

Exercise 1.57

Perform the following conversions: (a) 5.00 days to s, (b) 0.0550 mi to m, (c) \$1.89/gal to dollars per liter, (d) 0.510 in./ms to km/hr, (e) 22.50 gal/min to L/s, (f) 0.02500 ft³ to cm³.

Solution**Part (a)**

Convert from days to seconds using dimensional analysis.

$$5.00 \cancel{\text{days}} \times \frac{24.0 \cancel{\text{hr}}}{1 \cancel{\text{day}}} \times \frac{60 \cancel{\text{min}}}{1 \cancel{\text{hr}}} \times \frac{60 \text{ s}}{1 \cancel{\text{min}}} \approx 4.32 \times 10^5 \text{ s}$$

Part (b)

Convert from miles to meters using dimensional analysis.

$$0.0550 \cancel{\text{mi}} \times \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} \times \frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \text{ m}}{100 \cancel{\text{cm}}} \approx 88.5 \text{ m}$$

Part (c)

Convert from dollars per gallon to dollars per liter using dimensional analysis.

$$1.89 \frac{\$}{\cancel{\text{gal}}} \times \frac{1 \cancel{\text{gal}}}{3.7854 \text{ L}} \approx 0.499 \frac{\$}{\text{L}}$$

Part (d)

Convert from inches per millisecond to kilometers per hour using dimensional analysis.

$$0.510 \frac{\cancel{\text{in}}}{\cancel{\text{ms}}} \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \cancel{\text{m}}}{100 \cancel{\text{cm}}} \times \frac{1 \text{ km}}{1000 \cancel{\text{m}}} \times \frac{1000 \cancel{\text{ms}}}{1 \cancel{\text{s}}} \times \frac{60 \cancel{\text{s}}}{1 \cancel{\text{min}}} \times \frac{60 \cancel{\text{min}}}{1 \text{ hr}} \approx 46.6 \frac{\text{km}}{\text{hr}}$$

Part (e)

Convert from gallons per minute to liters per second using dimensional analysis.

$$22.50 \frac{\cancel{\text{gal}}}{\cancel{\text{min}}} \times \frac{3.7854 \text{ L}}{1 \cancel{\text{gal}}} \times \frac{1 \cancel{\text{min}}}{60 \text{ s}} \approx 1.420 \frac{\text{L}}{\text{s}}$$

Part (f)

Convert from cubic feet to cubic centimeters using dimensional analysis.

$$0.02500 \text{ ft}^3 \times \left(\frac{12 \cancel{\text{in}}}{1 \cancel{\text{ft}}} \right)^3 \times \left(\frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \right)^3 \approx 707.9 \text{ cm}^3$$