Exercise 76

Make the conversion indicated in each of the following:

(a) the men's world record long jump, 29 ft $4\frac{1}{4}$ in., to meters

(b) the greatest depth of the ocean, about 6.5 mi, to kilometers

(c) the area of the state of Oregon, 96,981 mi^2, to square kilometers

(d) the volume of 1 gill (exactly 4 oz) to milliliters

(e) the estimated volume of the oceans, 330,000,000 mi^3, to cubic kilometers.

(f) the mass of a 3525-lb car to kilograms

(g) the mass of a 2.3-oz egg to grams

Solution

Part (a)

Convert from meters to feet.

$$29 \text{ ft } 4\tfrac{1}{4} \text{ in} = 4.25 \text{ in} + 29 \text{ ft} = 4.25 \text{ in} + 29 \cancel{\text{ft}} \times \frac{12 \text{ in}}{1 \cancel{\text{ft}}} = (352.25 \cancel{\text{in}}) \times \frac{2.54 \cancel{\text{cm}}}{1 \cancel{\text{in}}} \times \frac{1 \text{ m}}{100 \cancel{\text{cm}}} \approx 8.9472 \text{ m}$$

Part (b)

Convert from miles to kilometers.

$$6.5 \text{ mi} = 6.5 \cancel{\text{mi}} \times \frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}} \times \frac{381 \cancel{\text{m}}}{1250 \cancel{\text{ft}}} \times \frac{1 \text{ km}}{1000 \cancel{\text{m}}} \approx 1.0 \times 10^1 \text{ km}$$

Part (c)

Convert from square miles to square kilometers.

$$96{,}981 \text{ mi}^2 = 96{,}981 \cancel{\text{mi}^2} \times \left(\frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}}\right)^2 \times \left(\frac{381 \cancel{\text{m}}}{1250 \cancel{\text{ft}}}\right)^2 \times \left(\frac{1 \text{ km}}{1000 \cancel{\text{m}}}\right)^2 \approx 2.5118 \times 10^5 \text{ km}^2$$

Part (d)

Convert from gill to milliliters.

$$1 \text{ gill} = 1 \cancel{\text{gill}} \times \frac{4 \cancel{\text{oz}}}{1 \cancel{\text{gill}}} \times \frac{1 \cancel{\text{quart}}}{32 \cancel{\text{oz}}} \times \frac{1 \cancel{L}}{1.0567 \cancel{\text{quart}}} \times \frac{1000 \text{ mL}}{1 \cancel{L}} \approx 1 \times 10^2 \text{ mL}$$

Part (e)

Convert from cubic miles to cubic kilometers.

$$3.3 \times 10^8 \text{ mi}^3 = 3.3 \times 10^8 \cancel{\text{mi}^3} \times \left(\frac{5280 \cancel{\text{ft}}}{1 \cancel{\text{mi}}}\right)^3 \times \left(\frac{381 \cancel{\text{m}}}{1250 \cancel{\text{ft}}}\right)^3 \times \left(\frac{1 \text{ km}}{1000 \cancel{\text{m}}}\right)^3 \approx 1.4 \times 10^9 \text{ km}^3$$

Part (f)

Convert from pounds to kilograms.

$$3525 \text{ lb} = 3525 \cancel{\text{lb}} \times \frac{1 \text{ kg}}{2.2046 \cancel{\text{lb}}} \approx 1599 \text{ kg}$$

Part (g)

Convert from ounces to grams.

$$2.3 \text{ oz} = 2.3 \cancel{\text{oz}} \times \frac{1 \cancel{\text{lb}}}{16 \cancel{\text{oz}}} \times \frac{1 \cancel{\text{kg}}}{2.2046 \cancel{\text{lb}}} \times \frac{1000 \text{ g}}{1 \cancel{\text{kg}}} \approx 65 \text{ g}$$