Name Key Date _____

Math Skills

Review Sheet – Quantitative Chemistry

1. Express each of the following numbers in *standard* scientific notation.

   a. 12,300 1.23×10^4

   b. 0.0987 9.87×10^{-2}

   c. 0.5102 5.102×10^{-1}

   d. 5.0 5.0×10^{0}

   e. 0.0000000564 5.64×10^{-8}

   f. 98,798,000,000,000 9.8798×10^{13}

2. Express each of the following as an ordinary decimal number.

   a. 9.88×10^{-2} 0.0988

   b. 4.683×10^{-5} 0.00004683

   c. 1.1×10^{9} 1100000000

   d. 4.0×10^{1} 40.

   e. 7.536×10^{-3} 0.007536

   f. 6.31×10^{4} 63100

3. Calculate the following. Be sure to use significant figures.

   a. 87,934.2 + 234,000.00 = 321934.2 (tenths place)

   b. $(2.3 \times 10^{2})(4.99 \times 10^{-12}) =$ [illegible] 1.1×10^{-9}

   c. $\dfrac{(9.82 \times 10^{3})}{(8.743 \times 10^{-4})} =$ 1.12×10^{7} Thanks Hannah :)

4. Convert the following (a-e) by using fence posting. Use significant figures, and show your work.

   a. 60 cm = _____ km $60\text{ cm} \times \frac{1\text{ m}}{100\text{ cm}} \times \frac{1\text{ km}}{1000\text{ m}} = 0.0006\text{ km}$

   b. 0.36 kg = _____ lb $0.36\text{ kg} \times \frac{2.2\text{ lb}}{1\text{ kg}} = 0.79\text{ lb}$

   c. 55 mL = _____ gal $55\text{ mL} \times \frac{1\text{ L}}{1000\text{ mL}} \times \frac{1.06\text{ qt}}{1\text{ L}} \times \frac{1\text{ gal}}{4\text{ qt}} = 0.015$

d. 12.2 g = 0.430 oz $12.2\,g \times \frac{1\,lb}{454\,g} \times \frac{16\,oz}{1\,lb} = 0.430\,oz$

e. 9.5 ft^2 = _____ mm^2

$$9.5\,ft^2 \times \underbrace{\frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{1\,m}{100\,cm} \times \frac{1000\,mm}{1\,m}}_{\#1} \times \underbrace{\frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{1\,m}{100\,cm} \times \frac{1000\,mm}{1\,m}}_{\#2} = 880000\,mm$$

For problems 5-9, be sure to show all of your work, and circle your answer. Use significant figures.

5. Some jobs require you to be able to lift 60 lbs. If a case of soup contains 24 cans, and each can weighs 298 g, how many cases of soup must you be able to lift?

$$60\,lbs \times \frac{454\,g}{1\,lb} \times \frac{1\,can}{298\,g} \times \frac{1\,case}{24\,can} = 3\,cases$$

(3.8 round down or you will have to be able to lift more than 60 lbs)

6. A nickel weighs about 5000 mg. What is the value in dollars of 4 kg of nickels?

$$4\,kg \times \frac{1000\,g}{1\,kg} \times \frac{1000\,mg}{1\,g} \times \frac{1\,nickel}{5000\,mg} \times \frac{\$1}{20\,nickels} = \$40$$

7. If you run at a speed of 6.5 yd/s, how fast in miles per hour are you going?

$$\frac{6.5\,yd}{s} \times \frac{60\,s}{1\,min} \times \frac{60\,min}{1\,hr} \times \frac{3\,ft}{1\,yd} \times \frac{1\,mi}{5280\,ft} = 13.\ \frac{mi}{hr}$$

8. A metal bolt weighs 0.0523 kg. When it is placed in a graduated cylinder, the water level rises from 23.6 mL to 29.1 mL. Calculate the density of the substance in g/cm^3.

$$D = \frac{m}{V} = \frac{0.0523\,kg}{29.1\,mL - 23.6\,mL} \times \frac{1000\,g}{1\,kg} \times \frac{1\,mL}{1\,cm^3} = 9.5\ \frac{g}{cm^3}$$

2 sf

9. A sample of sand with a density of 1.45 g/cm^3 is poured into a box and completely fills it. The dimensions of the box are 2.0 ft x 1.5 ft x 1.0 ft. Calculate the mass of the sand.

$$2.0\,ft \times 1.5\,ft \times 1.0\,ft \times \frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{12\,in}{1\,ft} \times \frac{2.54\,cm}{1\,in} \times \frac{1.45\,g}{1\,cm^3}$$

$$= 120000\,g$$