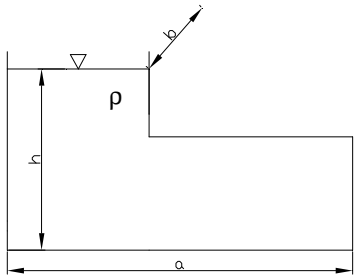
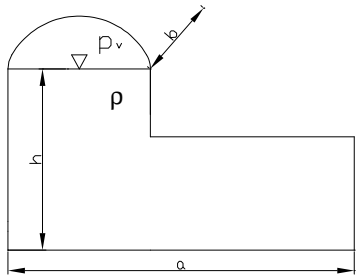
HYDROSTATIC FORCES

Ex.1. Determine the magnitude of the hydrostatic water force acting on the bottom of tank. Draw hydrostatic forces' diagrams:

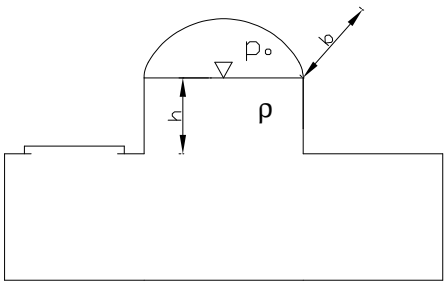
a) dimensions of the bottom: $a \times b = 3 \times 1m$, height of the water in tank: $h = 4m$, density $\rho = 1000\ kg/m^3$.



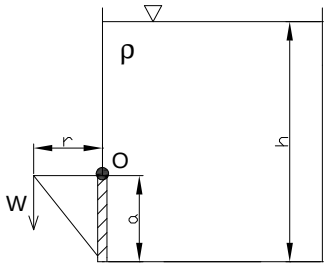
b) dimensions of the bottom: $a \times b = 5 \times 3m$, height of the water in tank: $h = 6m$, density $\rho = 1000\ kg/m^3$. Vacuum pressure in the tank: $p_v = 1kPa$.



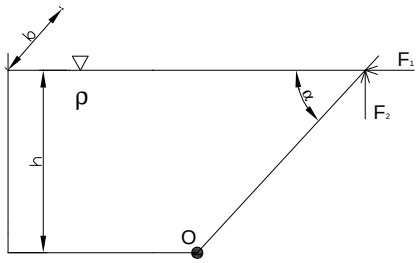
Ex.2. Rectangle hatch (dimensions: $a \times b = 0{,}6 \times 0{,}5m$) closes hole (dimensions: $c \times d = 0{,}5 \times 0{,}4m$) located on horizontal wall of the tank. Determine mass of the hatch that guarantees the hole being closed if $h = 2m$ and overpressure in the tank $p_o = 200hPa$.



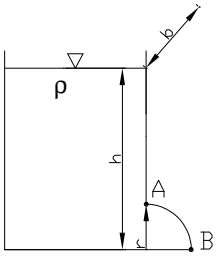
Ex.3. Square hole ($a = 1{,}5m$) is located on the vertical tank's wall. The hole is closed with plane gate, hinge is located on O point. The weight W (arm $r = 2{,}5m$) pushes the gate to the tank's wall. Determine the weight (W) guaranteeing the gate being closed if $h = 3m$.
Density of the liquid: $\rho = 1000\ kg/m^3$.
$I_{x0} = a^4/12$.



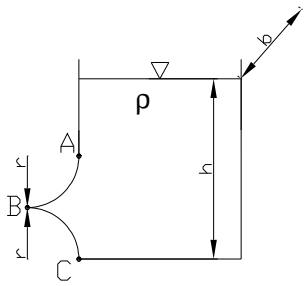
Ex.4. A tank $a = 2m$ wide and $b = 3m$ long is fitted with moveable gate (hinge is located on O point). Which one of two forces: F_1 or F_2 would be smaller if $h = 3m$ and $\alpha = 30°$.
$I_{x0} = c^3 \cdot b/12$ (c is the length of the inclined wall).



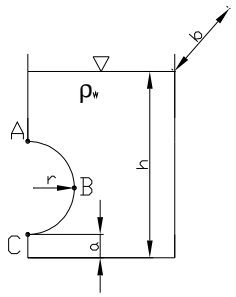
Ex.5. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on AB wall (part of cylinder) in open tank if: $h = 4m$, $r = 2m$, $b = 5m$, $\rho = 1000kg/m^3$.



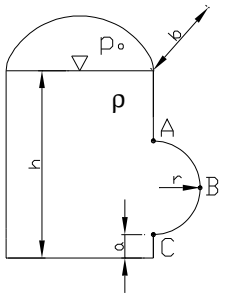
Ex.6. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on ABC wall (part of cylinder) in open tank if: $h = 5m$, $r = 2m$, $b = 10m$, $\rho = 1000kg/m^3$.



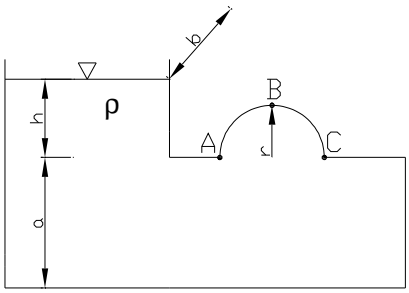
Ex.7. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on ABC wall (part of cylinder) in open tank if: $h = 3m$, $r = 0,5m$, $b = 4m$, $a = 0,5m$, $\rho_w = 1000\ kg/m^3$.



Ex.8. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on ABC wall (part of cylinder) in open tank if: $h = 2,5m$, $r = 1m$, $b = 5m$, $\rho = 1000\ kg/m^3$, overpressure in a tank $p_o = 2kPa$.



Ex.9. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on ABC wall (part of sphere) in open tank if: $h = 4m$, $r = 1m$, $b = 4m$, $a = 1m$, $\rho = 1000\ kg/m^3$.



Ex.10. Draw hydrostatic forces' diagrams and determine magnitude of the hydrostatic water force on ABCD wall (part of cylinder) in pressure tank if: $h_1 = 4m$, $h_2 = 3m$, $r = 0,5m$, $b = 2,5m$, $\rho = 1000\ kg/m^3$.