

Exercise 1.54

Using your knowledge of metric units, English units, and the information on the back inside cover, write down the conversion factors needed to convert (a) μm to mm, (b) ms to ns, (c) mi to km, (d) ft^3 to L.

Solution

Part (a)

Starting from micrometers, go to meters. Then go from meters to millimeters. The two necessary conversion factors are

$$\frac{1 \text{ m}}{10^6 \mu\text{m}} \quad \text{and} \quad \frac{1000 \text{ mm}}{1 \text{ m}}.$$

Part (b)

Starting from milliseconds, go to seconds. Then go from seconds to nanoseconds. The two necessary conversion factors are

$$\frac{1 \text{ s}}{1000 \text{ ms}} \quad \text{and} \quad \frac{10^9 \text{ ns}}{1 \text{ s}}.$$

Part (c)

Starting from miles, go to feet. Then go from feet to inches. Then go from inches to centimeters. Then go from centimeters to meters. Then go from meters to kilometers. The five necessary conversion factors are

$$\frac{5280 \text{ ft}}{1 \text{ mile}} \quad \text{and} \quad \frac{12 \text{ in}}{1 \text{ ft}} \quad \text{and} \quad \frac{2.54 \text{ cm}}{1 \text{ in}} \quad \text{and} \quad \frac{1 \text{ m}}{100 \text{ cm}} \quad \text{and} \quad \frac{1 \text{ km}}{1000 \text{ m}}.$$

Part (d)

Starting from cubic feet, go to cubic inches. Then go from cubic inches to cubic centimeters. Then go from cubic centimeters to milliliters. Then go from milliliters to liters. The four necessary conversion factors are

$$\left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3 \quad \text{and} \quad \left(\frac{2.54 \text{ cm}}{1 \text{ in}}\right)^3 \quad \text{and} \quad \frac{1 \text{ mL}}{1 \text{ cm}^3} \quad \text{and} \quad \frac{1 \text{ L}}{1000 \text{ mL}}.$$