

Physical quantities & measurements

A. Objective Questions

1. Write true or false for each statement

(a) The S.I. unit of volume is litre.

Answer. False.

The S.I. unit of volume is cubic metre.

(b) A measuring beaker of capacity 200 ml can measure only the volume. 200 ml of a liquid.

Answer. True.

(c) cm^2 is a smaller unit of area than m^2 .

Answer. True.

(d) Equal volumes of two different substances have equal masses.

Answer. False.

Equal volumes of two different substances have different masses.

(e) The S.I. unit of density is g cm^{-3} .

Answer. False.

The S.I. unit of density is Kg m^{-3} .

(f) $1 \text{ g cm}^{-3} = 1000 \text{ kg m}^{-3}$.

Answer. True.

(g) The density of water is maximum at 4°C .

Answer. True.

(h) The speed 5 ms^{-1} is less than 25 km h^{-1} .

Answer. True.

(i) The S.I. unit of speed is ms^{-1} .

Answer. True

4. Select the correct alternative

(a) One litre is equal to :

1. 1 cm^{-3}
2. 1 m^3
3. 10^{-3} cm^3
4. **10^{-3} m^3**

(b) A metallic piece displaces water of volume 15 ml. The volume of piece is :

1. **15 cm^3**
2. 15 m^3
3. $15 \times 10^3 \text{ cm}^3$
4. $15 \times 10^3 \text{ cm}^3$

(c) A piece of paper of dimensions 1.5 m x 20 cm has area :

1. 30 m^2
2. 300 cm^2
3. **0.3 m^2**
4. 3000 m^3

(d) The correct relation is :

1. $d = M \times V$
2. **$M = d \times V$**
3. $V = d \times M$
4. $d = M + V$

(e) The density of alcohol is 0.8 g cm^{-3} . In S.I. unit, it will be :

1. 0.8 kg m^{-3}
2. 0.0008 kg m^{-3}
3. **800 kg m^{-3}**
4. $8 \times 10^3 \text{ kg m}^{-3}$

(f) The density of aluminium is 2.7 g cm^{-3} and of brass is 8.4 g cm^{-3} . For the same mass, the volume of:

1. both will be same
2. aluminium will be less than that of brass
3. **aluminium will be more than that of brass**
4. nothing can be said.

(g) A block of wood of density 0.8 g cm^{-3} has a volume of 60 cm^3 . The mass of block will be :

1. 60.8 g
2. 75 g
3. **48 g**
4. 0.013 g

(h) The correct relation for speed is

1. Speed = distance x time
2. **speed = distance / time**
3. speed = time / distance
4. speed = 1 / distance x time

(i) A boy travels a distance 150 m in 1 minute. His speed is

1. 150 m s^{-1}
2. **2.5 m s^{-1}**
3. 25 m s^{-1}
4. 9 m s^{-1}

B. Short/Long Answer Questions

Question 1.

Define the term volume of an object.

Answer:

The space occupied by an object is called its volume.

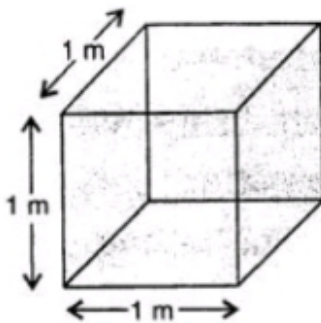
Question 2.

State and define the S.I. unit of volume.

Answer:

S.I. unit of volume – The S.I. unit of volume is cubic metre. In short form, it is written as m^3 .

One cubic metre is the volume of a cube of each side 1 metre as shown in figure below i.e., $1 m^3 = 1 m \times 1 m \times 1 m$.



Unit one metre³ (or 1 m³)

Question 3.

State two smaller units of volume. How are they related to the S.I. unit?

Answer:

A smaller unit of volume is cubic centimetre (symbol cm^3) and cubic decimetre (symbol dm^3). One cubic centimetre is the volume of a cube of each side 1 centimetre, i.e.,

$$1 cm^3 = 1 cm \times 1 cm \times 1 cm.$$

Relationship between m^3 and cm^3

$$1 m^3 = 1 m \times 1 m \times 1 m$$

$$= 100 cm \times 100 cm \times 100 cm$$

$$= 10,00,000 cm^3 = 10^6 cm^3.$$

Relationship between m^3 and dm^3

$$1 m^3 = 1 m \times 1 m \times 1 m.$$

$$= 10 dm \times 10 dm \times 10 dm$$

$$= 1000 dm^3$$

$$= 10^3 dm^3$$

Note $1 m = 10 dm$

Question 4.

How will you determine the volume of a cuboid ? Write the formula you will use.

Answer:

Volume of a cuboid = length \times breadth \times height.

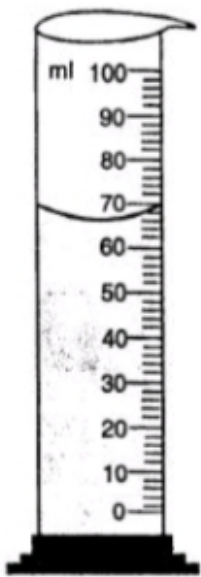
Question 5.

Name two devices which are used to measure the volume of an object. Draw their neat diagrams.

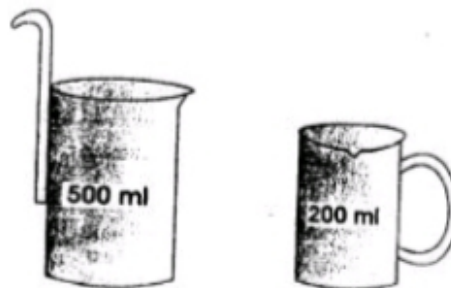
Answer:

Two devices that are used to measure the volume of an object are :

- (i) Measuring cylinder and
- (ii) Measuring beaker.



Measuring cylinder



Measuring beakers

Question 6.

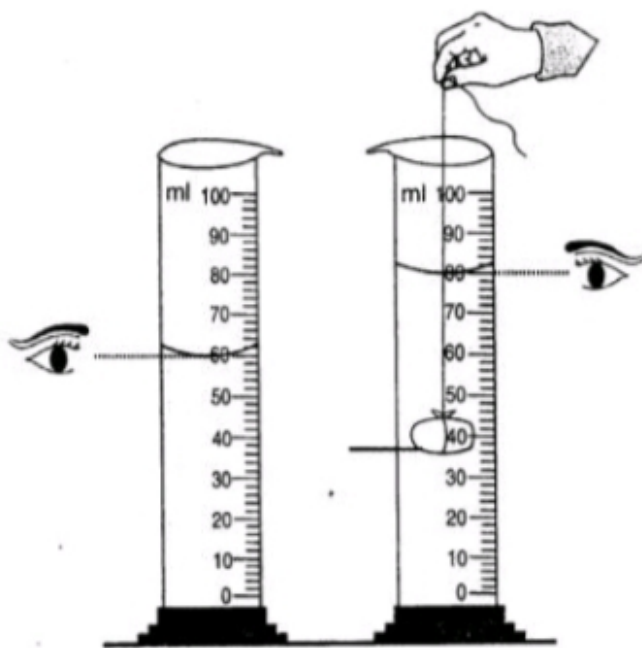
How can you determine the volume of an irregular solid (say a piece of brass) ? Describe in steps with neat diagrams.

Answer:

To measure the volume of a piece of stone.

Take a piece of brass, a measuring cylinder, fine thread of sufficient length and some water.

Place a measuring cylinder on a flat horizontal surface and fill it partially with water. Note the reading of the water level very carefully. Now tie the piece of brass with a thread and dip it completely into water. We see that the level of water rises. Note the reading of the new water level.



The difference in the two levels of water gives the volume of the piece of brass

Initial level of water = 60 ml

Level of water when brass is immersed = 80 ml

∴ Volume of water displaced = 80 ml – 60 ml = 20 ml

∴ Volume of the piece of brass = 20 cm³

Note : 1 ml = 1 cm³

Question 7.

You are required to take out 200 ml of milk from a bucket full of milk. How will you do it ?

Answer:

By using the measuring beaker A measuring beaker is used to measure a fixed volume of liquid from a large volume. Suppose it is required to measure 200 ml of milk from the milk contained in a bucket. For this, take the measuring beaker of capacity 200 ml. Wash it and dry it. Then, immerse the measuring beaker well inside the milk contained in the bucket so that the beaker gets completely filled with the milk.

Take out the measuring beaker from the bucket gently so that no milk splashes out and then pour the milk from the measuring beaker into the another empty vessel.