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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 $C = 1.8 C + 32$ **finds $C = -17$** Ans.

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

$$P = 3000 \text{ Pa} \quad D = 4 \text{ mm} \quad \Delta h = \frac{P}{\rho \cdot g} \quad A = 12.566 \text{ mm}^2$$

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

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

$$P = 300 \text{ Pa} \quad D = 0.17 \text{ m} \quad A = \frac{\pi}{4} D^2 \quad A = 0.023 \text{ m}^2$$

$$F = P \cdot A \quad g = 32.174 \frac{\text{ft}}{\text{sec}^2} \quad \text{mass} = \frac{F}{g} \quad \text{mass} = 1069.7 \text{ lb} \quad \text{Ans.}$$

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

$$\rho = 11.55 \frac{\text{lbm}}{\text{ft}^3} \quad g = 9.832 \frac{\text{m}}{\text{s}^2} \quad h = 56.38 \text{ m}$$

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

1.8 $P = \rho \cdot g \cdot h + P_{\text{atm}}$

$$\rho = 11.55 \frac{\text{lbm}}{\text{ft}^3} \quad g = 32.243 \frac{\text{ft}}{\text{s}^2} \quad h = 25.62 \text{ ft}$$

$$P_{\text{atm}} = 29.36 \text{ psi} \quad P_{\text{abs}} = \rho \cdot g \cdot h + P_{\text{atm}} \quad P_{\text{abs}} = 27.22 \text{ psi} \quad \text{Ans.}$$