Chemistry 11   **<u>Dimensional Analysis</u>**   Assignment

1. Convert the following. Show your work:

    a. 6.2 nm into m.

    b. 26,400 mL into L.

    c. 892 ks into ms.

    d. 2.67 g/mL into kg/L.

    e. 5.6 x 10^{-4} Mm into dm.

    f. 567,900 mL to L.

    g. 677 ks into ms.

    h. Convert 7.95 g/L into kg/L.

    i. Convert 100 L into dm^3.

2. The density of gold is 19.3 g/ml. What is the volume (in L) of a 16.5 kg piece of gold?

3. The speed of light is 3.0×10^{10} cm/s. Sunlight takes 8.29 minutes to travel from the surface of the sun to the earth. What is the distance of the earth from the sun?

4. Billy Bob raised 60 goats, and then entered into a series of business transactions. He traded all the goats for sheep at an exchange rate of 5 goats for 8 sheep. Next, he exchanged all the sheep for hogs at a rate of 5 sheep for 3 hogs weighing 250 lbs. each. He sold all the hogs at a market price of $55.00 per 100.0 lbs. How much money did he make from the 60 goats?

5. The average distance from the Earth to the Moon is 384 Mm. Express this distance in millimeters.

6. The maximum highway speed limit in Alberta is 110 km/h. Express this speed in units of m/s.

7. The distance from the Sun to the Earth is 150 Gm. If sound travels at a speed of 385 m/s, how many minutes would it take for a Sun-Dweller's message "It's really hot!" to reach the earth?

8. The mass of an average smoke particle is 1.05×10^{-12} g. Express this mass in ng.

9. The mass of an average grain of salt is 115 µg. Express this mass in grams.

10. The thickness of this paper is 40.5 µm. Express this thickness in km.

11. An automobile travels 7.50 km on each litre of gasoline. Express this gas mileage in m/mL.

12. A carton of chocolate milk occupies a volume of 0.250 L. Express this volume in in^3.
    (2.54cm = 1 in)

13. The distance from the Moon to the Earth is 384 Mm. If sound travels at a speed of 385 m/s, how many minutes would it take for an astronaut's message ("Full Moon") to reach the earth?

14. If Gasp cigarettes have 5 mg tar and 0.4 mg nicotine per cigarette and there are 20 cigarettes per pack, how many packs of cigarettes would have to be smoked to coat your lungs with 4.0 oz (1/4 lb.) of tar (Note: 1 oz = 28.35 g)? How many packs would you have to smoke to introduce your lungs to one gram of the drug nicotine?

15. How many miles could you drive for $7.90 if the gas mileage of your car is 14 km/L of gas and the price is $1.29/gallon? (4qt = 1 gal; 946.3mL = 1qt; 0.6214mi = 1km)

16. A full bucket which holds 3.5 L of water is leaking at a rate of 1.63 mL every hour. How long will it take (in hours) for the bucket to be empty?

17. A creature moves at a speed of 5 furlongs per fortnight (not a very common unit of speed). Given that a furlong is 220 yards and a fortnight is 14 days, determine the speed of the creature in m/s. (36in = 1 yard)

18. In the opening scenes of the movie "Raiders of the Lost Ark", Indiana Jones tries to remove a gold idol from a booby-trapped pedestal. He replaces the idol with a bag of sand of approximately equal volume. (Density of gold = 19.3 g/cm^3; density of sand 3.0 g/cm^3).

   a. Did he have a reasonable chance of not activating the mass-sensitive booby trap? Explain. (2 marks)

   b. In a later scene he and an unscrupulous guide play catch with the idol. Assume that the volume of the idol is about 1.0 L. If it were solid gold, what mass would the idol have? Is playing catch with it plausible?