HONORS CHEMISTRY – SUMMER ASSIGNMENT

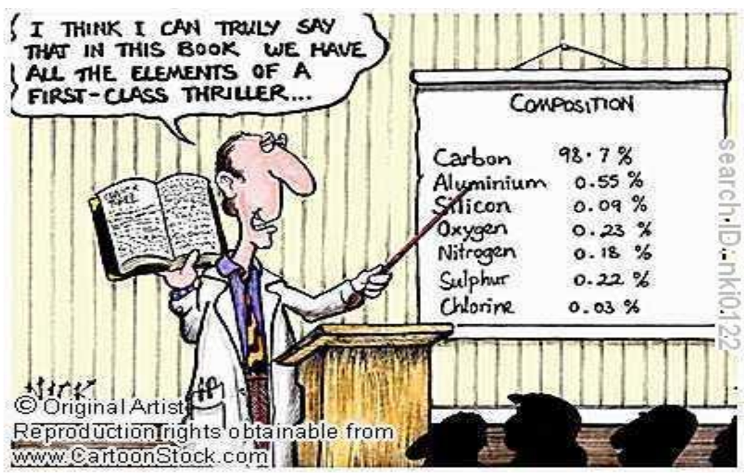
In chemistry, you will be learning the scientific names of elements and compounds, as well as completing many mathematical calculations of chemical quantities. Your summer assignment begins with learning some of these facts.

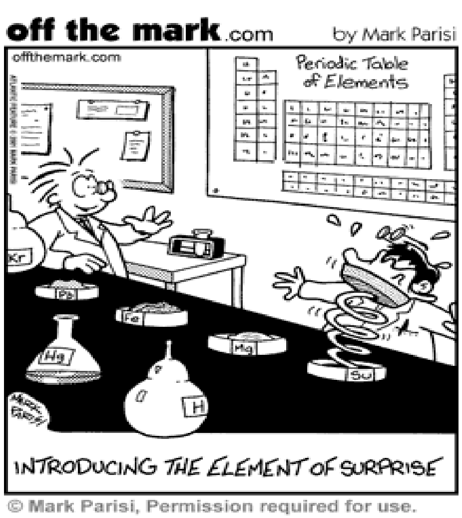
You will be quizzed on the names and symbols of the elements and polyatomic ions in this packet throughout the year (given the chemical symbol provide the properly spelled name or given the name provide the proper chemical symbol). You must know the <u>spelling</u> **and** <u>symbol</u>. All elements are to be written ***as shown on this list*** with a capital letter as the first letter and lowercase letter as the second letter. ***Do not write in all caps, or in cursive.*** You will also be quizzed on the metric prefixes, their meanings and the ability to convert between them.

Assignment:

Know the metric system prefixes at the bottom of this page, as well as the elements and the polyatomic ions listed on the next page. Be familiar with the information included in this packet.

Assume you have Chemistry the first day of school, do not wait to find out your schedule! Be prepared for a quiz on this information!





There are memorization tips and a periodic table at the back of the packet for your reference.

Name: ______________________________ Honors Chemistry

ELEMENTS

Aluminum	Al
Argon	Ar
Barium	Ba
Beryllium	Be
Bismuth	Bi
Boron	B
Bromine	Br
Calcium	Ca
Carbon	C
Cesium	Cs
Chlorine	Cl
Chromium	Cr
Cobalt	Co
Copper	Cu
Fluorine	F
Gold	Au
Helium	He

Gallium	Ga
Germanium	Ge
Hydrogen	H
Iodine	I
Iron	Fe
Lead	Pb
Lithium	Li
Magnesium	Mg
Manganese	Mn
Mercury	Hg
Neon	Ne
Nickel	Ni
Nitrogen	N
Oxygen	O
Phosphorus	P
Platinum	Pt
Potassium	K

Radon	Rn
Rubidium	Rb
Scandium	Sc
Silicon	Si
Silver	Ag
Sodium	Na
Strontium	Sr
Sulfur	S
Titanium	Ti
Tin	Sn
Uranium	U
Xenon	Xe
Zinc	Zn

POLYATOMIC IONS

Polyatomic ions are groups of multiple atoms that have a charge (positive or negative). The symbols shown below tell you what elements are in the ion, how many atoms of each, and the charge. For example: NH_4^{+1} contains a nitrogen atom, four hydrogen atoms and the entire group has a charge of +1.

Memory Hint: If you have two ions with similar names and the only difference is the number of oxygen atoms in your ion:

-ite means smaller number of O

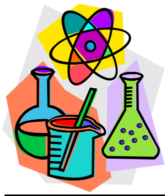
-ate means larger number of O

Hypo- (smallest) and Per- (largest) are used if there are four ions with similar names and different numbers of oxygen.

ION	NAME
NH_4^{1+}	ammonium
ClO^{1-}	hypochlorite
ClO_2^{1-}	chlorite
ClO_3^{1-}	chlorate
ClO_4^{1-}	perchlorate
CN^{1-}	cyanide
OH^{1-}	hydroxide
IO_3^{1-}	iodate
NO_3^{1-}	nitrate

ION	NAME
NO_2^{1-}	nitrite
MnO_4^{1-}	permanganate
CO_3^{2-}	carbonate
O_2^{2-}	peroxide
SO_4^{2-}	sulfate
SO_3^{2-}	sulfite
PO_4^{3-}	phosphate
CH_3COO^{1-}	acetate

Name: ____ Honors Chemistry

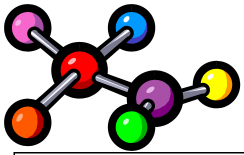


Memorization Tips: Elements/Symbols

Over the years, my students and I have developed several unique ways to help us remember the symbols for the elements. Be warned - some are a little out there!

Silver	Ag	If a person who is expecting a present of a gold necklace receives a silver one. He might say, “**Ag**, I didn’t want silver!”
Gold	Au	“Hey you, I want that gold necklace!” Said with “Hey you” sounding like **Au**.
Bromine	Br	That brother of mine - **Br**o of mine!
Calcium	Ca	“**Ca**ws give milk!” Pronounced with an accent to make cows sound like it’s spelled with an A.
Chlorine	Cl	“You **Cl**ean with chlorine!”
Iron	Fe	“**Fe**, Fi, Fo, Fum, I’m an iron man!”
Helium	He	If you breathe in helium, you will laugh! **He**, He, He!
Mercury	Hg	Greek mythology - Hg stands for **H**elmet **g**uy!
Potassium	K	You will get **K**icked out of school for the double nasty! You can’t do the first three letters and cannot say the next three!
Sodium	Na	“**Na**w, I don’t want any sodium!”
Nickel	Ni	“**Ni**ck owes me a nickel!”
Oxygen	O	“**O**pen your mouth wide to take in oxygen!”
Lead	Pb	**P**encil **b**roke!
Silicon	Si	**Si**lly con!
Tin	Sn	A tin roof gets hot in the **S**u**n.**
Manganese	Mn	Take first three letters - **M**a**n**
Magnesium	Mg	Take first three letters – **M**a**g**

Name: ____ Honors Chemistry



Fill in the missing symbol/name of the element. The date of discovery and the origin of the name are included for your information only. You will only be responsible for the names and symbols.

Symbol	**Name**	**Date**	**Origin of Name**
	aluminum	1825	Latin, alumen = astringent taste
Ar		1894	Greek, argos = neutral or inactive
	barium	1808	Greek, baryos = heavy
Bi		~1450	German, wismut = white mass
	boron	1808	Arabic, bawraq
Br		1826	Greek, bromos = stench
C		B.C.	Latin, carbo = coal
Cs		1860	Latin, caesius = blue
	chlorine	1808	Greek, chloros = green gas
Cr		1797	Greek, chroma = color
	cobalt	1735	Greek, cobolos = goblin
Cu		B.C.	Latin, cuprum
	fluorine	1886	Latin, fluere = to flow
Ga		1875	Latin name, Gaul, of France
	germanium	1886	country, Germany
Au		B.C.	Latin, aurum
He		1895	Greek, helios = the sun
H		1766	Greek, hydro genes = water former
I		1811	Greek, iodos = violet color
Fe		B.C.	Latin, ferrum
	lead	B.C.	Latin, plumbum
	magnesium	1803	Latin, magnesia = a place in Asia Minor
Mn		1774	Latin, magnes = magnet
Hg		B.C.	Latin, hydragyrum = god and planet
	neon	1898	Greek, neo = new
	nickel	1750	German, goblin
	nitrogen	1772	Latin, nitro = native soda and gen = born
O		1771	Greek, oxys = sharp and gen = born
P		1669	Greek, phosphoros = light bringer

	platinum	1735	Spanish, plata = silver
K		1807	Latin, kalium
	radon	1900	originates from radium
Rb		1860	Latin, rubidius = red
	scandium	1879	Scandanavian peninsula by its discoverer
	silicon	1823	Latin, silex = flint
Ag		B.C.	Latin, argentum
	sodium	1807	Latin, natrium
Sr		1808	town of Strontian, Scotland
	sulfur	B.C.	Latin, sulphur
	tin	B.C.	Latin, stannum
Ti		1791	Greek mythology, first sons of earth
U		1789	planet Uranus
Xe		1808	Greek, xenos = strange
	zinc	B.C.	German, zink = like tin

Honors Chemistry Summer Assignment

Purpose:

The purpose of this exercise is two-fold. The first purpose is to serve as a refresher for various skills to which each student should have already been exposed. There may be a few new terms, but the majority of this material is remedial in nature. The second purpose is to serve as a preview of what is to come. Most of you are entering this class after completing biology. This class is VERY different from biology. It is both a science class and a math class. In fact, math is the language through which chemistry is explained.

Content:

1. Variables
   – Independent, dependent, and control variables
2. Graphing and Data Analysis
   – Location of variables
   – Selecting the correct style of graph
   – Understanding how to obtain data
3. Scientific Notation
   – Writing Scientific Notation
   – Adding, Subtracting, Multiplying, & Dividing, using Scientific Notation
4. Units of Metric Measurement and Metric Conversions
   – Understanding what certain units measure (grams measures mass, etc.)
   – Understanding metric unit conversions are based on multiples of ten.
5. Isolating Variables from Equations
6. Density Calculations

The practice in this packet is strictly for practice to improve your quiz scores at the beginning of the six weeks.

1. *Variables*

The scientific method often employs the use of *variables* to carry out a particular study.

There are two types of variables:

- The ***independent variable*** is the variable that is being manipulated (changed) in the procedure. (*The cause*)
- The ***dependent variable*** is the variable (thing) that is being affected by the manipulation of the independent variable (*The effect*)

The term <u>*control*</u> can have two meanings in a controlled experiment.

- A ***control (trial)*** is often used as a comparison to the independent variable.
  - This serves as the "normal situation" for a given sample or situation.
- A study is considered to be ***controlled*** if all variables, except the independent, are held constant (fixed) for every trial that is done.

NOTE: When describing variables, it is important to <u>be specific</u>. For example, if the amount of water is changed, the independent variable is "mass of water" or "volume of water". If the color of water is changed, the independent variable would be "color of water", etc.

<u>*Example:*</u> Enrique and Lacey are testing soil for contamination outside a nuclear power plant. They test the concentrations of contaminants at different distances from the plant.

1. What is the independent variable? ***The distance from the plant. (Lacey and Enrique select the distances to test)***
2. What is the dependent variable? ***The concentration of contaminants (this is the data they will collect & the factor will depend on how far they are from the plant)***
3. What are some factors that Enrique and Lacey will keep constant? ***Test using the same equipment, test soil at the same depth in each location, test from the same power plant, test the same time of day, etc.***

2. *Graphing and Data Analysis*

Graphs are a useful tool for displaying scientific data because they show relationships among variables in a compact, visual form. You may have used *x*-*y* graphs, or ***Cartesian graphs***, in your math classes. Below are the four basic steps to constructing a graph from data in the chemistry lab.

1. Determining the variable

- In an experiment, the ***independent variable*** is the property that is under control and can be varied.
- The ***dependent variable*** is the property that is measured, observed, counted, or found.
- The independent variable is <u>***usually***</u>, but not always, assigned to be the *x* value, and the dependent variable is usually assigned to be the *y* value.
- If the study involves a measurement as a function of time, time is plotted on the *x* axis.

2. Scaling the axes

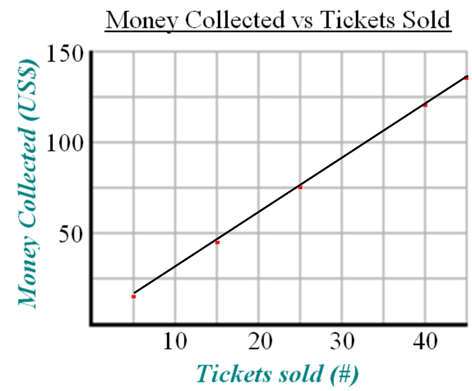
- The scale of the axes includes all data points and allows as much room as possible on both axes. Each axis should be evenly divided with plenty of space between divisions, making the graph easy to read and understand.
- The divisions should be labeled in multiple units of (i.e. 1, 2, 5, 10, etc.).
- Each axis should also be labeled with a description of what it represents and the units of measurement.

3. *Plotting the data*
    - If the plotted data points roughly form a straight line, use a transparent ruler to draw a line that best represents the data points. This is known as the ***best-fit line***.
    - If the points do not form a straight line but appear to form a curve, lightly sketch the curve with a pencil, connecting all the data points.

4. *Titling your graph*
    - It is important to add a title to the top of your graph, so that anyone looking at the graph can easily identify its purpose. Choose a title that is brief and descriptive of the data.

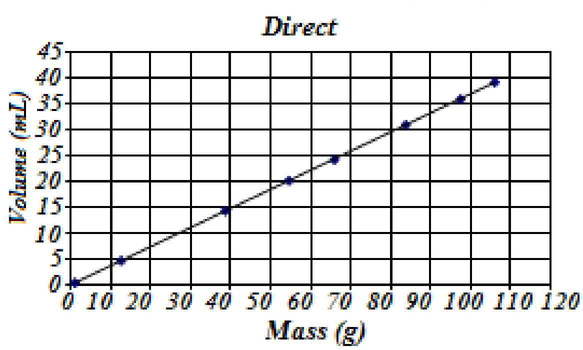
<u>Example:</u> Your school is putting on a play. To raise money for the event, tickets for the play are being sold for $3.00 each. The chart below shows how much money will be made from selling certain numbers of tickets.

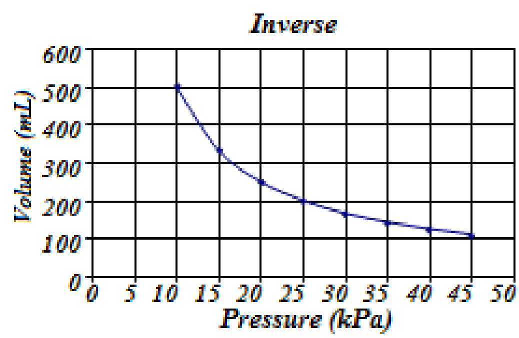
Tickets sold	*Money collected*
5	$15
15	$45
25	$75
40	$120
45	$135



Graphs show the relationship between *x* and *y* variables.

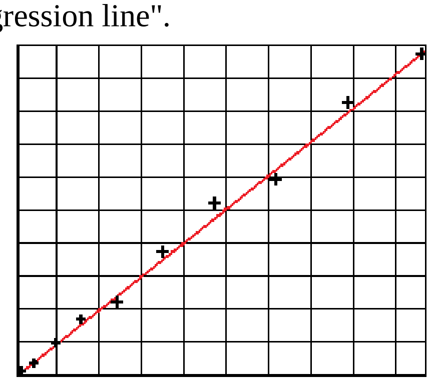
- If data forms a straight line when plotted, then *x* and *y* have a **linear relationship.**
- This line can be described by the general mathematical equation $y = mx + b$ where m is the slope of the line and b is a constant.
- Linear data is said to be **directly proportional** when dividing one variable by the other gives a constant value. This means that as one variable changes, the other changes at the same rate
- Not all data forms a straight line when graphed; your graph may show a curve.
- If the curve drops as you move from left to right, and dividing one variable by the other gives a constant reciprocal value, then your graph has an **inverse relationship.**





Quite often, you will need to determine whether or not a graph expresses a linear relationship. To do this you must draw what is known as a "best fit" straight line, also called a "regression line".

- The purpose of the graph is to visually display relationships which may not be apparent from data tables.
- Experimental errors which are always present may obscure the relationships.
- The best fit line averages out the errors.
- Without computer software, you will need to draw the lines "by hand" and then make a judgment about whether the points are "linear".



Remember, sometimes a graph represents neither a direct nor an inverse of relationship, but, rather, simply traces the effect of x on y.

Many types of graphs exist: line graphs, bar graphs, pie charts, histograms, etc. In order to display the results of the experiment appropriately, the right type of graph should be used.

- A line graph is used when the independent variable changes in regular increments and must be placed in a specific order. Points are plotted and then connected.
- A bar graph is used when the independent variables can be placed in any order.
- A histogram is a type of bar graph used when the data involves the frequency of occurrence.

3. *Using Scientific Notation*

Adjusting values for proper scientific notation:

- When there is more than 1 number to the left of the decimal:
  - Move the decimal to the left and increase the power of 10 by the number of places you moved your decimal. (big number goes to a smaller number, makes a "small" power of 10 bigger)
  - Example #1: $456 \times 10^5 = 4.56 \times 10^7$
  - Example #2: $6750. \times 10^{-20} = 6.750 \times 10^{-17}$
- When there are fewer than 1 non-zero numbers to the left of the decimal:
  - Move the decimal to the right and decrease the power of 10 by the number of places you moved your decimal. (small number goes to a bigger number, makes a "big" power of 10 smaller)
  - Example #1: $0.000783 \times 10^{12} = 7.83 \times 10^8$
  - Example #2: $0.0541 \times 10^{-7} = 5.41 \times 10^{-9}$

Adding and Subtracting:

- The powers of 10 must be the same in order to add or subtract values
  - Example #1: $(5 \times 10^7) + (4 \times 10^9)$
    $(5 \times 10^7) + (400 \times 10^7) = 405 \times 10^7 = 4.05 \times 10^9$

Multiplying:

- Add the powers of 10
  - Example #1: $(2 \times 10^{24}) \times (3 \times 10^4)$
    $(2 \times 3) \times (10^{24+4}) = 6 \times 10^{28}$
  - Example #2: $(4 \times 10^{14}) \times (6 \times 10^{-5})$
    $(4 \times 6) \times (10^{14+(-5)}) = 24 \times 10^9 = 2.4 \times 10^{10}$

Dividing:

- Subtract the powers of 10
  - Example #1: $(8 \times 10^{15}) / (2 \times 10^5)$
    $(8/2) \times (10^{15-5}) = 4 \times 10^{10}$
  - Example #2: $(3 \times 10^{16}) / (4 \times 10^{-4})$
    $(3/4) \times (10^{16-(-4)})$
    $(3/4) \times (10^{16+4}) = 0.75 \times 10^{20} = 7.5 \times 10^{19}$

4. *Metric Units of measurement and Conversions*

Le Systeme International d'Unites : SI

- System of measurement agreed on all over the world in 1960
- Contains 7 **base units** (This class will focus on 5 of them)
- Units are defined in terms of standards of measurement that are objects or natural occurrence that are of constant value or are easily reproducible

5 base unit important to chemistry

Quantity	*Quantity Symbol*	*SI Unit Name*	*SI Unit Abbreviation*	*Defined Standard*
Length	l	Meter	m	The length of the path traveled by light in a vacuum during a time interval of 1/299792458 of a second.
Mass	m	Kilogram	kg	The unit of mass equal to the mass of the international prototype of the kilogram.
Time	t	Second	s	The duration of 9192631770 periods of the radiation corresponding to the transition between two hyperfine levels of the ground state of the cesium-133 atom.
Temperature	T	Kelvin	K	The fraction 1/273.16 of the thermodynamic temperature of the triple point of water.
Amount of Substance	n	Mole	mol	The amount of substance of a system which contains as many elementary entities as there are atoms in 0.012 kilogram of carbon-12

Derived units are SI units are created from a combination of SI base units.

- Examples of derived unit are density, volume and area
- **Volume** is the amount of space that an object occupies.
- The metric unit is the **Liter (L).**
- The common unit used in the lab is the **milliliter (mL)**.
- **1 mL = 1 cm^3**

Examples of derived units: measurements calculated using other measurements

Quantity	*Quantity Symbol*	*SI Unit*	*SI Unit Abbreviation*	*Derivation*
Area	A	Square meter	m^2	length *x* width
Volume	V	Cubic meter	m^3	length *x* width *x* height
Density	D	Kilograms per cubic meter	kg/m^3	mass / volume
Molar Mass	M	Kilograms per mole	kg/mol	mass / amount
Energy (heat)	E	Joule	J	force *x* length
Pressure	P	Pascal*	Pa	force / area

***The Pascal is a cumbersome unit and is rarely used. Kilopascals (kPa) is much more commonly used. Also commonly used are, atm (atmospheres) and psi (lbs./in^2)**

Prefixes are added to the base and derived unit names to represent quantities smaller or larger

- For example, a kilometer is larger than a meter, while a micrometer is smaller than a meter.
- A table of prefixes is provided below (on the next page).

Table of metric prefixes:

Prefix	*Unit abbreviation*	*Exponential factor*	*Example*
tera–	T	10^{12}	1 terabyte (Tbyte)
giga–	G	10^{9}	1 gigabyte (Gbyte)
mega–	M	10^{6}	1 megawatt (Mwatt)
kilo–	k	10^{3}	1 kilometer (km)
hecto–	h	10^{2}	1 hectogram (hg)
deka–	da	10^{1}	1 dekaliter (daL)
		10^{0}	1 gram (g)
deci–	d	10^{-1}	1 decimeter (dm)
centi–	c	10^{-2}	1 centigram (cg)
milli–	m	10^{-3}	1 milliliter (mL)
micro–	µ*	10^{-6}	1 microsecond (µs)
nano–	n	10^{-9}	1 nanogram (ng)
pico–	p	10^{-12}	1 picometer (pm)

**This is the Greek letter mu "µ" and not a "u"*

To convert between metric prefixes using dimensional analysis, use the BS method. If the unit size gets bigger, the number gets smaller. If the unit size gets smaller, the number gets bigger. (One gets **b**igger, the other gets **s**maller, get it?)

- If you are converting 1500 mL to L, will the number be bigger or smaller than 1500?
  - The unit L is bigger than mL. Therefore, the number will be smaller.
  - 1500 mL = 1.5 L
- If you are converting 12 kg to ng, will the number be bigger or smaller than 12?
  - The unit ng is smaller than kg. Therefore, the number will be bigger.
  - Kilo = 1000 and nano = 1 x 10^{-9}, therefore the decimal will be moved 12 places to the right tto make a bigger number
  - 12 kg = 12000 g = 1.2 x 10^{13} ng

One thing we will cover when school starts is dimensional analysis (also known as factor-label method). Dimensional analysis is another way to solve this problem as shown below. If you are familiar with this technique, feel free to use. Feel free to solve it whatever way you wish.

$$12\,\cancel{kg}\left(\frac{1000\,\cancel{g}}{1\,\cancel{kg}}\right)\left(\frac{1\text{x}10^{9}\text{ ng}}{1\,\cancel{g}}\right)=1.2\text{x}10^{13}\text{ ng}$$

5. *Isolating Variables (Algebraic equations)*

Many of the relationships that are studies in chemistry involve algebraic equations. A student of chemistry must be able to solve algebraic equations and apply them to the solution of problems.

Example #1: Isolate the x intercept variable from the equation for a line. y = mx + b

$$y = mx + b$$

$$y - b = mx + b - b \quad \text{1. Subtract "b" from both sides}$$

$$y - b = mx$$

$$\frac{y-b}{m} = \frac{mx}{m} \quad \text{2. Divide both sides by "m"}$$

$$\frac{y-b}{m} = x$$

6. ***Density calculations***

Mass is a measure of the amount of matter in an object.

- Essentially, how much "stuff" is inside an object.

Weight is the force that mass has as a result of gravity.

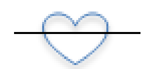
- When the gravity changes, the weight will change, but the mass will remain constant

Volume is the amount of space an object occupies.

- This remains constant for solids and liquids.

Density is the amount of matter per the amount of space. It is calculated by dividing the mass by the volume.

- Density is an intensive property; it will remain the same no matter how much of the substance there is.
- The density of an object will determine if it will float or sink in another phase. If an object floats, it is less dense than the other substance. If it sinks, it is denser.

The formula for density looks like a heart with a line through it: **D =**  $\mathbf{D = \frac{m}{V}}$

Example: What is the volume of a substance with a mass of 75.8g and a density of 7.87 g/cm^3?

$$7.87\ \text{g/cm}^3 = \frac{75.8\ \text{g}}{\text{V}}$$

1. **Input the information provided in the problem into the formula for density:** $\mathbf{D = \frac{m}{V}}$

$$\text{V}\left(7.87\ \text{g/cm}^3 = \frac{75.8\ \text{g}}{\text{V}}\right.$$

2. **Multiply through by "V"**

$$\text{V}\left(7.87\ \text{g/cm}^3\right) = 75.8\ \text{g}$$

$$\frac{\text{V}\left(7.87\ \text{g/cm}^3\right)}{7.87\ \text{g/cm}^3} = \frac{75.8\ \text{g}}{7.87\ \text{g/cm}}$$

3. **Divide both sides by 7.87 g/cm^3**

$$\text{V} = 9.63\ \text{cm}^3$$

***Name:* ____ *Period:* _____**

Practice Items

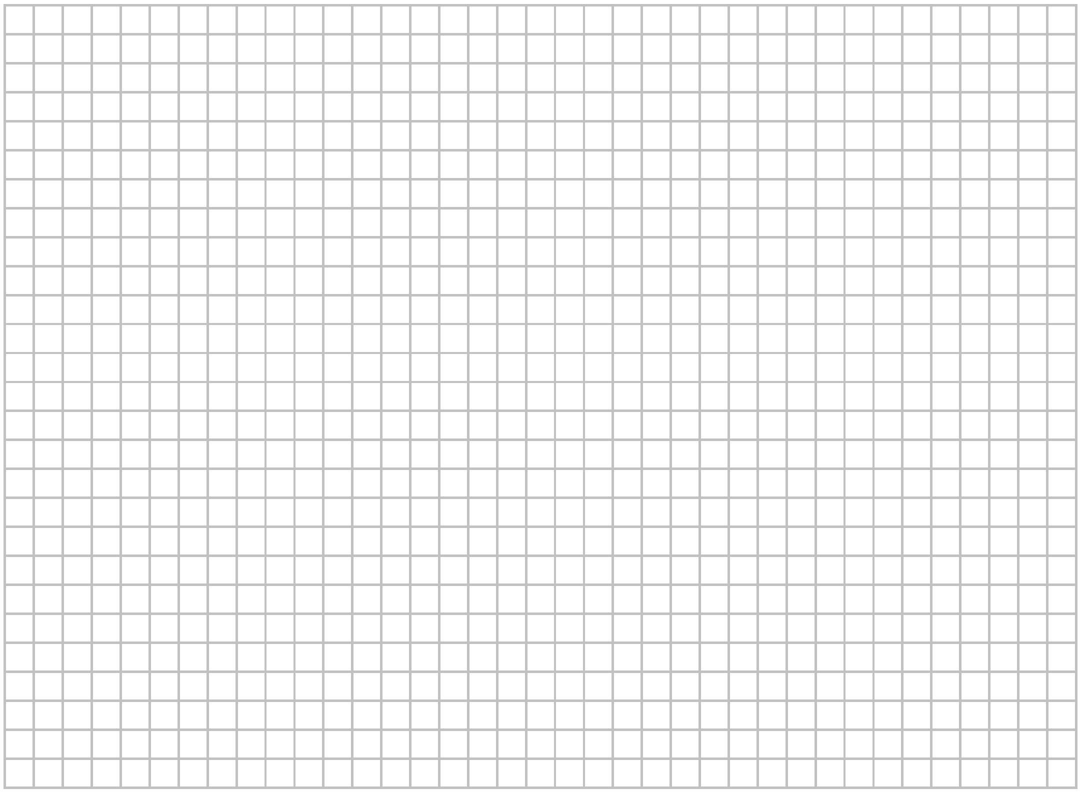
Directions: *Complete the following items in the spaces provided. If you feel that there is not enough room to complete the item in the space provided, you may use a separate sheet of paper and attach it to this portion of the document when you turn in this assignment.*

1. A new drug is suspected to reduce the number of malignant tumors in patients diagnosed with cancer. Dr. DeJesus gives his patients different doses of the medication.
   a. What is the independent variable?
   b. What is the dependent variable?
   c. What are some factors Dr. DeJesus is likely to keep constant (as control variables)?

   d. What could Dr. DeJesus do as a control trial and why would this experiment benefit from it?

2. Mira is measuring the boiling point of 5 different substances. What type of graph would be best to show the results of the experiment? ________________________
3. Jorge is measuring the pH of a sample for every 10 mL of water added. What type of graph would be best to show the results of the experiment? ________________________
4. The concentration of lead (in parts per billion) was tested in a local water system every morning for 2 weeks. The results from day1-day14 were 20 ppb, 21 ppb, 23 ppb, 21 ppb, 45 ppb, 43 ppb, 38 ppb, 35 ppb, 35 ppb, 32 ppb, 30 ppb, 28 ppb, 27 ppb, and 27 ppb.
   a. What is the independent variable? __________________________________
   b. What is the dependent variable? __________________________________
   c. In the space below, use a ruler to construct a data table for the results in the description above.

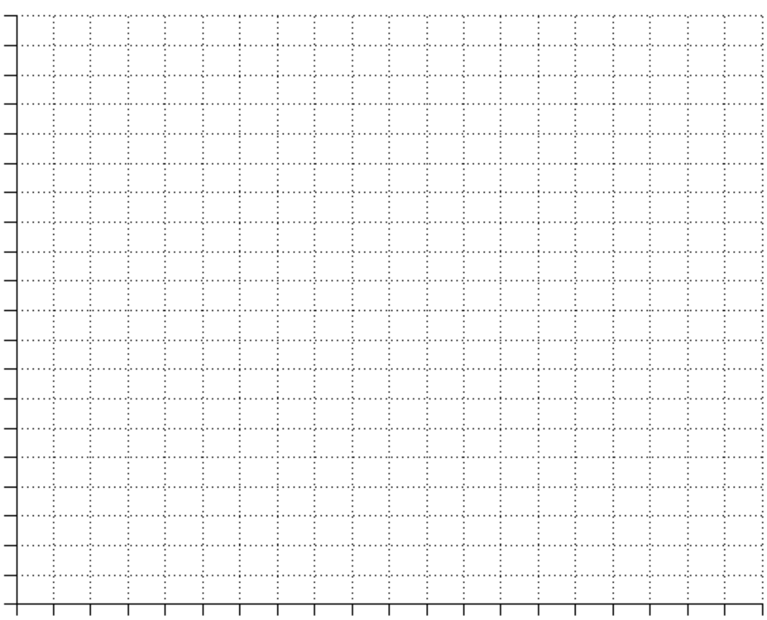
d. Using the grid below, construct a graph for the data in the table you just constructed. Simply connect the points. **<u>No</u>** best–fit line needed.



5. The length of six different objects was measured in both centimeters and inches. The data was recorded in the table to the right.

Object	***Length (cm)***	***Length (in)***
1	15.00	5.88
2	27.95	11.00
3	23.90	9.41
4	12.09	4.75
5	29.00	11.41
6	14.30	5.63

a. Plot the length in centimeters vs. the length in inches using the provided coordinate axes below. Label both axes.



b. Draw a best-fit line for the data. Calculate the slope of the line.

c. Calculate the y-intercept of the line

d. Write the equation of the line.

e. Based on your analysis of the data, if a measurement of 5.00 cm was made, how many inches long would the object be?

6. *Analyze the data and answer the questions associated with each scenario below*

<u>*Scenario #1*</u>

Problem Statement: *The purpose of this lab is to determine the number of molecules contained in a sip of water.*

Materials: *Dry plastic cup, tap water, triple beam balance*

Procedure:

- *One dry plastic cup was obtained.*
- *The plastic cup was massed on the triple beam balance and the mass in grams was recorded.*
- *The cup was filled with water from the water fountain.*
- *The mass (in grams) of the cup and water together was determined and recorded.*
- *A sip was taken from the cup.*
- *The mass (in grams) of the cup and water (after sipping) was determined and recorded.*

Data Obtained:

Item	Mass (g)
Plastic Cup	4.21
Plastic cup with water	186.53
Plastic cup with water after sip was taken	129.28

a. For this experiment, list the dependent and independent variables.

Independent variable: Dependent variable:

b. Determine the mass of water in the cup.

c. Determine the mass of your sip of water.

Scenario #2

In this experiment, the mass of an evaporating dish was recorded. A sample of salt water was added to the dish, and the mass was recorded. Then, the dish was heated until all of the water evaporated, leaving the salt behind. The mass of the dish, and remaining salt, was recorded after the dish cooled.

Data Obtained:

Item	Mass (g)
Evaporating Dish	26.54
Evaporating Dish with salt water	33.98
Evaporating Dish with dried salt	29.28

d. Determine the mass of salt water in the evaporating dish.

e. Determine the mass of dried salt remaining in the dish after evaporation.

f. Determine the mass of water which was lost during evaporation.

7. *Put the following into proper scientific notation.*

a. 870.94×10^{6}

b. 543×10^{-8}

c. $0.000\ 0504 \times 10^{23}$

d. 304.78×10^{-16}

e. $0.000\ 000\ 238 \times 10^{-3}$

f. 0.06×10^{-2}

8. *Perform the indicated functions using proper scientific notation.* ***<u>DO NOT</u>*** *simply plug into the calculator.* ***For this exercise, show how the exponent is manipulated just like the example exercises provided in the review.***

a. $(5.7 \times 10^{9}) + (6.8 \times 10^{12})$

b. $(4.38 \times 10^{-17}) + (5 \times 10^{-21})$

c. $(4.7 \times 10^{8)}) \times (2.0 \times 10^{4})$

d. $(6.2 \times 10^{-5}) \times (3.1 \times 10^{-9})$

e. $(7.5 \times 10^{18}) / (4.2 \times 10^{-4})$

f. $(3.22 \times 10^{-8}) / (2.0 \times 10^{9})$

9. *What does the following measure and is it base or derived? (Example: 34 cm^2: area, derived unit)*

a. 12.3 km:

b. 273 K:

c. 0.98 atm:

d. 52.5°C:

e. 87.2 cm^3:

f. 370 ns:

g. g/mL:

h. 75.2 mg:

i. 0.590 kL:

j. 4.18 J:

10. *Perform the following conversions. Show your work, including the ratio used to make this conversion. (1 mL = 1 cm^3)*

a. 459 mL = ____________________ L

b. 0.09 cm^3 = ____________________ mL

c. 62 μmol = ____________________ mmol

d. 987 liter = ____________________ μL

e. 0.32 g = ____________________ kg

f. 0.00021 Gg = ____________________ mg

g. 4.9 m = ____________________ cm

h. 44 mm = ____________________ cm

i. 2 Mmol = ____________________ cmol

j. 0.3 ks = ____________________ ds

k. 56.4 km = ____________________ m

l. 5 hm = ____________________ nm

m. 8.9 mmol = ____________________ mol

n. 68 kg = ____________________ g

o. 44.8 ms = ____________________ ns

p. 120 cg = ____________________ μg

q. 55 daL = ____________________ mL

r. 88 μm = ____________________ km

s. 88 kg = ____________________ Mg

t. 5600 cm^3 = ____________________ pL

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11. *Isolate the indicated variables in the following chart:*

Velocity	Density	Energy of Light	Combined Gas Law	Ideal Gas law
$V = \frac{d}{t}$	$D = \frac{m}{V}$	$E = h\nu$	$\frac{P_1V_1}{T_1} = \frac{P_2V_2}{T_2}$	$PV = nRT$
V =	D=	E=	P_1=	P=
d =	m=	h=	P_2=	V=
t =	V=	ν=	T_1=	n=
			T_2=	R=
			V_1=	T=
			V_2=	

12. *Solve the following problems. Be sure to show all work for full credit*

a. Determine the density of a brick in which 49.92 grams occupies 4.01 cm^3.

b. Determine the density of a rectangular piece of concrete that measures 3.7 cm by 2.1 cm by 5.8 cm and has a mass of 43.8 grams.

c. A graduated cylinder contains 30.0 mL of water. An object is placed in the cylinder and the water level moves to 46.7 mL. Find the density if the mass of the object is 121.3 grams.

d. Gold has a density of 19.32 g/cm^3. Find the mass of 2.35 cm^3 of gold.

e. Determine the volume of 7.37 grams of magnesium if its density is 1.29 g/cm^3.