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Chapter 1 - Section A - Mathcad Solutions

1.4 The equation that relates deg F to deg C is $(F) = 1.8 (C) + 32$. Solve this equation by setting $(F) = 100$.

Given solve for: $C = 0$

Given $C = 1.8 C + 32$ find $C = -17.78$ Ans.

1.5 By definition: $P = \frac{F}{A}$ $F = \text{mass} \cdot g$ Note: Pressures are in gauge pressure.

$P = 3000 \text{ lbf/in}^2$ $D = 4 \text{ in}$ $\Delta h = \frac{4}{12} \text{ ft}$ $A = 12.566 \text{ in}^2$

$F = P \cdot A$ $g = 9.807 \frac{\text{m}}{\text{s}^2}$ $\text{mass} = \frac{F}{g}$ $\text{mass} = 384.4 \text{ g}$ Ans.

1.6 By definition: $P = \frac{F}{A}$ $F = \text{mass} \cdot g$

$P = 3000 \text{ lbf/in}^2$ $D = 0.175 \text{ in}$ $A = \frac{\pi}{4} D^2$ $A = 0.023 \text{ in}^2$

$F = P \cdot A$ $g = 32.174 \frac{\text{ft}}{\text{sec}^2}$ $\text{mass} = \frac{F}{g}$ $\text{mass} = 1000.7 \text{ lb}$ Ans.

1.7 $P_{\text{abs}} = \rho \cdot g \cdot h + P_{\text{atm}}$

$\rho = 11.555 \frac{\text{lbm}}{\text{ft}^3}$ $g = 9.832 \frac{\text{m}}{\text{s}^2}$ $h = 56.38 \text{ m}$

$P_{\text{atm}} = 101.798 \text{ Pa}$ $P_{\text{abs}} = \rho \cdot g \cdot h + P_{\text{atm}}$ $P_{\text{abs}} = 176.809 \text{ Pa}$ Ans.

1.8 $P = \frac{F}{A}$ $F = \text{mass} \cdot g$ $h = 25.62 \text{ m}$

$\rho = 11.555 \frac{\text{lbm}}{\text{ft}^3}$ $g = 32.243 \frac{\text{ft}}{\text{s}^2}$ $h = 25.62 \text{ m}$

$P_{\text{atm}} = 29.316 \text{ psi}$ $P_{\text{abs}} = \rho \cdot g \cdot h + P_{\text{atm}}$ $P_{\text{abs}} = 27.22 \text{ psi}$ Ans.