

Solution 1.22

The gravitational acceleration changes with altitude. Accounting for this variation, the weights of a body at different locations are to be determined.

Analysis The weight of an 80-kg man at various locations is obtained by substituting the altitude z (values in m) into the relation

$$W = mg = (80\text{kg})(9.807 - 3.32 \times 10^{-6} z \text{ m/s}^2) \left(\frac{1\text{N}}{1\text{kg} \cdot \text{m/s}^2} \right)$$

Sea level: ($z = 0$ m): $W = 80 \times (9.807 - 3.32 \times 10^{-6} \times 0) = 80 \times 9.807 = \mathbf{784.6 \text{ N}}$

Denver: ($z = 1610$ m): $W = 80 \times (9.807 - 3.32 \times 10^{-6} \times 1610) = 80 \times 9.802 = \mathbf{784.2 \text{ N}}$

Mt. Ev.: ($z = 8848$ m): $W = 80 \times (9.807 - 3.32 \times 10^{-6} \times 8848) = 80 \times 9.778 = \mathbf{782.2 \text{ N}}$