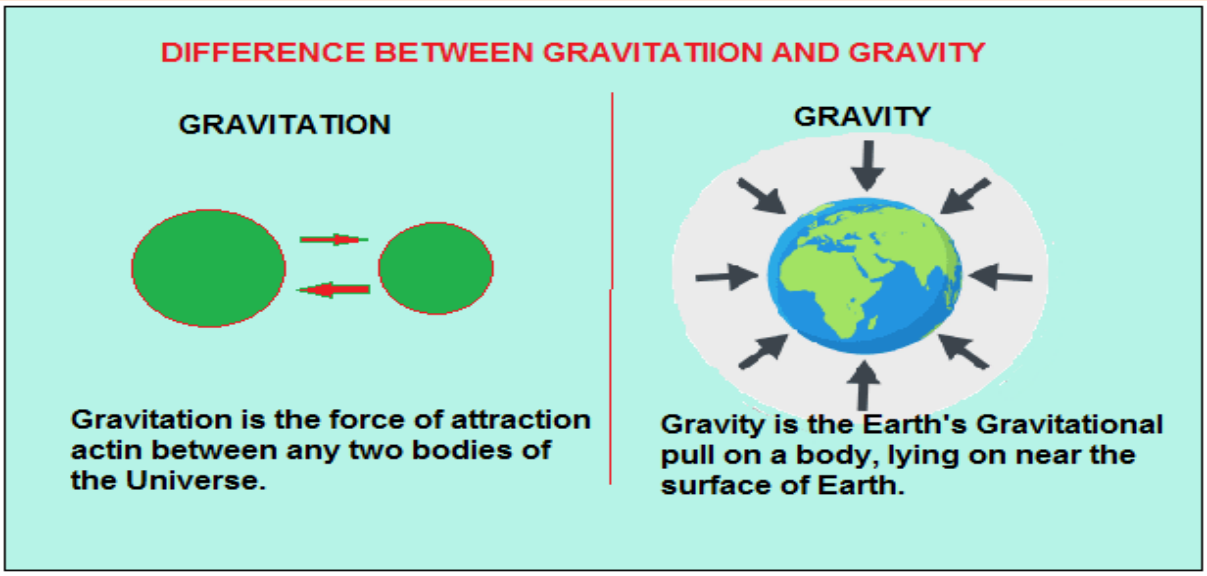
Chapter-10

Gravitation

Module-6
Class-IX (PHYSICS)

What you have learnt:

- The law of gravitation states that the force of attraction between any two objects is proportional to the product of their masses and inversely proportional to the square of the distance between them. The law applies to objects anywhere in the universe. Such a law is said to be universal.
- Difference between acceleration due to gravity ‘g’ and Universal Gravitational constant ‘G’



- Gravitation is a weak force unless large masses are involved.
- Force of gravitation due to the earth is called gravity.
- During free fall acceleration experienced by an object is independent of its mass.
- It is seen that a falling apple is attracted towards the earth. Does the apple attract the earth? If so, we do not see the earth moving towards an apple. Why?

  According to the third law of motion, the apple does attract the earth. But according to the second law of motion, for a given force, acceleration is inversely proportional to

the mass of an object [Eq. (9.4)]. The mass of an apple is negligibly small compared to that of the earth. So, we do not see the earth moving towards the apple. Extend the same argument for why the earth does not move towards the moon.

- The force of gravity decreases with altitude. It also varies on the surface of the earth, decreasing from poles to the equator.

- The weight of a body is the force with which the earth attracts it.

- The weight is equal to the product of mass and acceleration due to gravity.

- The weight may vary from place to place but the mass stays constant.

- All objects experience a force of buoyancy when they are immersed in a fluid.

- Objects having density less than that of the liquid in which they are immersed, float on the surface of the liquid. If the density of the object is more than the density of the liquid in which it is immersed then it sinks in the liquid.

  Explanation:

  Weight of object > Buoyant Force(liquid)

  or $m.g > V\rho g$

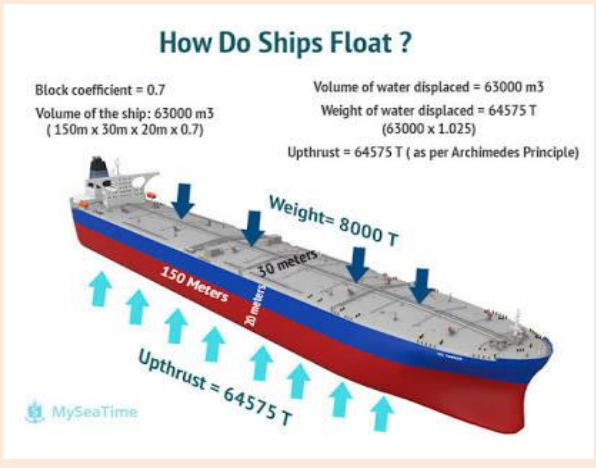
  or $V'\rho' g > V\rho g$

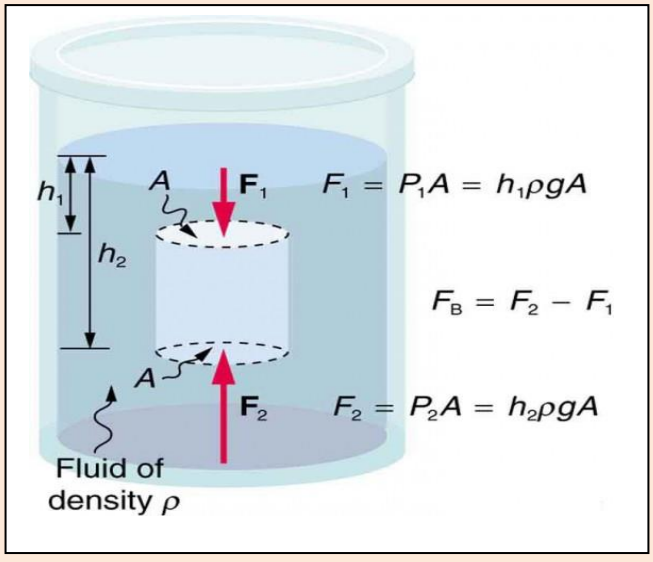
  or $V'\rho' > V\rho$

  if an object immersed in a liquid completely or partially, then volume of object will be equal to volume of liquid displaced($V' = V$).

  Hence $\rho' > \rho \longrightarrow$ object sink

  Similarly $\rho' < \rho \longrightarrow$ object float





THANK YOU