

Exercise 77

Make the conversion indicated in each of the following:

- (a) the length of a soccer field, 120 m (three significant figures), to feet
- (b) the height of Mt. Kilimanjaro, at 19,565 ft, the highest mountain in Africa, to kilometers
- (c) the area of an 8.5- \times 11-inch sheet of paper in cm^2
- (d) the displacement volume of an automobile engine, 161 in.^3 , to liters
- (e) the estimated mass of the atmosphere, 5.6×10^{15} tons, to kilograms
- (f) the mass of a bushel of rye, 32.0 lb, to kilograms
- (g) the mass of a 5.00-grain aspirin tablet to milligrams (1 grain = 0.00229 oz)

Solution**Part (a)**

Convert from meters to feet.

$$120 \text{ m} = 120 \cancel{\text{ m}} \times \frac{1250 \text{ ft}}{381 \cancel{\text{ m}}} \approx 394 \text{ ft}$$

Part (b)

Convert from feet to kilometers.

$$19,565 \text{ ft} = 19,565 \cancel{\text{ ft}} \times \frac{381 \cancel{\text{ m}}}{1250 \cancel{\text{ ft}}} \times \frac{1 \text{ km}}{1000 \cancel{\text{ m}}} \approx 5.9634 \text{ km}$$

Part (c)

Convert from inches to centimeters.

$$(8.5 \text{ in}) \times (11 \text{ in}) = \left(8.5 \cancel{\text{ in}} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{ in}}}\right) \times \left(11 \cancel{\text{ in}} \times \frac{2.54 \text{ cm}}{1 \cancel{\text{ in}}}\right) \approx 6.0 \times 10^2 \text{ cm}^2$$

Part (d)

Convert from cubic inches to liters.

$$161 \text{ in.}^3 = 161 \cancel{\text{ in}}^3 \times \left(\frac{2.54 \text{ cm}}{1 \cancel{\text{ in}}}\right)^3 \times \frac{1 \cancel{\text{ mL}}}{1 \cancel{\text{ cm}}^3} \times \frac{1 \text{ L}}{1000 \cancel{\text{ mL}}} \approx 2.64 \text{ L}$$

Part (e)

Convert from tons to kilograms.

$$5.6 \times 10^{15} \text{ tons} = 5.6 \times 10^{15} \cancel{\text{ tons}} \times \frac{2000 \cancel{\text{ lb}}}{1 \cancel{\text{ tons}}} \times \frac{1 \text{ kg}}{2.2046 \cancel{\text{ lb}}} \approx 5.1 \times 10^{18} \text{ kg}$$

Part (f)

Convert from pounds to kilograms.

$$32.0 \text{ lb} = 32.0 \cancel{\text{ lb}} \times \frac{1 \text{ kg}}{2.2046 \cancel{\text{ lb}}} \approx 14.5 \text{ kg}$$

Part (g)

Convert from grains to milligrams.

$$5.00 \text{ grains} = 5.00 \cancel{\text{ grain}} \times \frac{0.00229 \cancel{\text{ oz}}}{1 \cancel{\text{ grain}}} \times \frac{1 \cancel{\text{ lb}}}{16 \cancel{\text{ oz}}} \times \frac{1 \cancel{\text{ kg}}}{2.2046 \cancel{\text{ lb}}} \times \frac{1000 \cancel{\text{ g}}}{1 \cancel{\text{ kg}}} \times \frac{1000 \text{ mg}}{1 \cancel{\text{ g}}} \approx 325 \text{ mg}$$