

Hidrostática:
Estudia a los líquidos en reposo.

1) DENSIDAD (D)

$$D = \frac{\text{MASA}}{\text{VOLUMEN}} = \frac{m}{V}$$

S.I.: $D \left(\frac{kg}{m^3} \right)$

Ej: $D_{AGUA} = 1000 kg/m^3 = 1 g/cm^3$
 $D_{Hg} = 13600 kg/m^3 = 13,6 g/cm^3$
 $D_{Au} = 19300 kg/m^3 = 19,3 g/cm^3$

2) DENSIDAD RELATIVA (D_r)

$$D_r = \frac{D_{SUSTANCIA}}{D_{AGUA}}$$

Ej: $(D_r)_{AGUA} = 1$
 $(D_r)_{Hg} = 13,6$

3) Peso Específico (γ)

$$\gamma = \frac{\text{Peso}}{\text{Volumen}} = \frac{W}{V}$$

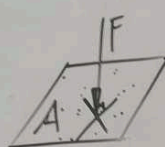
S.I.: $\gamma \left(\frac{N}{m^3} \right)$

4) Presión (P)

$$P = \frac{\text{FUERZA}}{\text{ÁREA}} = \frac{F}{A}$$

S.I:

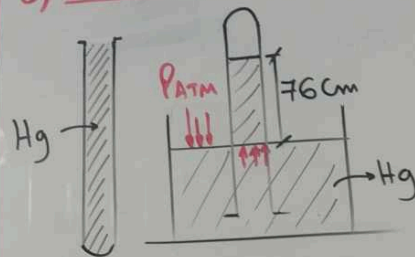
$$P \left(Pa = \frac{1N}{m^2} \right)$$



EQUIVALENCIAS

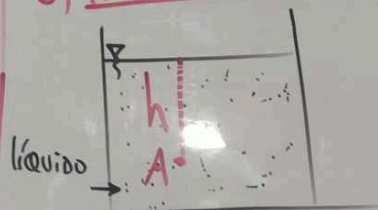
$$\begin{aligned} 1 \text{ ATM} &= 1,013 \times 10^5 \text{ Pa} \\ 1 \text{ ATM} &= 76 \text{ cmHg} = 760 \text{ mmHg} \\ 1 \text{ BAR} &= 10^5 \text{ Pa} = 100 \text{ kPa} \end{aligned}$$

5) Experimento de Torricelli



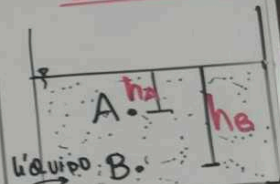
$$1 \text{ ATM} = 76 \text{ cmHg}$$

6) Presión Hidrostática (P_h)



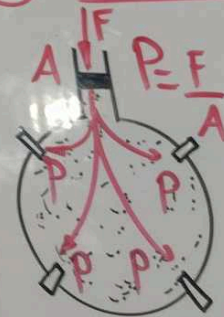
$$(P_h)_A = D_{\text{liq}} \cdot g \cdot h$$

7) Principio Fundamental DE LA HIDRO



$$P_B - P_A = D_{\text{liq}} \cdot g \cdot (h_b - h_a)$$

8) Principio DE PASCAL:

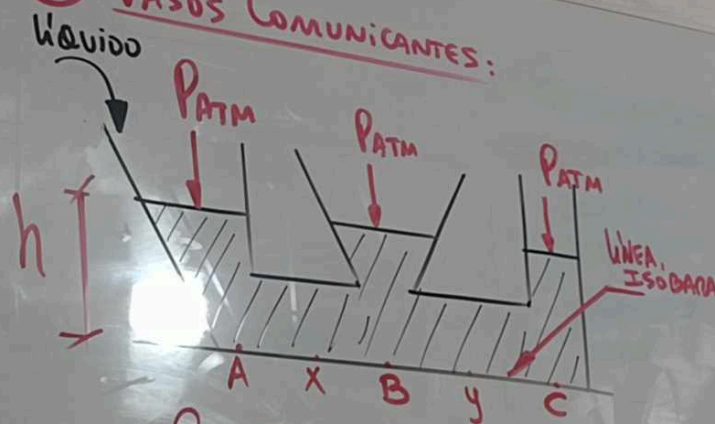


FUNDAMENTAL
STATICA:

9)
h

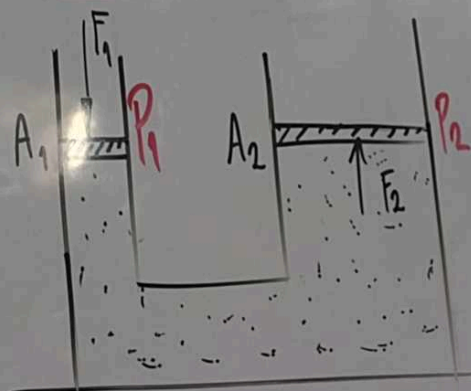
Principio Fundamental de Hidrostatica:

9) VASOS COMUNICANTES:



$$P_A = P_X = P_B = P_Y = \dots$$

10) Prensa Hidraulica:

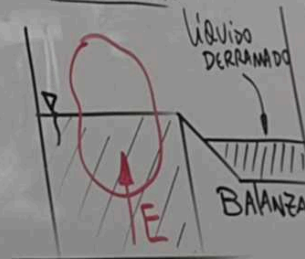


$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\frac{F_1}{F_2} = \left(\frac{r_1}{r_2}\right)^2 = \left(\frac{D_1}{D_2}\right)^2$$

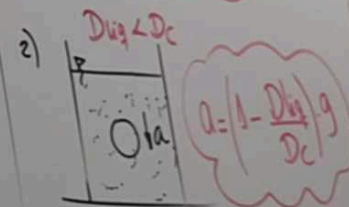
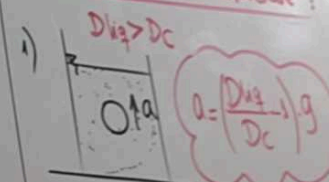
RADIO DIAMETRO

11) PRINCIPIO DE ARQUIMEDES: (EUREKA):



$$E = \text{Peso Real} - \text{Peso Aparente}$$

12) Aceleración cuando el cuerpo se SUMERGE o EMERGE:



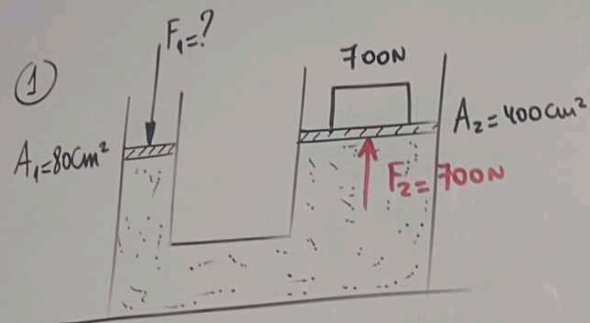
E: EMPUJE HIDROSTATICO

$$E = \text{Peso del liquido derramado} = m_{lo}g = D_{lo}V_{lo}g$$

$$= D_{liq} \cdot V_{sum} \cdot g$$

$$E = D_{liq} \cdot g \cdot \text{Vol. sumersion}$$

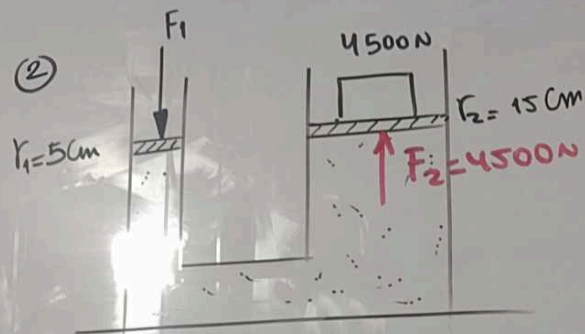
$$C_5 = \{8,1 \cdot 7\} \cup \{8,1 \cdot 07\}$$



$$\frac{F_1}{A_1} = \frac{F_2}{A_2}$$

$$\frac{F_1}{80} = \frac{700}{400}$$

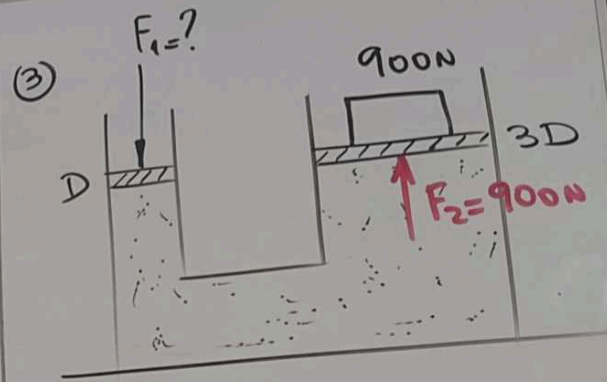
$$F_1 = 140 \text{ N}$$



$$\frac{F_1}{F_2} = \left(\frac{r_1}{r_2} \right)^2$$

$$\frac{F_1}{4500} = \left(\frac{5}{15} \right)^2$$

$$F_1 = 500 \text{ N}$$



$$\frac{F_1}{F_2} = \left(\frac{D_1}{D_2} \right)^2$$

$$\frac{F_1}{900} = \left(\frac{D}{3D} \right)^2$$

$$F_1 = 100 \text{ N}$$

④

$$m = 180 \text{ kg}$$

$$P_{\text{Real}} = 1800 \text{ N}$$

$$P_{\text{Aparente}} = 1400 \text{ N}$$

$$D_{\text{Metal}} = ?$$

1)

$$E = 400 \text{ N}$$

$$D_{\text{liq}} \cdot g \cdot V_{\text{sumerg.}} = 400$$

$$1000 \cdot (10) \cdot V_{\text{Metal}} = 400$$

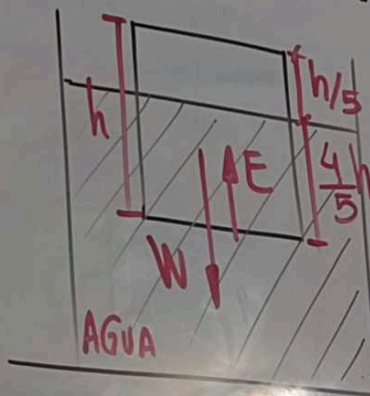
$$V_{\text{Metal}} = 0,04 \text{ m}^3$$

$$2) D_{\text{Metal}} = \frac{m_{\text{Metal}}}{V_{\text{Metal}}} = \frac{180 \text{ kg}}{0,04 \text{ m}^3}$$

$$= 4500 \frac{\text{kg}}{\text{m}^3}$$

⑤

$$D = \frac{m}{V} \rightarrow m = D_c \cdot V_c$$



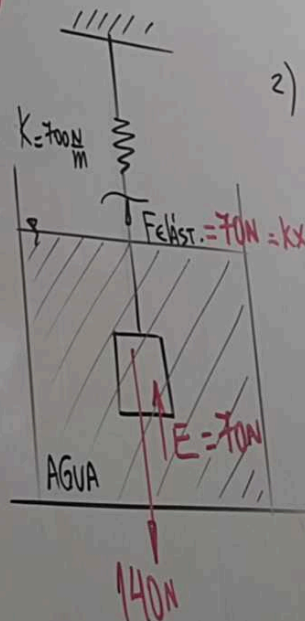
$$W = E$$

$$mg = D_{\text{liq}} \cdot g \cdot V_{\text{sum}} \quad \text{[crossed out]}$$

$$D_c \cdot V_c = 1000 \left(\frac{4}{5} V_c \right) \quad \text{[crossed out]}$$

$$D_c = 800 \frac{\text{kg}}{\text{m}^3} \quad \text{[crossed out]}$$

⑥



$$m = 14 \text{ kg}$$

$$2) P_{\text{Real}} = 140 \text{ N}$$

$$D_{\text{Cuero}} = 2000 \frac{\text{kg}}{\text{m}^3}$$

$$V_c = \frac{m}{D_c} = \frac{14 \text{ kg}}{2000 \frac{\text{kg}}{\text{m}^3}}$$

$$V_c = \frac{7}{1000} \text{ m}^3$$

$$3) Kx = 70$$

$$700x = 70$$

$$x = 0,1 \text{ m}$$

$$x = 10 \text{ cm}$$

$$1) E = D_{\text{liq}} \cdot g \cdot V_{\text{sum}}$$

$$E = 1000 \cdot (10) \cdot \left(\frac{7}{1000} \right) = 70 \text{ N}$$

⑦

$W = mg = D_c \cdot V_c \cdot g$

2,5m

$(V_{sum} = V_c)$

$\uparrow E$

$\downarrow W$

$\uparrow a$

$V_0 = 0$

1) $\frac{D_c}{D_{liq}} = \frac{2}{3}$

2) $F_{result.} = m \cdot a$
 $E - W = m \cdot a$

$D_{liq} \cdot g \cdot V_{sum} - D_c \cdot V_c \cdot g = D_c \cdot V_c \cdot a$

$\frac{(D_{liq} - D_c) \cdot g}{D_c} = a$

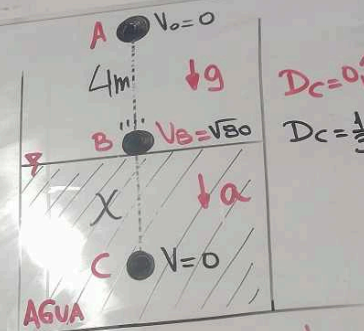
$\left(\frac{D_{liq}}{D_c} - 1\right) \cdot g = a \rightarrow a = \left(\frac{3}{2} - 1\right) \cdot 10$

$a = 5$

③ $d = V_0 t + \frac{1}{2} a t^2$

$2,5 = \frac{1}{2} (5) t^2$

$t = 1s$



$D_c = 0,3 \text{ g/cm}^3$

$D_c = \frac{1}{3} \text{ g/cm}^3$

③ BC: $V_F^2 = V_0^2 - 2a \cdot d$

$0 = 80 - 2(20) \cdot X$

$40X = 80$

$X = 2m$

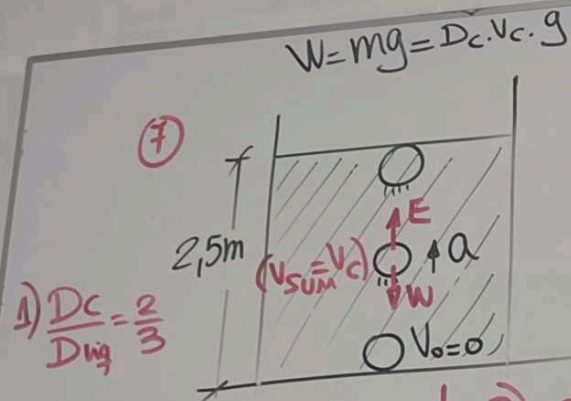
1) AB: $V_F^2 = V_0^2 + 2gh$

$V_B^2 = 2(10)(4)$

$V_B = \sqrt{80} \text{ m/s}$

2) BC: $a = \left(\frac{D_{liq}}{D_c} - 1\right) \cdot g$

$a = \left(\frac{1}{\frac{1}{3}} - 1\right) \cdot 10 = 20 \text{ m/s}^2$



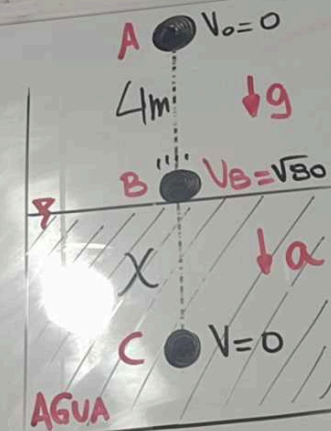
2) $F_{result.} = m \cdot a$
 $E - W = m \cdot a$

$D_{liq} \cdot g \cdot V_{sum} - D_c \cdot V_c \cdot g = D_c \cdot V_c \cdot a$
 $\frac{(D_{liq} - D_c) \cdot g}{D_c} = a$

$\left(\frac{D_{liq}}{D_c} - 1\right) \cdot g = a \rightarrow a = \left(\frac{3}{2} - 1\right) \cdot 10$
 $a = 5$

3) $d = V_0 t + \frac{1}{2} a t^2$
 $2,5 = \frac{1}{2} (5) t^2$

$t = 1s$



1) \overline{AB} : $V_F^2 = V_0^2 + 2gh$
 $V_B^2 = 2(10)(4)$
 $V_B = \sqrt{80} \text{ m/s}$

2) \overline{BC} : $a = \left(\frac{D_{liq}}{D_c} - 1\right) \cdot g$

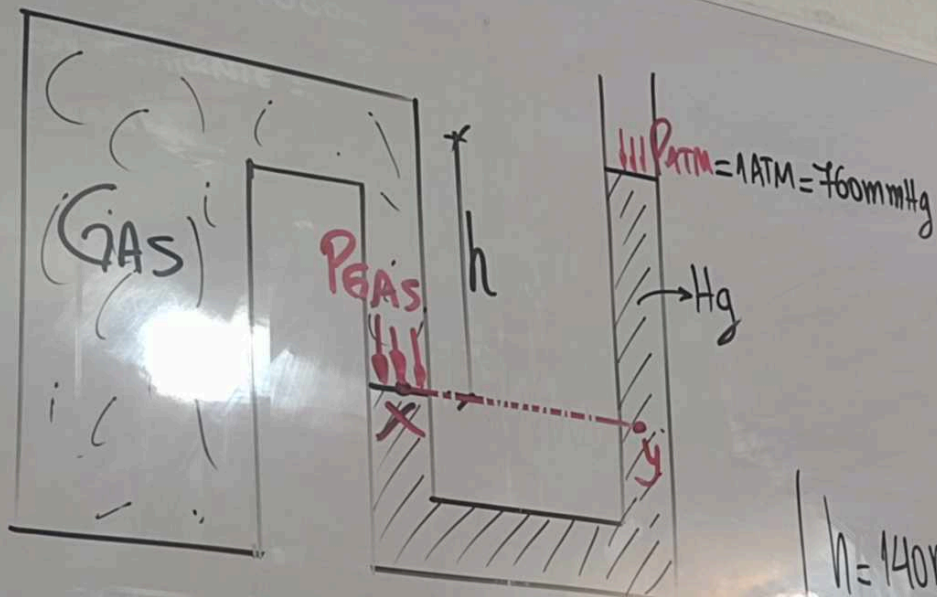
$a = \left(\frac{1}{\frac{1}{3}} - 1\right) \cdot 10 = 20 \text{ m/s}^2$

$D_c = 0,3 \text{ g/cm}^3$

$D_c = \frac{1}{3} \text{ g/cm}^3$

3) \overline{BC} : $V_F^2 = V_0^2 - 2a \cdot d$
 $0 = 80 - 2(20) \cdot x$
 $40x = 80$
 $x = 2m$

(20)



$$P_x = P_y$$

$$P_{GAS} = P_{Hg} + P_{ATM}$$

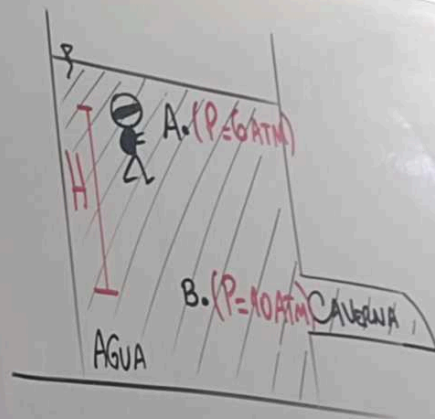
$$900 \text{ mmHg} = P_{Hg} + 760 \text{ mmHg}$$

$$P_{Hg} = 140 \text{ mmHg}$$

$$h = 140 \text{ mm}$$

$$h = 14 \text{ cm}$$

(24)



$$P_B - P_A = D_{liq} \cdot g \cdot (h_B - h_A)$$

$$4 \text{ ATM} = 1000 (10) (H)$$

$$4(10^5) = 10^4 H$$

$$H = 40 \text{ m}$$