ADVANCED PHYSICS CLUB

SEPTEMBER 30, 2018

Today's meeting

Today we discussed few problems in physics of fluids. We reviewed

- $P = \rho g h$ formula
- Archimedes principle and its applications

You might find the following web pages useful:

Static Fluid Pressure: `http://hyperphysics.phy-astr.gsu.edu/hbase/pflu.html#fp`
Archimedes' Principle: `https://en.wikipedia.org/wiki/Archimedes'_principle`

For the next meeting

Next time we continue to talk about buoyancy, Archimedes principle, Pascal's law and moving fluids.

IMPORTANT: There is no club on October 7. The next club's meeting is at 2:40pm, room P-131, on Sunday, **October 14**.

Discussed problems

1. A tank is filled with liquid of the density ρ_1 up to the height h_1 and then, on top of the first liquid by another liquid of the density ρ_2 for additional height of h_2. Liquids do not mix.
   (a) Find the pressure inside the tank as a function of the depth h from the top of the liquid.
   (b) Make a graph $P(h)$.
   (c) How will the answer change if there is a very thin but heavy metal plate of the mass M at the interface between liquids? The size of the plate is $L \times L$ and it is free to move up and down.

2. A wooden block of the density ρ_{wood} is floating at the surface of the water. What fraction of the block's height is under water?

3. A block of ice floating in a bucket with fresh water is melted.
   (a) How will the level of the water in the bucket change?
   (b) How will the answer change if the water in the bucket is salted?

Homework

1. A block of ice floating in a bucket with fresh water is melted.
   (a) How will the level of the water in the bucket change?
   (b) How will the answer change if the water in the bucket is salted?
   (c) What if the lead bullet is frozen into the ice?
   (d) A piece of cork is frozen into the ice?
   (e) The ice has an air bubble inside it?