory 10ml to 25ml pipette of glass or plastic are used.