

## Chapter 15 - Reminder

1- **Fluid** includes both **liquid** and **gas**.

2- The **density** of any point of the fluid is:  $\rho = \frac{\Delta m}{\Delta V}$  (The SI unit measured by Kg/m<sup>3</sup>)

3- The **pressure** on a point of the fluid is:  $P = \frac{\Delta F_{\text{perpendicular}}}{\Delta A}$  (The SI unit measured by N/m<sup>2</sup>  $\equiv$  Pa)

4- Some **atmosphere** pressure units are: 1 atm. =  $1.01 \times 10^5$  Pa = 1.01 bar = 760 torr = 14.7 lb/in<sup>2</sup>

5- The **pressure at a point in fluid in static equilibrium** depends on the depth of that point but not on any horizontal dimension of the fluid or its container:  $p = p_o + \rho gh$  (Pressure at depth h)

6- **Pascal's Principle** (A change in the pressure applied to an enclosed incompressible fluid is transmitted

undiminished to every portion of the fluid and to the wall of its container):  $P_{\text{in}} = \frac{F_{\text{in}}}{A_{\text{in}}} = P_{\text{out}} = \frac{F_{\text{out}}}{A_{\text{out}}}$

7- **Archimedes' Principle** (When a body is fully or partially submerged in a fluid, a buoyant force  $\vec{F}_b$  is directed upward, and has a magnitude equal to the  $m_f g$  of the fluid that has been displaced by the body):  $F_b = m_f g$  (Buoyant force)

8- The **apparent weight in a fluid**:  $\text{Weight}_{\text{apparent}} = \text{Weight}_{\text{actual}} - F_b$

9- **Equation of continuity**:  $A_1 v_1 = A_2 v_2$

10- The **volume flow rate** (equation of continuity):  $R_V = A v = \text{constant}$

11- **The mass rate**:  $R_m = \rho R_V = \rho A v = \text{constant}$

12- **Bernoulli's equation**:  $p + \frac{1}{2} \rho v^2 + \rho g y = \text{constant}$