I. Significant Figures and Scientific Notation

1. How many significant figures are in each of the following measured values and constants?
   
   a) 5.69 kg  
   b) 3.7 cm  
   c) 8.50 mg  
   d) 41,600 m  
   e) 0.0066 mm  
   f) 0.073090 g  
   g) 0.0570 L  
   h) 0.1090 g  
   i) $6.022 \times 10^{23}$ atoms  
   j) $450 \times 10^{-9}$ m  
   k) $6.6260755 \times 10^{-34}$ Js

2. Write each of the following numbers in proper scientific notation format without changing the significant figures:

   a) 582  
   b) 0.076  
   c) 4,700  
   d) 963.00  
   e) 25,800,000  
   f) 0.000005  
   g) 0.0004200  
   h) 4,800,010

3. Identify the correct number of decimal places (dp’s) each answer should have then perform the following addition and subtraction calculations reporting each answer with the correct number of significant figure’s.

   a) $21.36 \text{ g}$  
      $+ 0.85 \text{ g}$  
      (___ dp’s)  
      (___ sig fig’s)

   b) $14.357 \text{ g}$  
      $- 5.7 \text{ g}$  
      (___ dp’s)  
      (___ sig fig’s)

   c) $1001.0 \text{ mm}$  
      $+ 9824 \text{ mm}$  
      (___ dp’s)  
      (___ sig fig’s)

   d) $0.00235$ moles  
      $- 0.00200$ moles  
      (___ dp’s)  
      (___ sig fig’s)

   e) $2.75 \times 10^{-2} \text{ m}$  
      $+ 3.14 \times 10^{-1} \text{ m}$  
      (___ dp’s)  
      (___ sig fig’s)

   f) $6.1999 \times 10^{2} \text{ cm}$  
      $- 4.299 \times 10^{2} \text{ cm}$  
      (___ dp’s)  
      (___ sig fig’s)
4. Identify the correct number of significant figures each answer should have; then perform the following multiplication and division calculations reporting each answer with the correct number of sig fig’s.

a) \[ 21.3 \text{ cm} \times 1.77 \text{ cm} = \] \( ____ \text{ sig fig’s} \)

b) \[ 4.9 \text{ mm} \times 3.141593 = \] \( ____ \text{ sig fig’s} \)

c) \[ \frac{0.6281 \text{ g}}{0.3175 \text{ mL}} = \] \( ____ \text{ sig fig’s} \)

d) \[ \frac{0.0736 \text{ m}}{8.41 \text{ s}} = \] \( ____ \text{ sig fig’s} \)

e) \[ \frac{2.85 \text{ g} \times 670. \text{ cm} \times 524 \text{ cm}}{689 \text{ cm} \times 372 \text{ cm}} = \] \( ____ \text{ sig fig’s} \)

f) \[ \frac{0.83 \text{ m} \times 545 \text{ m} \times 6.520 \text{ m}}{689 \text{ cm} \times 372 \text{ cm}} = \] \( ____ \text{ sig fig’s} \)

5. Perform the following calculations reporting each answer with the correct number of sig fig’s, in proper scientific notation.

a) \[ 1.47 \times 10^4 \times 5.0 \times 10^4 = \]

b) \[ \frac{3.698 \times 10^4}{1.85 \times 10^2} = \]

c) \[ 7.2 \times 10^4 \times 6.20 \times 10^4 = \]

d) \[ \frac{2.38 \times 10^{-4}}{2.2 \times 10^2} = \]

e) \[ \frac{8.50 \times 10^2}{5.69 \times 10^5} = \]
Continued… don’t forget the units here

f) \( 2.874 \text{ g} \)

\[
\frac{58.32 \text{ g}}{} + 33.21 \text{ g}
\]

g) \( 865.4 \text{ g} \) - \( 47.85 \text{ g} \)

\[ \]

h) \((3.86 \times 10^3 \text{ m}) \times (6.77 \times 10^7 \text{ m}) = \]

i) \( 6.6 \text{ cm} \times 4.890 \text{ cm} = \)

j) \((3.78 \times 10^{-4} \text{ g}) \times (9.31 \times 10^{-2} \text{ mL}) = \frac{(5.62 \times 10^4 \text{ mL})}{(5.62 \times 10^4 \text{ mL})} \]

k) \((5.67 \times 10^{-7} \text{ m}) + (3.46 \times 10^{-8} \text{ m}) = \)

l) \((5.28 \text{ cm} + 5.6148 \text{ cm}) \times (13.87 \text{ cm} + 195.2 \text{ cm}) = \)

m) \((5.28 \text{ cm} \times 5.6148 \text{ cm}) + (13.87 \text{ cm} \times 195.2 \text{ cm}) = \)

n) \( \sqrt{(9.75 \times 10^{-4} \text{ km}^2)} = \)

o) \((4.86 \times 10^{-2} \text{ mm})^3 = \)

p) \((0.000879 \text{ g} - 4.3 \times 10^{-5} \text{ g}) / (5.982 \times 10^{-5} \text{ mL}) = \)
II. Standard Deviation

Calculate the Standard Deviation for the following sets of data collected in a Chemistry 110 lab. Report the average value and the standard deviation with the correct number of significant figures and units.

a) Mass of pennies = 3.0107 grams
(pre-1986)
3.0532 g
3.0098 g
3.0463 g
3.0351 g
3.0079 g

b) Volume of solution = 7.12 milliliters
(10-mL cylinder)
7.24 mL
6.92 mL
7.02 mL
7.09 mL
6.95 mL

c) Height of Mercury (Hg) = 743.6 millimeters of Hg
(barometer)
749.1 mm Hg
752.8 mm Hg
741.5 mm Hg
747.3 mm Hg
III. Unit Conversions

Perform each of the following conversions:

a) \(47.98 \text{ in} = ? \text{ cm}\)

b) \(2634 \text{ cm}^3 = ? \text{ L}\)

c) \(7.64 \times 10^{-7} \text{ m} = ? \text{ nm}\)

d) \(25.8 \text{ mi} = ? \text{ in}\)

e) \(5.60 \times 10^3 \text{ cm} = ? \text{ yds}\)

f) \(3.19 \text{ lbs} = ? \mu\text{g}\)

g) A car is traveling at a speed of \(1.76 \times 10^5 \text{ yds/hr}\). Convert this speed to SI units. ______

h) Convert \(2.34 \text{ cubic feet (ft}^3\) to liters (L). ______

i) Convert \(-12.8^\circ\text{F (Fahrenheit)}\) to \(^\circ\text{C (Celsius)}\) and Kelvin. ______
Continued…

Avogadro’s Number: $6.022 \times 10^{23}$ atoms or molecules = 1 mole

j) How many moles of Nitrogen are in 58.00 grams of Nitrogen? : ________

k) How many grams of Lithium are in 4.16 moles of Lithium?: __________

l) How many moles of Calcium are in 5.00 moles of Calcium Phosphate? : ________

m) How many moles of Oxygen are in 5.00 moles of Calcium Phosphate? : ________

n) How many Carbon atoms are in 30.0 grams of Carbon? : ________

o) How many grams of Sodium are in $5.31 \times 10^{25}$ Sodium atoms? : ________

p) How many grams of Lithium are in a sample of $2.99 \times 10^{24}$ molecules of Lithium Sulfate? : ________