

Problem 1-16

The *pascal* (Pa) is actually a very small unit of pressure. To show this, convert $1 \text{ Pa} = 1 \text{ N/m}^2$ to lb/ft^2 . Atmosphere pressure at sea level is 14.7 lb/in^2 . How many pascals is this?

Solution

Use the conversion factor in Table 1-2 on page 9.

$$1 \text{ Pa} = \frac{1 \cancel{\text{N}}}{1 \cancel{\text{m}}^2} \times \frac{1 \text{ lb}}{4.448 \cancel{\text{N}}} \times \left(\frac{1 \cancel{\text{m}}}{3.28 \text{ ft}} \right)^2 \approx 0.0209 \frac{\text{lb}}{\text{ft}^2}$$

Convert the atmospheric pressure at sea level to pascals.

$$14.7 \frac{\cancel{\text{lb}}}{\cancel{\text{in}}^2} \times \frac{4.448 \text{ N}}{1 \cancel{\text{lb}}} \times \left(\frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \right)^2 \times \left(\frac{3.28 \cancel{\text{ft}}}{1 \text{ m}} \right)^2 \approx 1.01 \times 10^5 \frac{\text{N}}{\text{m}^2} = 1.01 \times 10^5 \text{ Pa}$$