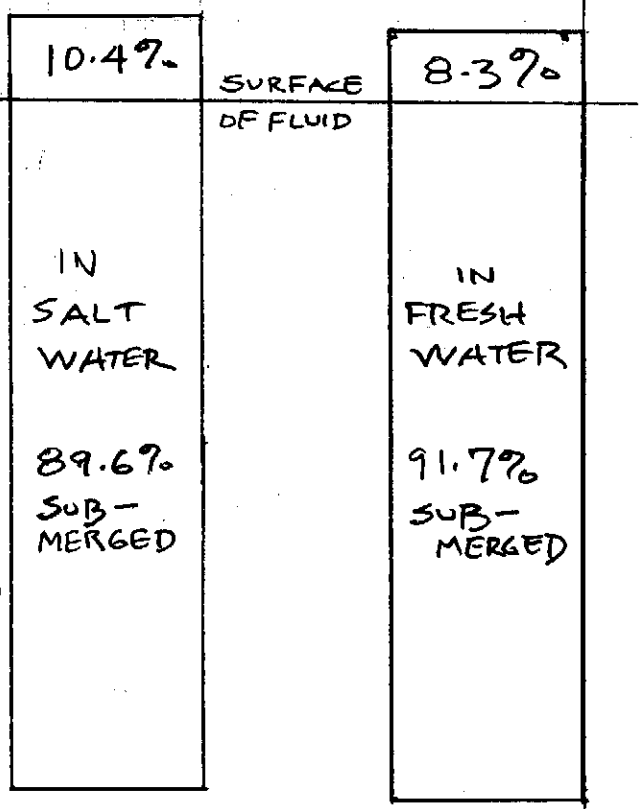
STAEDTLER® No. 937 811E Engineer's Computation Pad

••39 What fraction of the volume of an iceberg (density 917 kg/m^3) would be visible if the iceberg floats (a) in the ocean (salt water, density 1024 kg/m^3) and (b) in a river (fresh water, density 1000 kg/m^3)? (When salt water freezes to form ice, the salt is excluded. So, an iceberg could provide fresh water to a community.)



$$\vec{F}^{\text{NET}}_{\text{ON ICEBERG}} = m\vec{g} + \vec{B} = 0$$

$\vec{B}$ = Buoyant Force = Weight of the displaced fluid

$$= V_{\text{DISPLACED}}\,\rho_{\text{fluid}}\,g$$

$$m = V_{\text{ICEBERG}}\,\rho_{\text{ICE}}$$

$$\Rightarrow V_{\text{ICEBERG}}\,\rho_{\text{ICE}}\,g + V_{\text{DISPLACED}}\,\rho_{\text{FLUID}}\,g = 0$$

$$\Rightarrow \frac{V_{\text{DISPLACED}}}{V_{\text{ICEBERG}}} = \frac{\rho_{\text{ICE}}}{\rho_{\text{FLUID}}}$$

$$= \frac{917\ \text{kg/m}^2}{1024\ \text{kg/m}^2}$$

SALTWATER $= 0.896 \Rightarrow 0.104 \Rightarrow 10.4\%$ above surface

$$\frac{V_{\text{DISPLACED}}}{V_{\text{ICEBERG}}} = \frac{917\ \text{kg/m}^2}{1000\ \text{kg/m}^2}$$

FRESHWATER $= 0.917 \Rightarrow 0.083 \Rightarrow 8.3\%$ above surface.