

**Review—Chem Honors**  
**Chapter 2: Matter and Measurement**

Name \_\_\_\_\_  
Period \_\_\_\_\_ Date \_\_\_\_\_

**Test Statistics and format:**

- Test will be a combination of short answer, problem solving and short explanation questions.
- Test should be a total of 60-70 points.
- Study all concepts covered in notes, worksheets, and labs (Candle, and Density Lab)
- My suggestion is to PRACTICE problems and practice answering questions. Don't just READ!!!

**Topics:**

- units: base vs. derived
- scientific notation (*with and without a calculator*)
- accuracy vs. precision
- percent error (*equation on reference sheet*)
- significant digits (*counting # of sig figs and properly rounding answers to proper # of sig figs*)
- density: concept and problem solving (*rearranging equation, plugging in numbers, writing units*)
- dimensional analysis (factor label) conversions (*using method properly to convert any type of units*)
- metric unit conversions: use factor label method to convert metric units

**Practice questions:**

1) **Scientific notation**-- Do not use a calculator to do this question.

Express the following quantities in scientific notation: Express each # as either a whole number or a decimal:

- a) 7770 g \_\_\_\_\_ d)  $5.05 \times 10^2$  s \_\_\_\_\_  
b) 0.0125 cm \_\_\_\_\_ e)  $2.0054 \times 10^{-3}$  m \_\_\_\_\_  
c) 250,000 L \_\_\_\_\_ f)  $8.1 \times 10^5$  J \_\_\_\_\_

2) Determine the number of significant digits in each of these numbers.

- a) 0.000345 g \_\_\_\_\_ c) 220 paperclips \_\_\_\_\_ e) 1000 yrs/millennium \_\_\_\_\_  
b) 500.00 km \_\_\_\_\_ d) 30,050 L \_\_\_\_\_ f) 0.0076080 mg \_\_\_\_\_

3) Make the following calculations. You must be able to do these questions **WITHOUT** a calculator. Show initial calculations before converting to valid scientific notation, with the correct significant digits and units

a)  $(3.0 \times 10^3 \text{ mm})(6.00 \times 10^{-5} \text{ mm}) =$

b)  $\frac{144.0 \times 10^2 \text{ km}}{12.0 \times 10^7 \text{ s}} =$

4) Perform the following calculations, expressing your answers with the appropriate number of **significant digits** and **correct units**. You may write answers in scientific or regular notation. You may use a calculator.

a)  $\frac{0.0050 \text{ g}}{2.03 \text{ mL}} =$

b)  $(19.1 \text{ m})(8.010 \text{ m})(4,023 \text{ m}) =$

c)  $\frac{7.87 \text{ m} + 2.3 \text{ m}}{65.7 \text{ s}} =$

5) Why is it important to write calculated answers with the proper number of significant digits?



- g) A car uses  $0.050 \text{ cm}^3$  of oil for each kilometer it is driven. How much oil, in liters, is consumed if the car is driven  $2.0 \times 10^3 \text{ km}$ ? **1 mL = 1 cm<sup>3</sup>**
- h) The standard pressure of the atmosphere is  $14.7 \text{ lbs/in}^2$ . (*This means that the atmosphere typically pushes down with a force of 14.7 pounds per square inch of surface area.*) Convert this standard pressure of the atmosphere into units of  $\text{kg/cm}^2$ . **1 inch = 2.54 cm; 1 lb = 453.6 g**
- i) Traveling at  $30.0 \text{ m/s}$ , how many hours will it take to drive  $345 \text{ km}$  to Washington, DC?

**For these last few questions, you do not need to use dimensional analysis (though it often is helpful), but you must show all work and every number must have units. If a formula is used, you must rearrange the formula as needed before plugging in numbers.**

- 14) The average density of living matter on Earth's land areas is  $0.100 \text{ g/cm}^2$ . What mass of living matter in kilograms would occupy an area of  $0.125 \text{ ha}$ ?  
(1 ha =  $10,000 \text{ m}^2$ )

- 15) A rectangular piece of a metal has a mass of  $6.58 \text{ g}$ . The metal piece is  $0.560 \text{ mm}$  thick,  $36.5 \text{ mm}$  long and  $30.1 \text{ mm}$  wide. What is the density of the metal in  $\text{grams/cm}^3$ ?

- 16) What volume of magnesium in  $\text{cm}^3$  would have the same mass as  $1.82 \text{ L}$  of platinum?  
**Density of magnesium =  $1.74 \text{ g/cm}^3$       Density of platinum =  $21.45 \text{ g/cm}^3$**

Answers: 3a)  $1.8 \times 10^{-1} \text{ mm}^2$ ; 3b)  $1.20 \times 10^{-4} \text{ km/s}$ ; 4a)  $2.5 \times 10^{-3} \text{ g/mL}$ ; 4b)  $615,000 \text{ m}^3$  or  $6.15 \times 10^5 \text{ m}^3$ ; 4c)  $0.155 \text{ m/s}$ ; 10)  $16.0 \text{ mL}$ ; 11)  $2.8 \text{ g/cm}^3$ ; 12)  $4\%$ ; 13a)  $3.5 \times 10^{-3} \text{ g}$ ; 13b)  $186 \text{ pm}$ ; 13c)  $0.49882 \text{ MW}$ ; 13d)  $2.24 \times 10^7 \text{ J/g/mL}$ ; 13e)  $231,000 \text{ rubles}$ ; 13f)  $0.28 \text{ m/s}$ ; 13g)  $0.10 \text{ L}$ ; 13h)  $1.03 \text{ kg/cm}^2$ ; 13i)  $3.19 \text{ hr}$ ; 14)  $1250 \text{ kg}$  or  $1.25 \times 10^3 \text{ kg}$ ; 15)  $10.7 \text{ g/cm}^3$ ; 16)  $22,400 \text{ cm}^3$  or  $2.24 \times 10^4 \text{ cm}^3$