Unit Conversion Practice

The purpose of this assignment is for you to become comfortable converting between different units of measurement, a skill necessary to all scientists. Many publications in the United States still use the English system, whereas many scientists use the metric system. Therefore, it is often necessary to convert between the two systems. Feel free to work in groups on this assignment, but each student should turn in a copy. **<u>SHOW YOUR WORK!!!!</u>**

Length

1) It is useful to be able to estimate lengths in the metric system. Examine a ruler, and get an idea of the length of a millimeter, centimeter, and meter.

Common Units of Length	Abbreviation	Meter Equivalent
Millimeter	mm	1000 mm = 1 m
Centimeter	cm	100 cm = 1 m
Decimeter	dm	10 dm = 1 m
Meter	m	1 m
Kilometer	km	1 km = 1000 m

a) An adult's height may be about
   1) 1.7 km   2) 1.7 mm   3) 1.7 cm   4) 1.7 m

b) The longer edge of a credit card is about
   1) 8.5 mm   2) 8.5 cm   3) 1.7 cm   4) 1.7 m

c) The thickness of the wire in a paper clip is about
   1) 1 mm   2) 10 mm   3) 1 cm   4) 10 cm

d) The width of this sheet of paper is about
   1) 22 m   2) 22 dm   3) 22 cm   4) 22 ml

Volume

Volume is a measure of how much space an object takes up.

Common Metric Units of Volume	Abbreviation	Meter Equivalent
Liter	l	1 l
Milliliter	ml	1000 ml = 1 l

7) Take a look at the relative sizes of liters and milliliters and circle the appropriate volume.

a) One aluminum can of soda is about
1) 3.5 ml   2) 35 ml   3) 350 ml   4) 3.5 l

b) A small glass of orange juice is approximately
1) 2.0 l   2) 2.0 ml   3) 200 ml   4) 20 l

c) A gallon of milk is about equal to
1) 380 ml   2) 3.8 ml   3) .38 ml   4) 3.8 l

The following unit conversions may be helpful:

1 in = 2.54 cm
1 ft = 12 in
$1 cm^3 = 1 mL$
$1 in^3 = 16.4 cm^3$
$1 ft^3 = 28.3$ liter
1 gal = 3.79 liter
4 qt = 1 gallon

1 m = 3.3 ft
1 yard = 36 inches
1 metric ton = 1000 kg.
2.2 lb. = 1 kg
28.4 g = 1 oz.
16 oz. = 1 pound
$1 acre = 43560 ft^2$

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8) Which of the above is a unit of length?   Which of the above is a unit of mass?

Which of the above is a unit of area?   Which of the above is a unit of volume?

Practice with Scientific Notation and Powers of Ten

13) Convert the following numbers into scientific notation.

   a) 100

   b) 10,000

   c) 10,000,000

   d) 0.001

   e) 0.000001

   f) 0.1

   g) 1

14) Arrange the following numbers, written as powers of 10, from the smallest to the largest:

$$10^0, \ 10^{-14}, \ 10^2, \ 10^{-3}, \ 10^{-7}, \ 10, \ 10^{-9}, \ 10^5, \ -10$$

15) Convert the following to scientific notation:

   a) 4,256

   b) -6,234,000

   c) -0.0026

   d) 0.00005689

Write the following numbers in standard notation.

16) 6.5×10^{-5}

17) -3.22×10^9

18) 8.314×10^3

19) -4.08×10^{-12}

20) Identify the type of notation, standard or scientific, that would make the most sense for each situation below. Explain.

   a) The length of a football field measured in inches…

27) A murder suspect was found 200 miles from the crime scene 150 minutes after the time of death. Assuming he actually committed the murder, how fast (in miles per hour) would he have had to drive in his getaway car? Given this information, is he a realistic suspect?

28) How many 325 mg tablets can be produced from 2.50 kg of ibuprofen?

29) A crime suspect fled the scene when police officers entered the building. The police are planning to set up a search, but need to know a realistic search radius. How far could he run in 10 minutes if he can run 5 miles per hour?

30) One baked potato provides an average of 31.0 mg of vitamin C. If 5.0 lb. of potatoes has 15 potatoes, how many milligrams of vitamin C are provided per pound of potatoes?

31) Forensic scientists must be careful to avoid communicable diseases such as HIV/AIDS. In body fluids such as blood or saliva, the HIV virus can survive over 15 days at room temperature and longer if refrigerated. How many hours can the HIV virus survive in liquid at room temperature?