

Solution de la série d'exercices 01

(Propriétés des fluides)

Exercice 01

- Masse volumique

$$\rho = \frac{M}{V} = \frac{G}{gV} = \frac{47.1000}{9.81 * 6} = 798.5 \text{ kg/m}^3$$

- Poids volumique

$$\varpi = \rho * g \Rightarrow \varpi = 798.5 * 9.81 = 7833.3 \text{ N/m}^3$$

- Densité

$$d = \frac{\rho}{\rho_{\text{réf}}} \Rightarrow d = \frac{798.5}{1000} = 0.7985$$

- Poids : $\varpi = \frac{G}{V} \Rightarrow G = \varpi * V = \rho * g * V = 0.9 * 10^3 * 9.81 * 3 * 10^{-3} = 26.48 \text{ N}$

- Masse : $M = \rho * V = 0.9 * 10^3 * 3 * 10^{-3} = 2.7 \text{ kg}$ ou $M = \frac{G}{g} = \frac{26.48}{9.81} = 2.7 \text{ kg}$

Exercice 02

$$\varpi = \rho * g \Rightarrow \varpi = 0.7 * 1000 * 9.81 = 6867 \text{ N/m}^3$$

Exercice 03

$$\text{Face 1 : } p_1 = \frac{F}{S_1} = \frac{m * g}{S_1} = \frac{2.5 * 9.81}{0.2 * 0.1} = 1226.25 \frac{\text{N}}{\text{m}^2}$$

$$\text{Face 2 : } p_2 = \frac{F}{S_2} = \frac{m * g}{S_2} = \frac{2.5 * 9.81}{0.2 * 0.05} = 2425.50 \frac{\text{N}}{\text{m}^2}$$

$$\text{Face 3 : } p_3 = \frac{F}{S_3} = \frac{m * g}{S_3} = \frac{2.5 * 9.81}{0.1 * 0.05} = 4905.00 \frac{\text{N}}{\text{m}^2}$$

Exercice 04

$$\text{Pression sur le pouce : } p = \frac{F}{S} = \frac{3 * 9.81}{\pi * \frac{10^{-2}}{4}} = 3.5 * 10^5 \frac{\text{N}}{\text{m}^2}$$

$$\text{Sur le bois : } p = \frac{F}{S} = \frac{3 * 9.81}{\pi * \frac{(0.5^{-3})^2}{4}} = 1530 * 10^5 \frac{\text{N}}{\text{m}^2}$$

La pression augmente lorsque la surface pressée est petite

Exercice 05

$$\nu = \frac{\mu}{\rho} \quad \nu = \frac{\mu}{\rho} = \frac{0.095}{950} = 10^{-4} \text{ m}^2/\text{s} = 1 \text{ St} \quad (1 \text{ Stokes} = 1 \text{ cm}^2/\text{s} = 10^{-4} \text{ m}^2/\text{s})$$

Exercice 06

$$\nu = \frac{\mu}{\rho} \Rightarrow \mu = \nu * \rho = 1.1 * 10^{-4} * 900 = 0.099 \text{ Pa} * \text{s}$$