Exercise 1.55

(**a**) A bumblebee flies with a ground speed of 15.2 m/s. Calculate its speed in km/hr. (**b**) The lung capacity of the blue whale is 5.0×10^3 L. Convert this volume into gallons. (**c**) The Statue of Liberty is 151 ft tall. Calculate its height in meters. (**d**) Bamboo can grow up to 60.0 cm/day. Convert this growth rate into inches per hour.

Solution

Part (a)

Convert from meters per second to kilometers per hour using dimensional analysis.

$$15.2 \, \frac{\cancel{m}}{\cancel{s}} \times \frac{1 \text{ km}}{1000 \, \cancel{m}} \times \frac{60 \, \cancel{s}}{1 \, \cancel{min}} \times \frac{60 \, \cancel{min}}{1 \text{ hr}} \approx 54.7 \, \frac{\text{km}}{\text{hr}}$$

Part (b)

Convert from liters to gallons using dimensional analysis.

$$5.0 \times 10^3 \, \cancel{L} \times \frac{1.057 \, \cancel{qt}}{1 \, \cancel{L}} \times \frac{1 \text{ gal}}{4 \, \cancel{qt}} \approx 1.3 \times 10^3 \text{ gal}$$

Part (c)

Convert from feet to meters using dimensional analysis.

$$151 \, \cancel{ft} \times \frac{12 \, \cancel{in}}{1 \, \cancel{ft}} \times \frac{2.54 \, \cancel{cm}}{1 \, \cancel{in}} \times \frac{1 \text{ m}}{100 \, \cancel{cm}} \approx 46.0 \text{ m}$$

Part (d)

Convert from centimeters per day to inches per hour using dimensional analysis.

$$60.0 \, \frac{\cancel{cm}}{\cancel{day}} \times \frac{1 \text{ in}}{2.54 \, \cancel{cm}} \times \frac{1 \, \cancel{day}}{24 \text{ hr}} \approx 0.98 \, \frac{\text{in}}{\text{hr}}$$