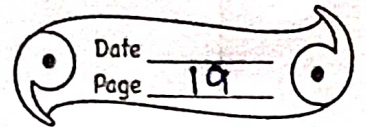


# TEST YOURSELF



1) Define the term density.

A- The Density of a substance is defined as its mass of a unit per volume of that substance. unit volume.

2) Name the SI unit of density. How is it related to  $\text{g cm}^{-3}$ ?

A- The SI unit of density is  $\text{kg m}^{-3}$ .  $1 \text{ g cm}^{-3} = 1000 \text{ kg m}^{-3}$ .  $1 \text{ kg m}^{-3} = \frac{1}{1000} \text{ g cm}^{-3}$ . It's CGS unit.

3) The density of brass is  $8.4 \text{ g cm}^{-3}$ . What do you mean by this statement?

A- It means that mass of  $1 \text{ cm}^3$  of brass is  $8.4 \text{ g}$ .  
Density of brass ( $8.4 \text{ g cm}^{-3}$ ) =  $\frac{\text{mass of brass}}{\text{Volume of brass}}$   $8.4 \text{ g}$ .

4) Arrange the following substances in order of their increasing density: iron, cork, brass, water, mercury.

A- Cork, Water, Iron, Brass, Mercury.

5) How does the density of a liquid (or gas) vary with temp.?

A- The Density of a substance in solid state is more than that in liquid state and the density of a substance in liquid state is more than that in gaseous state. Liquid (or gas) decreases with increase in temp.

6) A given quantity of a liquid is heated. Which of the following quantity will vary and how? (a) mass, (b) volume or (c) density.

A- The density of a substance decreases with increase in its temp. if the substance expands on heating.

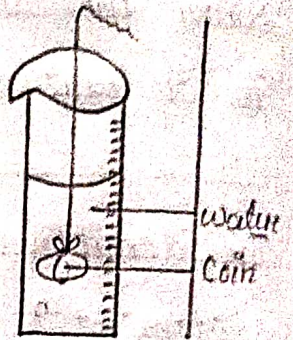
7) Describe an experiment to determine the density of the material of a coin.

A- Aim - To find the density of a coin.

Materials required - Measuring cylinder, water, coin, string.

Procedure - Take a measuring cylinder. Fill it partly with water. Note the level of water.

Let it be  $V_1$  ml. Now, tie the given coin with a string and gently lower the coin in water. Note the level of water again.



Let it be  $V_2$  ml. Find the difference,  $V_2 - V_1$ . It gives the volume  $V$  of the coin i.e.  $V = (V_2 - V_1) \text{ cm}^3$ .

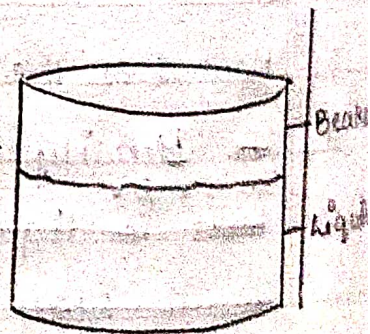
Observations - Density =  $\frac{\text{Mass}}{\text{Volume}}$  =  $\frac{M}{V} \text{ g cm}^{-3}$

8) Describe the an experiment to determine the density of a liquid.

A- Aim - To find the density of a liquid.

Materials required - Beaker, liquid, measuring cylinder, common beam balance.

Procedure - Take a beaker. Measure the



mass of the empty beaker using a common beam balance. Let the mass be  $M_1$  gram. Now take a measuring cylinder and pour the liquid into a certain level. Transfer the milk into the empty beaker. Measure its mass again. Let it be  $M_2$  gram. Find the

difference,  $M_2 - M_1$ , which gives the mass  $M$  of the liquid. Find its volume.

Observations -  $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$

9) What is a density bottle? How is it used to find the density of a liquid?

A- A density bottle is a bottle used to determine the density of a liquid.

The bottle can store a fixed volume of a liquid. The stopper has a narrow hole through it. When the bottle is filled with the liquid and stopper is inserted, the excess liquid rises and comes out. Thus, the bottle always contains the same amount of liquid each time it is filled.

10) What is relative density of a substance? State its unit.

A- Relative density <sup>is the ratio between density of substance and density of water.</sup> of a substance =  $\frac{\text{Density of the substance}}{\text{Density of water}}$

$R.D = \frac{\text{Density of substance}}{\text{Density of water}}$

It is just a number. It has no unit.

11) Distinguish between density and relative density.

A-  $\text{Density} = \frac{\text{Mass}}{\text{Volume}}$ , whereas

$\text{Relative density} = \frac{\text{Density}}{\text{Density of water}}$

12) Explain the meaning of the statement 'relative density of aluminium = 2.7'.

A- We mean that a piece of aluminium of any volume has mass 2.7 times that of an equal volume of water.

13) How does the density of a body, and that of a liquid determine whether the body will float or sink into that liquid?

A- A body floats on a liquid if its density is less than the density of the liquid, while a body sinks in a liquid if its density is more than the density of the liquid.

14) A cork piece floats on water surface while an iron nail sinks in it. Explain the reason.

A- This is because the density of cork is less than the density of water, while the density of iron nail is more than the density of water.

15) Which of the following will sink or float on water? (Density of water =  $1 \text{ g cm}^{-3}$ ).

$$1 \text{ g cm}^{-3} = 1000 \text{ kg m}^{-3}$$

- a) Body A having density  $500 \text{ kg m}^{-3}$  - Float
- b) Body B having density  $2520 \text{ kg m}^{-3}$  - Sink
- c) Body C having density  $1100 \text{ kg m}^{-3}$  - Sink
- d) Body D having density  $0.85 \text{ g cm}^{-3} = 850 \text{ kg m}^{-3}$  - Float

16) State the law of floatation.

A- Law of floatation states that when a body floats in a liquid, the weight of the liquid displaced by its immersed part is equal to the total weight of the body.

17) For a floating body, how is its weight related to buoyant force?

A- Weight of the floating body = weight of the liquid displaced by its immersed part (i.e. buoyant force).

18) Why does a piece of ice float on water? Explain why

A- it is easier to lift a stone under water than in air.

A- Due to buoyant force it is easier to lift a stone under water than in air. As gravitational force pulls it downwards and buoyant force pushes it upwards, stone <sup>seems to be</sup> lighter under water.

19) A balloon filled with hydrogen rises in air. Explain the reason.

A- The reason is that the density of these gases is less than the density of air.

20) What is a submarine?

A- A submarine is a water-tight boat which ~~can~~ <sup>can</sup> travel under and above the water.

## NUMERICALS

1) The density of air is  $1.28 \text{ g litre}^{-1}$ . Express it in :

a)  $\text{g cm}^{-3}$  -  $\frac{1.28 \text{ g litre}^{-1}}{1000 \text{ g cm}^{-3}} = 0.00128 \text{ g cm}^{-3}$

b)  $\text{kg m}^{-3}$  -  $1.28 \times 1000 = 1.28 \text{ kg m}^{-3}$

2) The dimensions of a hall are  $10 \text{ m} \times 7 \text{ m} \times 5 \text{ m}$ . If the density of air is  $1.1 \text{ kg m}^{-3}$ , find the mass of air.

A-  $M = D \times V$

$$= 1.1 \text{ kg m}^{-3} \times (10 \text{ m} \times 7 \text{ m} \times 5 \text{ m})$$

$$= 1.1 \text{ kg m}^{-3} \times 350 \text{ m}^3 = 385 \text{ kg}$$

3) The density of aluminium is  $2.7 \text{ g cm}^{-3}$ . Express in  $\text{kg m}^{-3}$

A- In  $\text{kg m}^{-3} = 2.7 \times 1000 = 2700 \text{ kg m}^{-3}$

4) The density of alcohol is  $600 \text{ kg m}^{-3}$ . Express in  $\text{g cm}^{-3}$ .

A- In  $\text{g cm}^{-3} = \frac{600}{1000} = 0.60 \text{ g cm}^{-3}$

1000

5) A piece of zinc of mass  $438.6 \text{ g}$  has a volume of  $86 \text{ cm}^3$ . Calculate the density of zinc.

A-  $D = \frac{M}{V} = \frac{438.6}{86} = 5.1 \text{ g cm}^{-3}$

6) A piece of wood of mass  $150 \text{ g}$  has a volume of  $200 \text{ cm}^3$ . Find the density of wood in :

$$a) \text{ ATGS unit} - \frac{150}{200} \times 100 = \frac{150}{200} \times 100$$

$$a) \text{ CGS unit} - \frac{75}{200} \times 100 = 0.75 \text{ g cm}^{-3}$$

$$b) \text{ SI unit} - 0.75 \times 1000 = 750 \text{ kg m}^{-3}$$

7) Calculate the volume of wood of mass 6000 kg if the density of wood is  $0.8 \text{ g cm}^{-3}$ .

$$A - V = \frac{M}{D} = \frac{6000}{0.8} = 7500 = 7.5 \text{ m}^3$$

8) Calculate the density of