

Review of physics 2 - Hydromechanics, exercise

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Hydrostatics

Opening in the boat:

Calculate the force F needed for covering by the plug (from the inner site) an opening in the boat. The opening is in depth $h = 3$ m under the sea level, the area of the plug is $A = 5$ m², gravity acceleration assume as $g = 10$ m s⁻² and density of water take equal to $\rho_w = 1000$ kg m⁻³.

[15 kN]

Press machine:

Press machine is made from two connected tubes with two pistons, inside with incompressible fluid (in real case is usually using the hydraulic oil). Lets' displacements of pistons to be $l_1 = 25$ cm and $l_2 = 5$ cm respectively and the force acting to the narrower piston is $F_1 = 200$ N. Calculate force working to the wider piston F_2 .

[1 kN]

Mercury in the tube:

Inside an U-shape tube is mercury and in one of two tubes is the column of water above the mercury, see the picture. Difference between the mercury's levels is $\Delta h = 2$ cm. Density of water is $\rho_w = 1000$ kg/m³ and density of mercury is $\rho_m = 13\,600$ kg/m³. Gravity acceleration lets' assume as $g = 10$ m s⁻². What is the height of the column of water h_w ?

[27.2 cm]



