

$$p = \frac{\rho \cdot V \cdot g}{A} = \frac{\rho \cdot A \cdot h \cdot g}{A} = \boxed{\rho \cdot h \cdot g}$$

$$P_1 = P_2$$

$$W_1 = W_2$$

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

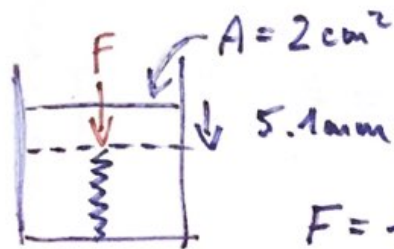
$$F_1 \cdot S_1 = F_2 \cdot S_2$$

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

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

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a)

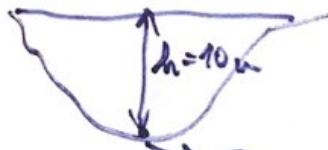


$$F = k \cdot \Delta x$$

$$P = \frac{F}{A} = \frac{k \cdot \Delta x}{A} = \frac{4 \cdot 10^3 \text{ N/m} \cdot 5.1 \cdot 10^{-3} \text{ m}}{2 \cdot 10^{-4} \text{ m}^2}$$

$$= \frac{20.4 \text{ N}}{2 \cdot 10^{-4} \text{ m}^2} = \underline{\underline{102000 \text{ Pa}}}$$

b)



$$P_{\text{total}} = P_{\text{hydrost.}} + P_{\text{atm}}$$

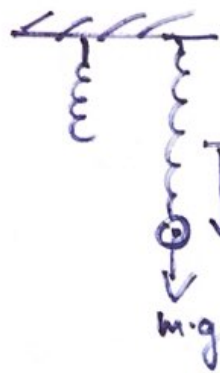
$$p_{\text{total}} = \rho \cdot g \cdot h + P_{\text{atm}} = 1000 \frac{\text{kg}}{\text{m}^3} \cdot 9.81 \frac{\text{m}}{\text{s}^2} \cdot 10 \text{ m} + 102000 \text{ Pa}$$

$$= \underline{\underline{200100 \text{ Pa}}}$$

$$\Delta x = \frac{P \cdot A}{k} = \frac{200100 \text{ Pa} \cdot 2 \cdot 10^{-4} \text{ m}^2}{4000 \frac{\text{N}}{\text{m}}} = \underline{\underline{0.01 \text{ m}}}$$

$$\underline{\underline{10.005 \text{ mm}}}$$

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$$\begin{aligned} \text{a) } A &= \frac{F}{k} = \frac{m \cdot g}{k} = \frac{0.4 \text{ kg} \cdot 9.81 \frac{\text{m}}{\text{s}^2}}{60 \text{ N/m}} \\ &= \underline{\underline{6.54 \text{ cm}}} \end{aligned}$$

$$\text{b) } f = \frac{1}{2\pi} \cdot \sqrt{\frac{k}{m}} \quad f = \frac{1}{T}$$

$$T = \frac{1}{f} = 2\pi \cdot \sqrt{\frac{m}{k}} = 2\pi \cdot \sqrt{\frac{0.4 \text{ kg}}{60 \text{ N/m}}} = \underline{\underline{0.513 \text{ s}}}$$

$$f = \underline{\underline{1.949 \text{ Hz}}}$$