UNIT 1A REVIEW: *Scientific Notation, Significant Figures & Rounding, Metric Units, Density, Percent error*

A. Convert the following numbers to scientific notation.

a) 17600.0 _____ d) 10.2 _____

b) 0.00135 _____ e) - 0.000130 _____

c) -67.30 _____ f) 301.0 _____

B. Expand the following scientific notation to regular (standard) notation.

a) 4.96×10^{-2} _____ d) -9.3×10^{-3} _____

b) 5.50×10^{-4} _____ e) 7.01×10^{0} _____

c) -8.37×10^{4} _____ f) 4.92×10^{2} _____

C. *Correct the following incorrect scientific notation.*

a) 36.7×10^{1} _____ d) 851.6×10^{-3} _____

b) 0.0123×10^{4} _____ e) -966×10^{-1} _____

c) -0.015×10^{-3} _____ f) 0.047×10^{33} _____

D. Perform the following calculations. Answer in scientific notation

a) $(2.1 \times 10^{4}) + (3.5 \times 10^{5})$ _____

b) $(5.2 \times 10^{-5}) + (-2.69 \times 10^{-4})$ _____

c) $(6.0 \times 10^{16}) - (1.77 \times 10^{18})$ _____

d) $(-4.5 \times 10^{-11}) - (1.83 \times 10^{-9})$ _____

e) $(8 \times 10^{15}) \times (6 \times 10^{3})$ _____

f) $(1.5 \times 10^{26}) \times (-3.0 \times 10^{-24})$ _____

g) $(6 \times 10^{-7}) \div (3 \times 10^{-15})$ _____

h) $(-5.6 \times 10^{-44}) \div (2.8 \times 10^{-34})$ _____

E. How many significant figures are in each of the following numbers?

a) 114.0 _____ e) 4.50×10^{3} _____

b) 733.02 _____ f) -2340 _____

c) 0.000310 _____ g) 6.0040 _____

d) 908010. _____ h) -4.010×10^{-4} _____

Addition/Subtraction Use LEAST DECIMAL PLACES in problem.

Multiplication/Division Use LEAST NUMBER OF SIG FIG in problem.

F. Report the answers to the following operations to the correct number of significant figures.

a) 23.5732 + 4.08 – 245.21 + 75.6 = _____

b) 180.00 – 76.33 – 33.456 = _____

c) 1 + 0.023 – 0.046 = _____

d) 23.5732 x 4.08 ÷ 245.21 = _____

e) 180 ÷ 76.33 x 33.5 = _____

f) $\frac{30.59 + 28.205}{13.3 \times 0.023}$ = _____

Accurate & Precise

G. A measurement was taken three times. The correct measurement was 68.1 mL. Circle whether the set of measurements is accurate, precise, both, or neither.

a) 78.1 mL, 43.9 mL, 2 mL	accurate	precise	both	neither
b) 68.1 mL, 68.2 mL, 68.0 mL	accurate	precise	both	neither
c) 98.0 mL, 98.2 mL, 97.9 mL	accurate	precise	both	neither
d) 72.0 mL, 60.3 mL, 68.1 mL	accurate	precise	both	neither

H. Metric Units

Common Metric Prefixes					
Prefix	10^n	Prefix	10^n	Prefix	10^n
micro (μ)	10^{-6}	milli (m)	10^{-3}	mega (M)	10^{6}
nano (n)	10^{-9}	centi (c)	10^{-2}	giga (G)	10^{9}
kilo (k)	10^{3}	deci (d)	10^{-1}		

1. Fill in the conversion factor

__1__ l =____ ml = ____ Ml = _____ cl = _____ kl =____ μl=____ Gl=____ dL

Write the equivalent measurement(MUST SHOW THE BRIDGE FOR CREDIT)

2. 4 m = _____mm 3. 49 cm = _____Gm 4. 16 kg = _____g

5. 97 cm = _____ μm 6. 2.5l dL = _____kl 7. 437 mg = _____g

8. 4.3 km = _____Mm 9. 5 mm = _____cm 10. 1.6l = _____ml

I. Percent Error:

1. A student measured the string as 1.25 m long. The teacher said it was actually 2.12 m long. What was the student's percent error?

2. A teacher calculated the percent of sodium in the compound as 54%. The reference book said it was actually supposed to be 76%. What was the teacher's percent error?

Density:

For each problem below, write the equation and show your work. Always use units and box in your final answer.

1. The density of silver (Ag) is 10.5 g/cm^3. Find the mass of Ag that occupies 965 cm^3 of space.

2. Under certain conditions, oxygen gas (O_2) has a density of 0.00134 g/mL. Find the volume occupied by 250.0 g of O_2 under the same conditions.

3. Find the volume that 35.2 g of carbon tetrachloride (CCl_4) will occupy if it has a density of 1.60 g/mL.

4. The density of ethanol is 0.789 g/mL. Find the mass of a sample of ethanol that has a volume of 150.0 mL.

5. 30.0 g of each of the following acids are needed. Find the volume of each that must be measured out in a graduated cylinder.

   A. hydrochloric acid (HCl), density = 1.164 g/mL

   B. sulfuric acid (H_2SO_4), density = 1.834 g/mL

   C. nitric acid (HNO_3), density = 1.251 g/mL

6. A rectangular block of lead (Pb) measures 20.0 mm X 30.0 mm X 45.0 mm. If the density of Pb is 11.34 g/cm^3, calculate the mass of the block.

7. A cube of gold (Au) has a side length of 1.55 cm. If the sample is found to have a mass of 71.9 g, find the density of Au.

8. An irregularly-shaped sample of aluminum (Al) is put on a balance and found to have a mass of 43.6 g. The student decides to use the water-displacement method to find the volume. The initial volume reading is 25.5 mL and, after the Al sample is added, the water level has risen to 41.7 mL. Find the density of the Al sample in g/cm^3. (Remember: 1 mL = 1 cm^3.)