

Problem 1.23

[Difficulty: 1]

1.23 Express the following in SI units:

- (a) 100 cfm (ft^3/min)
- (b) 5 gal
- (c) 65 mph
- (d) 5.4 acres

Given: Quantities in English Engineering (or customary) units.

Find: Quantities in SI units.

Solution: Use Table G.2 and other sources (e.g., Google)

$$(a) \quad 100 \cdot \frac{\text{ft}^3}{\text{min}} = 100 \cdot \frac{\text{ft}^3}{\text{min}} \times \left(\frac{0.0254 \cdot \text{m}}{1 \cdot \text{in}} \times \frac{12 \cdot \text{in}}{1 \cdot \text{ft}} \right)^3 \times \frac{1 \cdot \text{min}}{60 \cdot \text{s}} = 0.0472 \cdot \frac{\text{m}^3}{\text{s}}$$

$$(b) \quad 5 \cdot \text{gal} = 5 \cdot \text{gal} \times \frac{231 \cdot \text{in}^3}{1 \cdot \text{gal}} \times \left(\frac{0.0254 \cdot \text{m}}{1 \cdot \text{in}} \right)^3 = 0.0189 \cdot \text{m}^3$$

$$(c) \quad 65 \cdot \text{mph} = 65 \cdot \frac{\text{mile}}{\text{hr}} \times \frac{1852 \cdot \text{m}}{1 \cdot \text{mile}} \times \frac{1 \cdot \text{hr}}{3600 \cdot \text{s}} = 29.1 \cdot \frac{\text{m}}{\text{s}}$$

$$(d) \quad 5.4 \cdot \text{acres} = 5.4 \cdot \text{acre} \times \frac{4047 \cdot \text{m}^2}{1 \cdot \text{acre}} = 2.19 \times 10^4 \cdot \text{m}^2$$