Diagnostic Test - Chem 101 Mathematical Computations in General Chemistry

This diagnostic test is designed to help you assess your computing abilities as well as your skills in using your scientific calculator. Since computations are an important part of the study of chemistry, it is important that you can **WITH** the correct number of significant figures:

- put scientific notation correctly into your cheapie scientific calculator it's best to practice on one you will use for the exams. Remember: use the ee or exp button when working in scientific notation on your calculator. In new calculators, this button has been replaced by a button marked x10. Don't use multiply button and the 10^x button.
- (2) do calculations using numbers in scientific notation.
- (3) manipulate exponents (to check your calculations on your calculator)
- (4) do straightforward algebraic manipulations
- (5) do unit conversions using dimensional analysis (also called the factor-label method)

For more help, visit the math review at http://www.chem.tamu.edu/class/fyp/mathrev/mathrev.html.

Use the correct number of significant figures in all calculations!

- **1.** Change these numbers into scientific notation:
 - (a) 2,430,000
 - (b) 0.00072
- **2.** (a) $(6.4 \times 10^{-3}) + (3.96 \times 10^{-2}) =$
 - (b) $(1.0369 \times 10^4) (9.14 \times 10^2) =$
 - (c) $(6.02 \times 10^{23})(2.9 \times 10^{-3}) =$
 - (d) $(3.5 \times 10^4)^5 =$
 - (e) $\sqrt{4.53 \times 10^6} =$
 - (f) $\sqrt[5]{4.53 \times 10^{-36}} =$
- **3.** (a) $10^3 \times 10^2 =$
 - (b) $10^2/10^5 =$
 - (c) $10^4/10^{-6} =$
 - (d) $(10^3)^5 =$
 - (e) $\sqrt[3]{10^{-6}} = (10^{-6})^{1/3} =$

Hint: (a) and (b) are tricky. Determine longhand.

Note that 10^3 is essentially the same thing as 1×10^3 .

4. (a)
$$x - 3 = 7$$

(b)
$$\frac{3}{x} = 7$$
 (to 2 sig. fig)
(c) $\frac{4x+3}{2} = 5$ (to 3 sig. fig.)
(d) $\frac{3x+5}{4} = \frac{x-7}{3}$ (to 3 sig. fig.)

5. (a) Convert 3.0 milliliters (mL) to units of liters. Which numbers are exact and which are inexact (measured) values?

(b) How many minutes are in 1.00 year? Which numbers are exact and which are inexact (measured) values?

- 6. (a) $\log 1.5 \times 10^3 =$
 - (b) $\log 8.0 \ge 10^{-6} =$
 - (c) $\log x = 4.00$
 - (d) $-\log x = 6.75$