

CLASS 8, CHAPTER 2. PHYSICAL QUANTITIES AND MEASUREMENT SUMMARY

- 1. Measurement is one of the best tools which a scientist can have.**
- 2. It is comparison of certain physical quantity with a known standard quantity.**
- 3. To express any measured value of a physical quantity one needs a unit and a numerical value.**
- 4. A unit of measurement is a definite magnitude of a quantity, defined and adopted by convention or by law, that is used as a standard for measurement of the same kind of quantity. Any other quantity of that kind can be expressed as a multiple of the unit of measurement. For example, a length is a physical quantity.**
- 5. A material's density is defined as its mass per unit volume. Density is essentially a measurement of how tightly matter is packed together. It is a unique physical property for an object. The principle of density was discovered by the Greek scientist Archimedes.**
- 6. Mathematically, Density $D = \text{Mass} / \text{Volume} = M/V$**
- 7. Density of a pure substance is often considered as a characteristic property of the substance.**
- 8. Temperature and pressure are the two factors which can affect the density of a substance.**
- 9. Most substances expand on heating i.e. their volume increases and hence density decreases.**
- 10. S.I unit of density is Kg/m^3 and c.g.s unit is g/cm^3 and $1 \text{ g}/\text{cm}^3 = 1000 \text{ Kg}/\text{m}^3$.**
- 11. The anomalous expansion of water is an abnormal property of water whereby it expands instead of contracting when the temperature goes from 4°C to 0°C , and it becomes less dense.**
- 12. The density of water is maximum at 4 degree centigrade and decreases below that temperature. The density becomes less and less as it freezes.**

13. Water has a maximum density of 1 g/cm^3 or 1000 kg/m^3 .

14. FLOATING AND SINKING

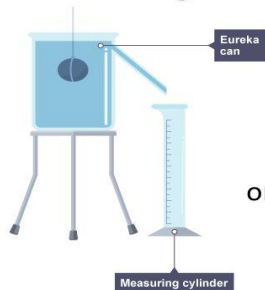
15. Boats and ships are floating objects. Any piece of wood may float on water. Even a piece of iron or brass can be made to float, if placed over mercury in a dish. This can be explained on the basis of ARCHIMEDES' PRINCIPLE.

16. Archimedes' principle states that the upward buoyant force that is exerted on a body immersed in a fluid, whether fully or partially submerged, is equal to the weight of the fluid that the body displaces. Archimedes' principle is a law of physics fundamental to fluid mechanics.

17. For a body to float in fluid, the density of the floating object should be less than or equal to the density of the fluid in which it is to float.

18. DETERMINATION OF DENSITY OF AN IRREGULAR SOLID USING EUREKA CAN & MEASURING CYLINDER

Finding the density of an irregular solid-method 2



or

- Find the mass of the solid using the balance
 - Fill the Eureka can with water
 - Lower the solid into the water
 - Measure the displaced water volume in the measuring cylinder
- or
- Fill a small beaker almost full with water
 - Lower it into a large beaker-carefully top up the water
 - Lower the solid into the water
 - Pour the displaced water into a measuring cylinder and measure the volume

19. LAW OF FLOATATION AND BUOYANCY: A body when immersed in water is acted upon by two forces:

The weight of the body acting in the downward direction and

The up thrust or buoyant force given by the liquid on the body acting in upward direction.

Depending on whether the weight of the body is more, or the up thrust is more, the body will float or sink.

20.EXAMPLES OF FLOATATION: A piece of cork floats whereas a coin sinks at the bottom of the glass full of water, a ship floats in water though it is made up of iron and steel which are denser than water.

21.INTERNATIONAL LOAD LINE OR PLIMSOLL LINE: It is a reference mark located on a ship's hull.

It indicated the maximum depth to which the vessel may be safely immersed when loaded with cargo

WORKSHEET

1. WRITE TRUE OR FALSE FOR THE FOLLOWING STATEMENTS:

- (a) Equal volumes of the two different substances have equal masses.
- (b) The density of a piece of brass will change by changing its size or shape.
- (c) The density of a liquid decreases with an increase in its temperature.
- (d) When a body is immersed in a liquid, the buoyant force experienced by the body is equal to the volume of the liquid displaced by it.
- (e) A body floats in a liquid when its weight becomes equal to the weight of the liquid displaced by its submerged part.
- (f) A body while floating sinks deeper in a liquid of low density than in a liquid of high density.

2. Fill in the blanks

- (a) 1kg is the mass of ----- of water at 4°C.
- (b) Mass = density × -----.

- (c) The S.I. unit of density is -----.
- (d) The density of water is ----- Kg m^{-3}
- (e) $1 \text{ g cm}^{-3} = \text{----- } \text{Kgm}^{-3}$
- (f) The density of a body which sinks in water is ----- 1000 Kg .
- (g) A body sinks in a liquid A, but floats in a liquid. The density of the liquid is ----
---- than the density of liquid B.
- (h) A body sinks in water, but a body Y floats on water. The density of the body
is ----- than the density of the body.
- (i) The buoyant force experienced by a body when floating in salt-water is -----
- to or same that of when floating in pure water.
- (j) The weight of a body floating in a liquid is -----.

3. Match the following

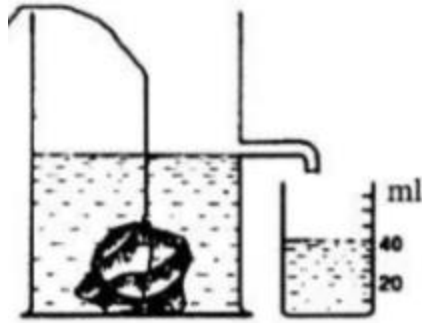
Column A

Column B

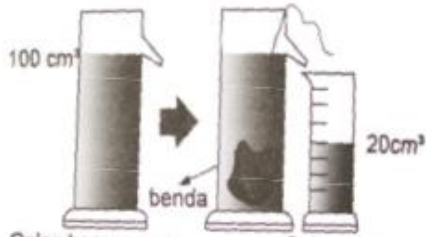
- | | |
|----------------------|-----------------------|
| (a) Kg | (i) relative density |
| (b) no unit | (ii) sinks in alcohol |
| (c) relative density | (iii) floats on water |
| (d) iron | (iv) density |
| (e) Wood | (v) density bottle |

NUMERICALS BASED ON DENSITY

- The volume of an object is 8 cm^3 and mass of an object is 84 grams. What is the density of the object?
- Volume of a block is 5 cm^3 . If the density of the block is 250 g/cm^3 , what is the mass of the block?
- Volume of water is 35 cm^3 and mass of water is 60 grams, what is the density of the water.
- Mass of a metal is 120 gram and volume of a metal is 60 cm^3 . What is the density of the metal?
- Mass of object is 316 grams, placed in a container as shown in figure. What is the density of the object?



6. Based on the figure below, if the mass of an object is 300 grams, what is the density of the object.



7. State Archimedes' principle.

8. Discuss the law of floatation with the help of diagram.

9. What is International load line?

10. Small rocks sink while boats and ships float in water. Explain.

DO THE SAMPLE PROBLEMS DONE IN THE CHAPTER AND THE SHORT AND LONG ANSWERS AS HOMEWORK IN YOUR EXERCISE COPY.