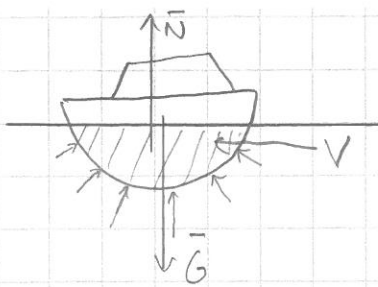


9.6 a)



Puolalaisia ei ole ympäristö rantea

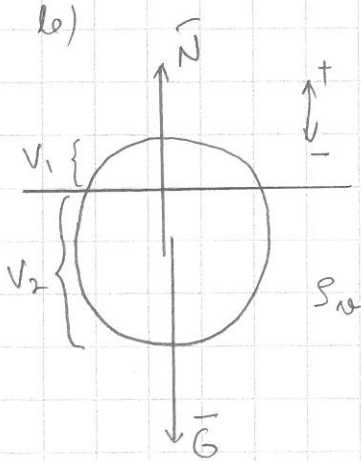
$$\Sigma \vec{F} = \vec{N} + \vec{G} = \vec{0}$$

$$\Rightarrow N - G = \rho_{\text{vesi}} V g - mg = 0$$

$$\Leftrightarrow \underbrace{\rho_{\text{vesi}} V}_{m} = m$$

sen veden tilavuuden massa joutaa laivan rynnäyttää

9.16



$$m = 1,0 \cdot 10^3 \text{ kg}$$

$$\rho_{\text{ice}} = 1,0 \cdot 10^3 \frac{\text{kg}}{\text{m}^3}$$

$$\rho_{\text{f}} = 0,917 \cdot 10^3 \frac{\text{kg}}{\text{m}^3}$$

jäälautte on levossa: $\Sigma \vec{F} = \vec{N} + \vec{G} = \vec{0}$

$$\Rightarrow N - G = \rho_{\text{ice}} \cdot V_2 \cdot g - mg = 0$$

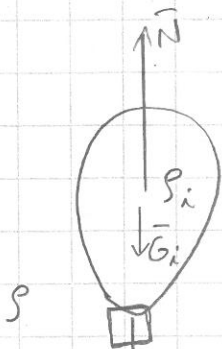
$$\Leftrightarrow V_2 = \frac{m}{\rho_{\text{ice}}} = \frac{1,0 \cdot 10^3 \text{ kg}}{1,0 \cdot 10^3 \frac{\text{kg}}{\text{m}^3}} = 1,0 \text{ m}^3$$

$$\rho_{\text{f}} = \frac{m}{V} \quad | \cdot \frac{V}{\rho_{\text{f}}} \quad \Leftrightarrow V = \frac{m}{\rho_{\text{f}}} = \frac{1,0 \cdot 10^3 \text{ kg}}{0,917 \cdot 10^3 \frac{\text{kg}}{\text{m}^3}} = 1,09051 \text{ m}^3$$

$$\Rightarrow \text{vedenpinnan yläpuolelle: } \frac{V_1}{V} = \frac{V - V_2}{V} = \frac{0,09051 \text{ m}^3}{1,09051 \text{ m}^3}$$

$$= 0,083 = \underline{\underline{8,3\%}}$$

9.17



\vec{G} : suoran (pallo, kori, tervikset, kerkkiöt, ...) paino

\vec{N} : noste

\vec{G}_i : kuuman ilman paino

Pallo tasapainossa: $\Sigma \vec{F} = \vec{N} + \vec{G}_i + \vec{G} = \vec{0}$

$$\Rightarrow N - G_i - G = \rho V g - \rho_i V g - G = 0$$

$$\Leftrightarrow G = \rho V g - \rho_i V g = 2,40 \cdot 10^3 \text{ m}^3 \cdot 9,81 \frac{\text{m}}{\text{s}^2} (1,30 \frac{\text{kg}}{\text{m}^3} - 0,94 \frac{\text{kg}}{\text{m}^3}) = 8475,84 \text{ N} \approx \underline{\underline{8,4 \text{ kN}}}$$

$$G = mg \quad \Leftrightarrow m = \frac{G}{g} = \frac{8475,84 \text{ N}}{9,81 \frac{\text{m}}{\text{s}^2}} \approx 864 \text{ kg} = \underline{\underline{860 \text{ kg}}}$$