

Worksheet # C7: Converting With Squareds and Cubes

Equalities:

1.000 pounds = 453.59 grams

1 cm³ = 1 cc = 1 mL

1.000 grams = 0.0353 ounces

1.000 teaspoons = 4.9289 mL

1.000 gallons = 4.0000 quarts = 16.000 cups = 3.7854 liters

1.000 inch = 2.5400 cm

1. A rectangular metal bar has a volume of 60.0 in³. What is its volume in cm³?

$$60.0 \text{ in}^3 \times \frac{2.5400 \text{ cm}}{1.000 \text{ in}} \times \frac{2.5400 \text{ cm}}{1.000 \text{ in}} \times \frac{2.5400 \text{ cm}}{1.000 \text{ in}} = 983 \text{ cm}^3$$

a. This same bar weighs 3.00 pounds. What is its density in g/mL?

$$3.00 \text{ pounds} \times \frac{453.59 \text{ g}}{1 \text{ pound}} = 1360 \text{ grams}$$

$$D = \frac{\text{mass}}{\text{volume}} = \frac{1360 \text{ grams}}{983 \text{ cm}^3} = \frac{1360 \text{ grams}}{983 \text{ mL}} = 1.38 \text{ g/mL}$$

2. Convert the following:

a. 85 in² to ft²

$$85 \text{ in}^2 \times \frac{1 \text{ foot}}{12 \text{ in}} \times \frac{1 \text{ foot}}{12 \text{ in}} = .59 \text{ ft}^2$$

b. 1.00 m³ to cm³

$$1.00 \text{ m}^3 \times \frac{100 \text{ cm}}{1 \text{ meter}} \times \frac{100 \text{ cm}}{1 \text{ meter}} \times \frac{100 \text{ cm}}{1 \text{ meter}} = 1.00 \times 10^6 \text{ cm}^3$$

c. 55.0 mi/hr to ft/sec

$$\frac{55.0 \text{ miles}}{1 \text{ hour}} \times \frac{5280 \text{ feet}}{1 \text{ mile}} \times \frac{1 \text{ hour}}{60 \text{ min}} \times \frac{1 \text{ min}}{60 \text{ sec}} = 80.7 \text{ ft/sec}$$

d. 50.0 cm³ to mm³

$$50.0 \text{ cm}^3 \times \left(\frac{1 \text{ meter}}{100 \text{ cm}} \times \frac{1000 \text{ mm}}{1 \text{ meter}} \right)^3 = 5.00 \times 10^4 \text{ mm}^3$$

e. 1.00 ft³ to liters

$$1.00 \text{ ft}^3 \times \left(\frac{12 \text{ in}}{1 \text{ ft}}\right)^3 \times \left(\frac{2.540 \text{ cm}}{1 \text{ in}}\right)^3 \times \frac{1 \text{ mL}}{1 \text{ cm}^3} \times \frac{1 \text{ L}}{1000 \text{ mL}} = 28.3 \text{ Liters}$$

f. 10.0 cc's to tsp

$$10.0 \text{ cc} \times \frac{1 \text{ mL}}{1 \text{ cc}} \times \frac{1 \text{ tsp}}{4.9289 \text{ mL}} = 2.03 \text{ tsp}$$

3. Here are a couple of extra credit -worthy tough problems: (Check in class for these.)

a. At flood stage, the Colorado River flows through the Grand Canyon at a rate of 100,000. ft³/sec. What is this in gallons/hour? [Remember 1 mL = 1 cm³]

b. You are building a small airplane. Weight is a critical factor, and you have decided to carry no more than 355 pounds worth of gasoline. When you order the gas tanks to be built, how large will they be if the density of the gasoline you'll use is 0.965 g/mL? [Give the volume of the tank in gallons.]