FÍSICA Y QUÍMICA – 4º ESO – FLUIDOS – HOJA 4

(1) $P = dgh$

a) $P = 1000 \cdot 9{,}8 \cdot 3 = \boxed{29400 \text{ Pa}}$

b) $P = 1030 \cdot 9{,}8 \cdot 3 = \boxed{30282 \text{ Pa}}$

(2) $P = dgh \rightarrow h = \dfrac{P}{dg} = \dfrac{50650}{1030 \cdot 9{,}8} = \boxed{5{,}02 \text{ m}}$

(3) $\dfrac{F_1}{S_1} = \dfrac{F_2}{S_2} \Rightarrow F_1 S_2 = F_2 S_1 \Rightarrow \boxed{S_2 = \dfrac{F_2 S_1}{F_1}}$

$F_2 = 1000 \text{ kg} \cdot 9{,}8 \text{ m/s}^2 = 9800 \text{ N}$

$S_2 = \dfrac{9800 \text{ N} \cdot 20 \text{ cm}^2}{490 \text{ N}} = \boxed{400 \text{ cm}^2}$

(4) Primero hay que calcular la presión del agua sobre el tapón: ($h = 10 \text{ cm} = 0{,}1 \text{ m}$)

$P = dgh = 1000 \cdot 9{,}8 \cdot 0{,}1 = 980 \text{ Pa}$

Ahora podemos calcular la fuerza que el agua ejerce sobre el tapón:

$P = \dfrac{F}{S} \Rightarrow F = P \cdot S$

$S = \pi R^2 \qquad R = 3 \text{ cm} = 0{,}03 \text{ m}$

$S = \pi \cdot (0{,}03\ m)^2 = 0{,}0028 m^2$

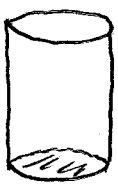
$F = p\,S = 980 \cdot 0{,}0028 = \boxed{2{,}7\ N}$

(5) $\boxed{S_2 = 6\,S_1}$ $\qquad F_1 = 240\ N$

$\frac{F_1}{S_1} = \frac{F_2}{S_2} \Rightarrow F_1 S_2 = F_2 S_1 \Rightarrow F_2 = \frac{F_1 S_2}{S_1} \Rightarrow$

$F_2 = \frac{F_1\, 6\, S_1}{S_1} = 6\,F_1 = 6 \cdot 240 = \boxed{1440\ N}$

(6)



$R = 5m \qquad F = 6923700\ N$

$S = \pi R^2 \qquad S = \pi \cdot 5^2 = 78{,}5\ m^2$

$p = \frac{F}{S} = \frac{6923700}{78{,}5} = 88200\ Pa$

$p = dgh \Rightarrow h = \frac{p}{dg} = \frac{88200}{1000 \cdot 9{,}8} = \boxed{9\ m}$

(7) $p = dgh \Rightarrow d = \frac{p}{gh} = \frac{131690}{9{,}8 \cdot 5} = 2688\ \frac{kg}{m^3}$

$d = 2688\ \frac{kg}{m^3} \cdot \frac{1000\ g}{1\ kg} \cdot \frac{1\ m^3}{1000000\ cm^3} = \boxed{2{,}69\ g/cm^3}$

(8) $\left.\begin{aligned} P_{Hg} &= d_{Hg} \cdot g\, h_{Hg} \\ P_{agua} &= d_{agua} \cdot g \cdot h_{agua} \end{aligned}\right\} \; P_{Hg} = P_{agua}$

$$d_{agua} \cdot g \cdot h_{agua} = d_{Hg} \cdot g \cdot h_{Hg}$$

$$1000 \cdot h_{agua} = 13600 \cdot 1$$

$$h_{agua} = \frac{13600}{1000} = \boxed{13{,}6 \text{ m}}$$

(9) $F_2 = 15\, F_1$

$$\frac{F_1}{S_1} = \frac{F_2}{S_2} \Rightarrow F_1 S_2 = F_2 S_1 \Rightarrow$$

$$\Rightarrow \frac{S_2}{S_1} = \frac{F_2}{F_1} = \frac{15 F_1}{F_1} = 15$$

$$\boxed{S_2 = 15\, S_1}$$

El pistón mayor debe tener una superficie 15 veces mayor que la del pistón más pequeño.