

Definitions

Density:

$$\rho = \frac{m}{v}$$

Pressure:

$$P = \frac{F_{\perp}}{A}$$

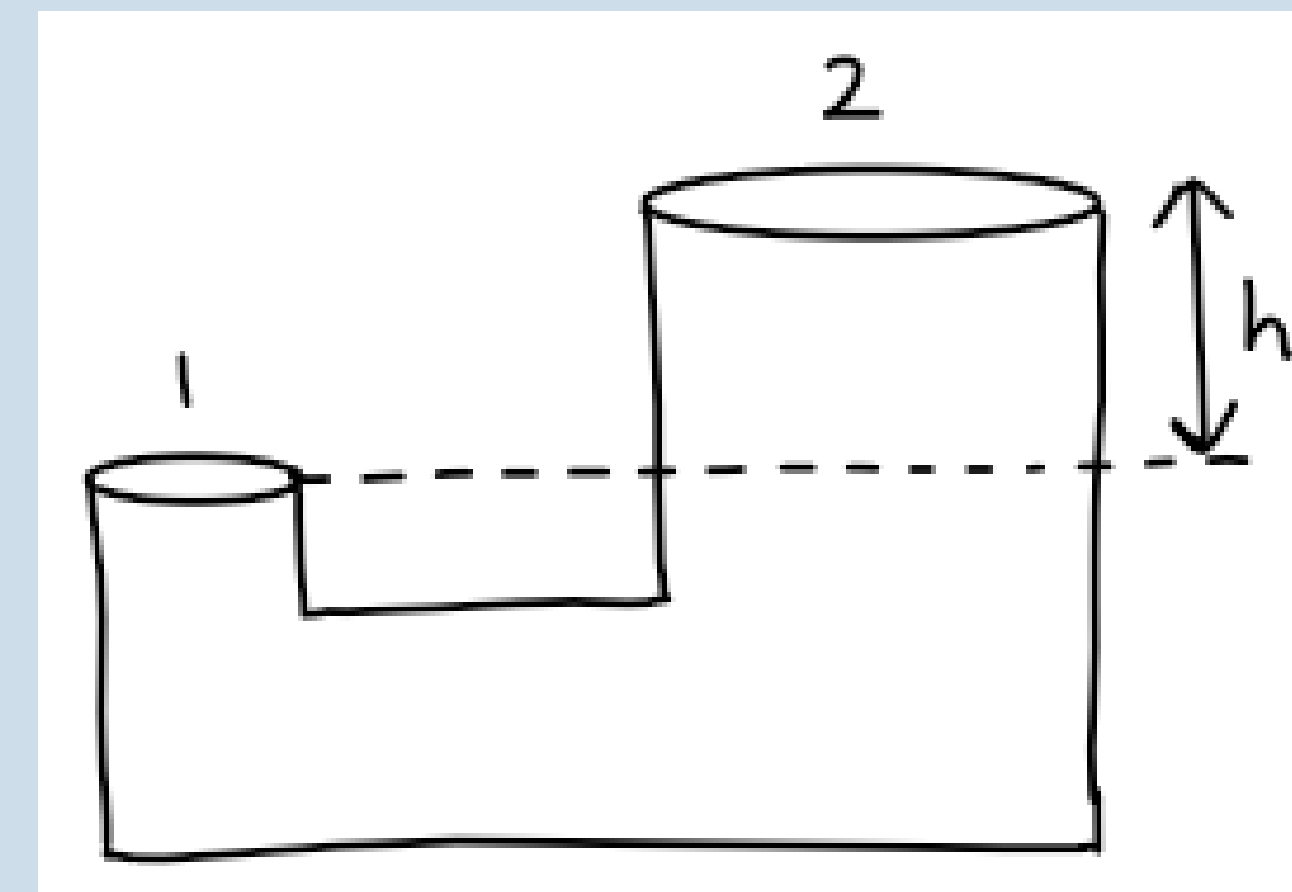
Gauge Pressure:

$$P_{\text{gauge}} = P_{\text{abs}} - P_{\text{atm}}$$

Pressure at a Depth:

$$P = P_0 + \rho gh$$

Hydraulics:



$$P_1 = P_2 + \rho gh$$

$$\frac{F_1}{A_1} = \frac{F_2}{A_2} + \rho gh$$

Fluids: incompressi-

Buoyancy:

(Archimedes Principle)

$$|\vec{F}_B| = \rho_f V_d g$$

If $\bar{\rho}_o > \rho_f$ — Sinks

If $\bar{\rho}_o < \rho_f$ — Floats

If $\bar{\rho}_o = \rho_f$ — Neutral

Fluid Dynamics:

Assumptions:

- 1) Fluid is incompressible
- 2) Laminar flow
- 3) No viscous forces

Continuity:

Mass Flow Rate:

$$\dot{m} = \rho A \vec{V}$$

A = cross sectional area

Volume Flow Rate (Q):
[$\rho = \text{constant}$]

$$\sum Q_{in} = \sum Q_{out}$$

$$Q = \frac{\dot{m}}{\rho} = \vec{V}A$$

Bernoulli's:

$$P_1 + \frac{1}{2} \rho \vec{V}_1^2 + \rho g y_1 = P_2 + \frac{1}{2} \rho \vec{V}_2^2 + \rho g y_2$$