# GRAVITATION

## BUOYANCY

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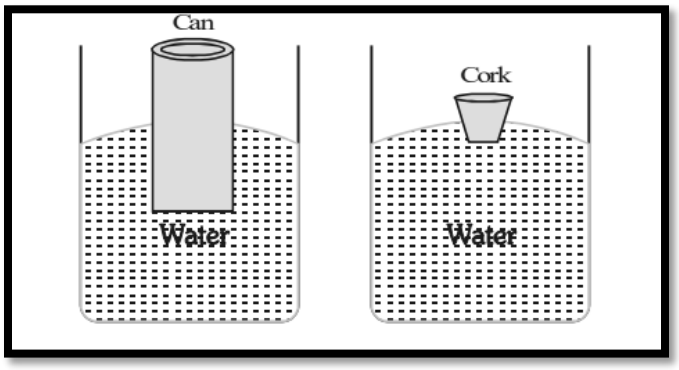
When a body is partially or wholly immersed in a liquid, an upward force acts on it which is called upthrust or buoyant force. The property of the liquids responsible for this force is called buoyancy. Buoyancy is a familiar phenomenon: a body immersed in water seems to weigh less than when it is in air. When the body is less dense than the fluid, then it floats. The human body usually floats in water, and a helium filled balloon floats in air. When a body is immersed in a fluid (liquid or gas) it exerts an upward force on the body. This upward force is called upthrust or buoyant force (U or FB) and the phenomenon is termed as buoyancy. Thus, buoyancy or upthrust is the upward force exerted by a fluid (liquid or gas) when a body is immersed in it. It is a common experience that when a piece of cork is placed in water it floats with two-fifth of its volume inside water. If the cork piece is pushed into water and released it comes to the surface as if it has been pushed by someone from inside due to the buoyant force exerted by fluid.

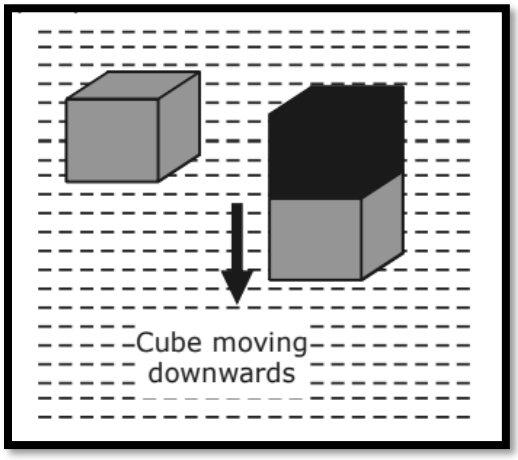



### Newton's Thought

How does buoyant force on an object that is completely submerged in water or any liquid change as it is moved deeper and deeper in that liquid?

**Explanation**

The buoyant force doesn't change with depth. Suppose you drop a steel cube into the ocean. You might think that the cube would sink only to a depth where the buoyant force on the cube balances its weight. However, the steel sinks to the bottom, no matter how deep the ocean is. The buoyant force on the cube is the difference between the downward force due to the water pressure on the top of the cube, and the upward force due to water pressure on the bottom of the cube. When the cube is deeper, the pressure on the top surface increases, but the pressure on the bottom surface also increases by the same amount. As a result, the difference between the forces on the top and bottom surfaces is the same, no matter how deep the cube is submerged. The buoyant force on the submerged object is the same at any depth.




**Factor on which buoyancy depends.**

Upthrust depends upon the following two factors:

**(a) The volume of the body submerged in the fluid**

It is found that greater the volume of a body greater is the upthrust it experiences when inside a fluid.

**(b) The density of fluid in which the body is immersed**

It is also found that greater the density of the fluid greater is the upthrust it applies on the body