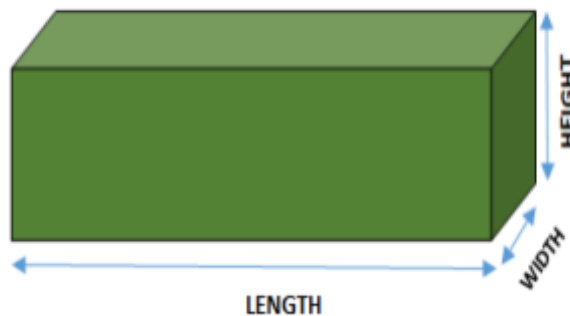


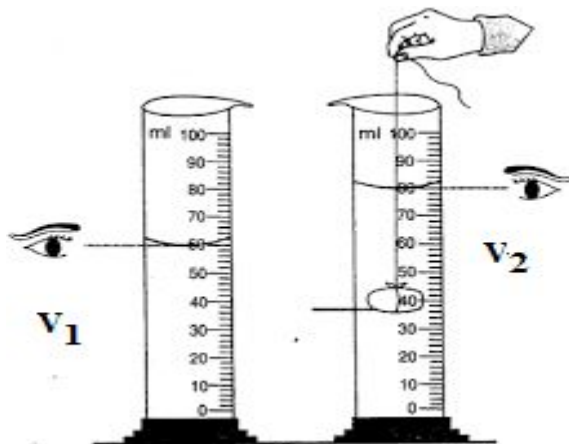
CHAPTER -1. PHYSICAL QUANTITIES AND MEASUREMENT

SUMMARY

- Measurement is the determination of the size or magnitude of something. By comparing the unknown quantity with some standard quantity of equal nature, is known as “measurement unit”.
- The space occupied by an object is called its volume.
- The S.I unit of volume is m^3 or cubic metres.
- Other units of volume are cm^3 and mm^3 .
- $1 \text{ cm}^3 = 10^{-6} \text{ m}^3$ and $1 \text{ mm}^3 = 10^{-9} \text{ m}^3$.
- Volume of regular solids for example a brick, matchbox which are in the shape of a cube or a cuboid is given as
= length \times breadth \times height
= $L \times B \times H$

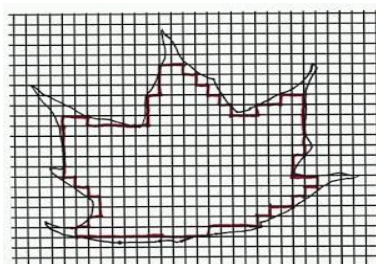


- The volume of an irregular solid can be found by the method of displacement of a liquid using a measuring cylinder and beakers.



- The density of a substance is defined as the ratio of the mass of a body to its volume.

- Density = mass/volume
- The S.I unit of density is kgm^{-3} and another unit is gcm^{-3} .
- $1 \text{ gcm}^{-3} = 1000 \text{ kgm}^{-3}$.
- The density of most substances decreases with increase in temperature because the substances expand on heating.
- Density of water decreases when heated from 0°C to 4°C and then increases on heating above 4°C .
- Many substances especially gases can be compressed into smaller volume by increasing the pressure acting on it.
- The area of an object is the surface occupied by it.
- For Square, area = side \times side
For a rectangle area = length \times breadth
- For irregular polygonal shaped areas, we take the help of a graph or we can draw a grid. The most accurate way to compute area is to partition the shape into triangles/squares then add up the areas of those small triangles.
- A grid unit may be 1 cm^2 . Place the irregular area like a Maple leaf on the grid/graph and draw its outline. Calculate the number of boxes or grids within the outline and multiply with the area of each grid.



$$\begin{aligned}
 &0.5 \text{ cm grid} \\
 &1 \text{ sq} = 0.25 \text{ cm}^2 \\
 &234 \text{ sq} \times 0.25 \text{ cm}^2 = 58.5 \text{ cm}^2 \\
 &36 \text{ sq} \times 0.25 \text{ cm}^2 = 9.0 \text{ cm}^2 \\
 &\hline
 &67.5 \text{ cm}^2
 \end{aligned}$$

- Speed of a moving body is defined as the distance travelled by it in one second/
- Speed $V = \text{distance travelled by body}(d)/\text{time of travel } (t)$.
- The S.I unit of speed is m/s and the other units are km/h and cm/sec .

ASSIGNMENT

A. State the following statements true or false:

i). The S.I unit of volume is litre.

ii). Equal volume of two different substances have equal masses.

- iii). The S.I unit of density is kgm^{-3} .
- iv). The density of water is maximum at 4°C .
- v). The speed 10 m/s is less than 36 km/hr .
- vi). cm^2 is a smaller unit of area than m^2 .

B. Fill in the blanks:

- i). $1 \text{ m}^3 = \text{-----cm}^3$
- ii). The volume of an irregular solid is determined by the method of -----.
- iii). Volume of a cuboid = -----.
- iv). The area of an irregular lamina is measured by using a -----.
- v). $\text{mass} = \text{density} \times \text{-----}$.
- vi). $1 \text{ g/cm}^3 = \text{-----kg/m}^3$.
- vii). $36 \text{ km/hr.} = \text{-----m/s}$
- viii). Distance travelled $d = \text{-----} \times \text{time}$.

C. Match the following:

| COLUMN A | COLUMN B |
|------------------------|-----------------------|
| 1. Volume of a liquid | 1. kg/m^3 |
| 2. Area of a leaf | 2. m^3 |
| 3. S.I unit of volume | 3. Graph paper |
| 4. S.I unit of density | 4. m/s |
| 5. S.I unit of speed | 5. measuring cylinder |

D. Select the correct alternative:

1. 1 litre is equal to

- a) 1 cm^{-3}
- b) 1 m^3
- c) 10^{-3} cm^3
- d) 10^{-3} m^3

2. A metallic piece displaces water of volume equal to 16 ml. Then the volume of the piece is

- a) 16 cm^3 b) 16 m^3 c) $16 \times 10^3 \text{ cm}^3$ d) $16 \times 10^3 \text{ m}^3$

3. The dimension of a piece of paper is $1.5 \text{ m} \times 20 \text{ cm}$. The area of the piece is

- a) 30 m^2 b) 300 cm^2 c) 0.3 m^2 d) 3000 m^3

4. The correct relation is

- a) $d = M + V$ b) $d = M \times V$ c) $M = d \times V$ d) $V = d \times M$

5. Define Volume. State the S.I unit of volume.

6. Name two devices that are used to measure the volume of an object. Draw neat labelled diagram of it.

7. How can you find the volume of an irregular solid? Give diagram.

8. Describe the method in steps to find the area of a rectangular lamina using a graph paper.

9. How does the density of water changes when it is a) heated from 0°C to 4°C and b) heated from 4°C to 10°C ?

10. The length, breadth and height of a water tank is 5m , 2.5 m and 1.25 m , respectively. Calculate the capacity of water tank in m^3 and litre.
