

TENDER HEART HIGH SCHOOL, SEC.-33'B, CHD.

CLASS- VII

SUBJECT- PHYSICS

CHAPTER- 1

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KAUR

Good morning students!

This lesson is of class - VII, for the subject of 'Physics', Topic - 'Measurement of Volume and area' which is covered in Chapter-1

'Physical Quantities and Measurement'

of your textbook - 'Concise Physics by Selina Publications' and is being

submitted to you on 15th April, 2024.

This week we will learn how to measure

Volume and area of regular objects (i.e.

objects having definite shape, like - cube,

cylinder, sphere, circle square, rectangle etc)

and of irregular objects (not having

particular or definite shape)

MEASUREMENT OF VOLUME

REGULAR OBJECTS:

i) Volume of cube = $(\text{side})^3$

ii) Volume of cuboid = length $\times$ breadth $\times$ height

For spherical surfaces, a constant is

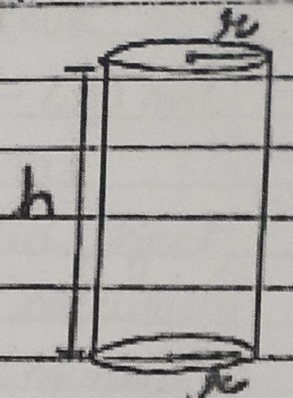
taken in formula, denoted by a

symbol of π (read as pi). Its

value is $\frac{22}{7}$ (which in decimals is

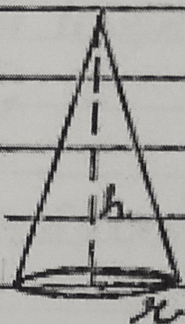
taken as 3.14)

1. Volume of a cylinder $= \pi \cdot r^2 h$
where, r is radius of circular surfaces
and, h is height of the cylinder



2. Volume of a cone $= \frac{\pi}{3} r^2 h$

3. Volume of a sphere $= \frac{4}{3} \pi r^3$



Measurement of Volume of an Irregular Object

Volume of body of irregular shape is equal to volume of liquid displaced by the body when it is immersed completely into the liquid.

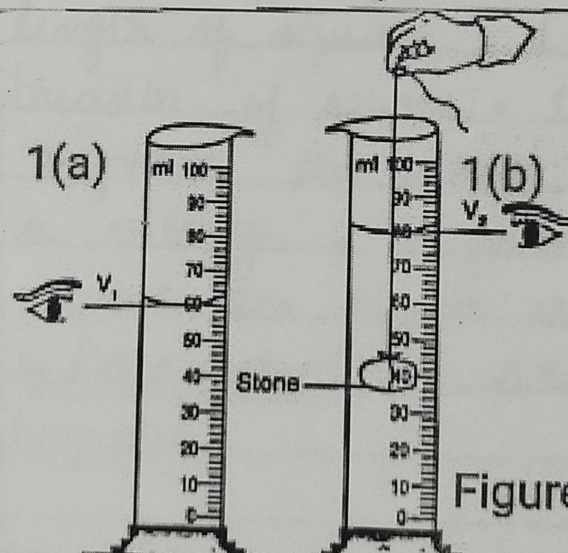


Figure-1

Observe figure 1(a), the initial volume of water is 60 ml and when a piece of stone is immersed in it, the level of water rises to 80 ml.

Volume of H_2O displaced = $(80 - 60) \text{ ml}$
= 20 ml

Students, since stone is a solid object, hence its volume is to be calculated in cm^3 as ml is use to measure volume of liquid. As, we have learnt last week that, $1 \text{ ml} = 1 \text{ cm}^3$, it means that: $20 \text{ ml} = 20 \text{ cm}^3$.

Hence; Volume of piece of stone = 20 cm^3 .

AREA

The surface occupied by an object is called area. It is measured in m^2 (S.I unit = m^2).

- 1 m^2 can be defined as area of square of side 1 m . i.e. $1 \text{ m}^2 = 1 \text{ m} \times 1 \text{ m}$ where, length of square = 1 m , and breadth of square = 1 m

NOTE: To express the area of a play ground, a village, a farm, m^2 is a small unit. The bigger units of area are sq. Decametre (or are), Hectare, square Kilometer.

sq. Decameter (1 Are) - It is the area of a square whose each side is 1 decameter (= 10 m)

$$1 \text{ are} = 1 \text{ Dm} \times 1 \text{ Dm} = 10 \text{ m} \times 10 \text{ m}$$

$$1 \text{ are} = 100 \text{ m}^2$$

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1 Hectare is the area of a square with each side measuring 100 m. i.e.

$$1 \text{ hectare} = 100 \text{ m} \times 100 \text{ m}$$

$$1 \text{ hectare} = 10000 \text{ m}^2$$

or,

$$1 \text{ hectare} = 10^4 \text{ m}^2 = (100)^2 \text{ m}^2$$

Also, $1 \text{ are} = 100 \text{ m}^2$, Thus:

$$1 \text{ hectare} = 100 \text{ are}$$

1 Square Kilometer (km^2) is the area of square with each side measuring 1 km. i.e.

$$1 \text{ km}^2 = 1 \text{ km} \times 1 \text{ km}$$

As, $1 \text{ km} = 1000 \text{ m}$, thus:

$$1 \text{ km}^2 = 1 \text{ km} \times 1 \text{ km}$$

$$= 1000 \text{ m} \times 1000 \text{ m}$$

$$1 \text{ km}^2 = 1000000 \text{ m}^2$$

$$1 \text{ km}^2 = 10^6 \text{ m}^2$$

SMALLER UNITS OF AREA

1 cm^2 (square centimetre) is the area of square with each side 1 cm. i.e.

$$1 \text{ cm}^2 = 1 \text{ cm} \times 1 \text{ cm}$$

Also, $1 \text{ cm} = \frac{1}{100} \text{ m}$

Thus, $1 \text{ cm}^2 = \frac{1}{100} \text{ m} \times \frac{1}{100} \text{ m}$

so, $1 \text{ cm}^2 = \frac{1}{10000} \text{ m}^2$, or,

$$1 \text{ cm}^2 = \frac{1}{10^4} \text{ m}^2$$

$$1 \text{ cm}^2 = 10^{-4} \text{ m}^2$$

} (Note this step)

Similarly, $1 \text{ mm}^2 = 1 \text{ mm} \times 1 \text{ mm}$

$$1 \text{ mm}^2 = \frac{1}{1000} \text{ m} \times \frac{1}{1000} \text{ m}$$

$$1 \text{ mm}^2 = \frac{1}{1000000} \text{ m}^2 = \frac{1}{10^6} \text{ m}^2$$

or,

$$1 \text{ mm}^2 = 10^{-6} \text{ m}^2$$

Measurement of Area of Regular Objects

- 1) Area of Square = side $\times$ side = (side)²
- 2) Area of Rectangle = length $\times$ breadth
- 3) Area of a Circle = $\pi \times (\text{radius})^2 = \pi r^2$

Area of irregular object is measured by placing the object on a graph paper and then counting the number of squares enclosed within the boundary of the object.

With this I conclude today's interactive session. You all are required to do Numerical-1, 2, 3 and 4 in your Physics Notebook.

Thank you.