Useful resources

Today's meeting

We solved most of the assigned problems on gravity and orbital motion. Our next topic is hydrostatics: Paskal's and Archimedes laws.

Homework

1. Determine the pressure of the liquid on the lower surface of a floating disk of cross-sectional area A and mass m, if the atmospheric pressure is P_0.

2. 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 a 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?

3. A sphere blocks an opening of radius r in a flat wall separating two liquids whose pressures are $3P$ and P, respectively. With what force is the sphere pressed against the opening?
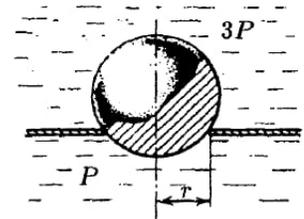
4. A vessel with water slides down an inclined plane with acceleration a. The plane makes angle α with the horizon. What angle does the surface of the water in the vessel make with the horizon?

5. A regular tetrahedron floats under the surface of water in such a way that its bottom face is horizontal and at a depth h. The tetrahedron side has length a, water density is ρ. Find the force exerted by the water on any non-horizontal face of the tetrahedron.
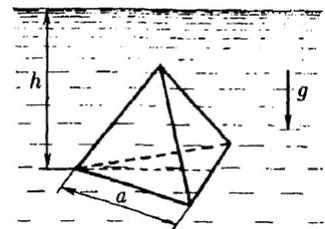
*6. A thin-walled metal hemisphere with a little hole at the top rests on a table. Hemisphere's edges fit snugly against the table. Water is being poured inside through the hole and when it rises all the way to the hole, it lifts the hemisphere and starts flowing underneath it. Find the mass of the hemisphere if its' internal radius is R and density of water is ρ.
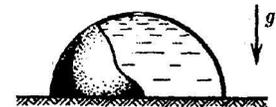
For the next meeting

IMPORTANT: The next club's meeting is at 3:00pm, via Zoom, on Sunday, **February 22**.