CHAPTER 10

FLOATATION

NOTES

Thrust and pressure

- Thrust - It is the force acting perpendicularly on the surface.
- Pressure- Pressure is the thrust acting on a surface per unit area.
- SI unit of pressure is **N/m^2 or Pascal (pa).**

$$\textbf{Pressure} = \frac{thrust}{area} = \frac{F}{A}$$

Buoyancy

- Buoyancy is a phenomenon in which an object immersed in a fluid experience an upward force.
- The upward force exerted by a fluid on an object is known as upthrust or buoyant force.
- The magnitude of buoyant force depends on the density of the fluid and volume of the immersed body.

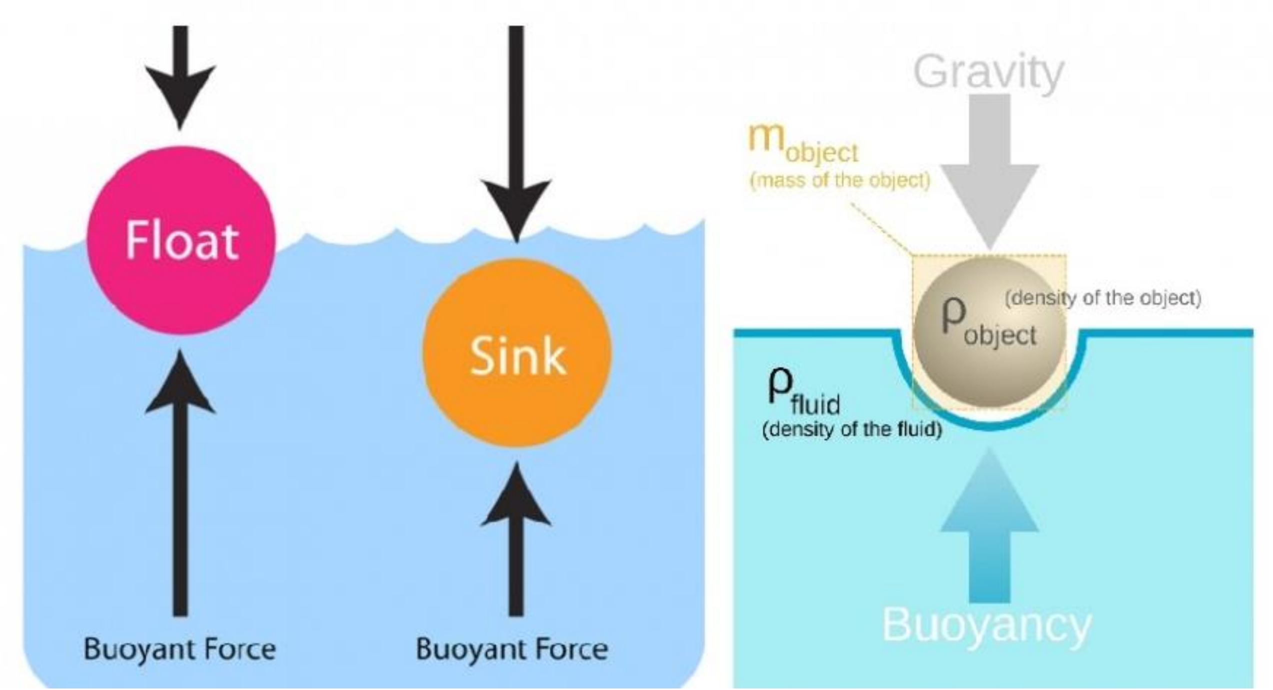


Fig: Buoyant force

Why an object float or sink when placed on the surface of water?

- When an object is immersed partially or fully in a liquid (water), it is under the action of two forces
  - **i)** The weight of the body acting downward.
  - **ii)** The upthrust or buoyant force of the liquid on the body.

- If a body having density less than that of water is place on the surface of water, the upthrust of water on the body is greater than the weight of the body. As a result, the body floats. On the other hand, if a body having density more than that of water is place on the surface of water, the upthrust of water on the body is less than the weight of the body. As a result, the body sinks.

Archimedes' Principle:

When a solid body is immersed partly or fully in fluid (liquid as well as gas), it experiences an upward force that is equal to the weight of the fluid displaced by the body.

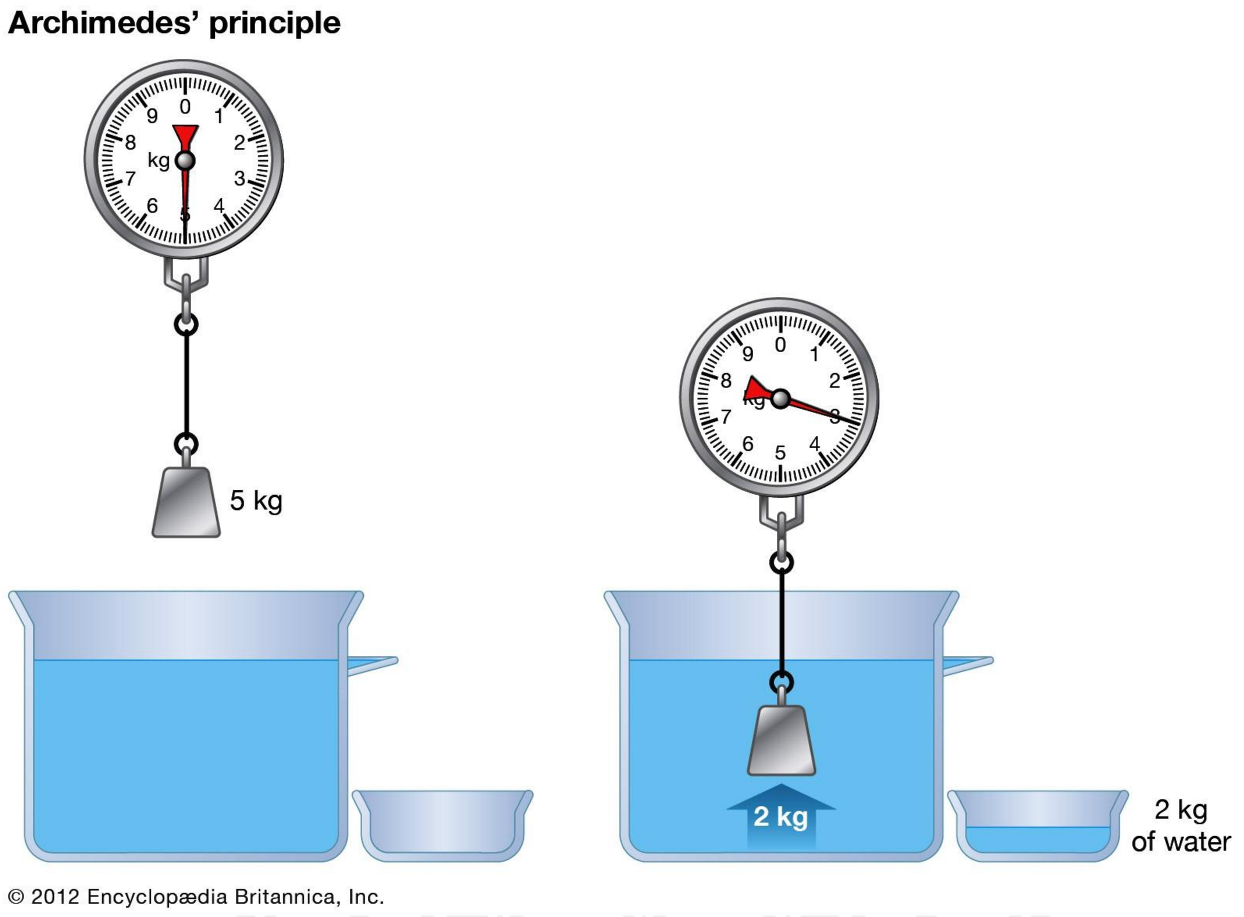
Application of Archimedes' Principle

Archimedes' Principle is applied for:

a) Determination of density and relative density of substances.

b) The design of ships and submarines.

c) Designing of lactometers to test the purity of milk and hydrometer for determining the density of liquids.



Relative density

The relative density of a substance is the ratio of its density to that of water. It is also called its specific gravity.

$$\text{Relative density} = \frac{\textit{density of the substance}}{\textit{density of water}}$$

It has no unit i.e. a pure number.

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