Name: _____

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.

This assignment essentially covers the Introduction to a math based science course minus a couple of items with which I will start the year off with. **_The practice items will be due after the first week of school: September 9th_**

Practice Items

Directions: Accept the invitation into your google classroom and refer to the reference information before completing the practice items.

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.

*Upload to google classroom- you will get help uploading the first week of school if needed.*

Due date: September 9th 2019

1. A new drug is suspected to reduce the number of malignant tumors in patients diagnosed with cancer. Dr. Braunstein 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. Braunstein is likely to keep constant (as control variables)?

    d. What could Dr. Braunstein do as a control <u>trial</u> 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. **No** best–fit line needed.
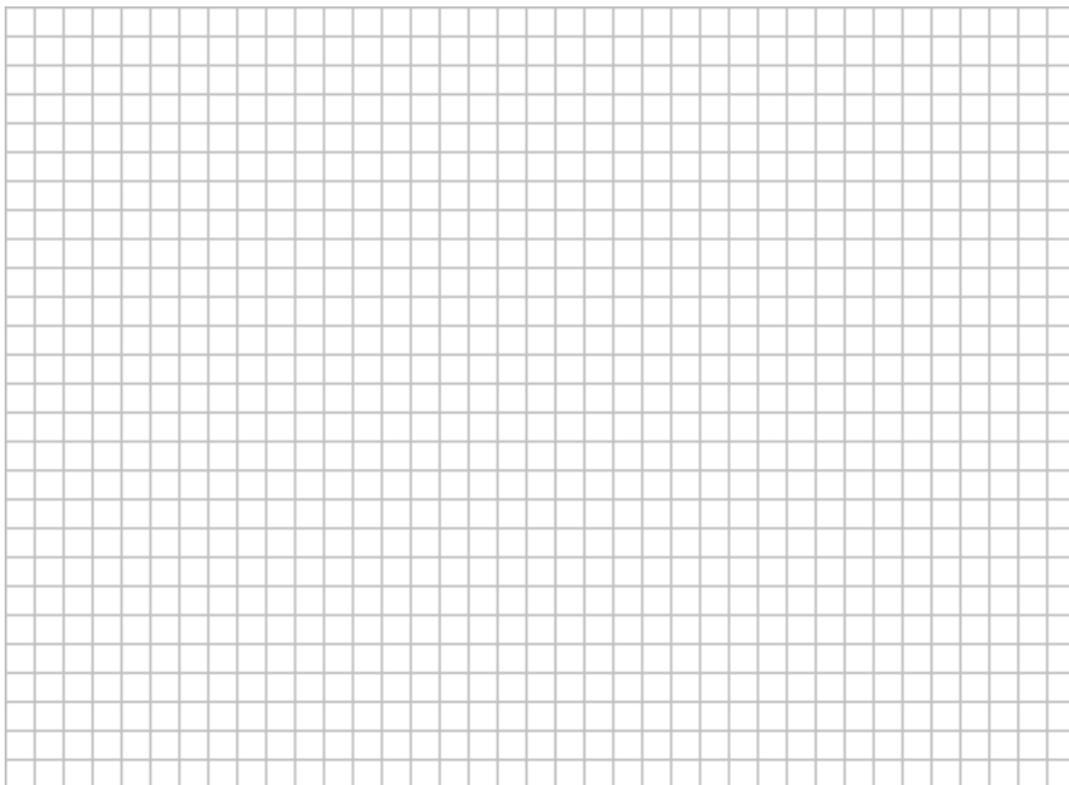
5. The length of six different objects was measured in both centimeters and inches. The data was recorded in the table to the right.

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

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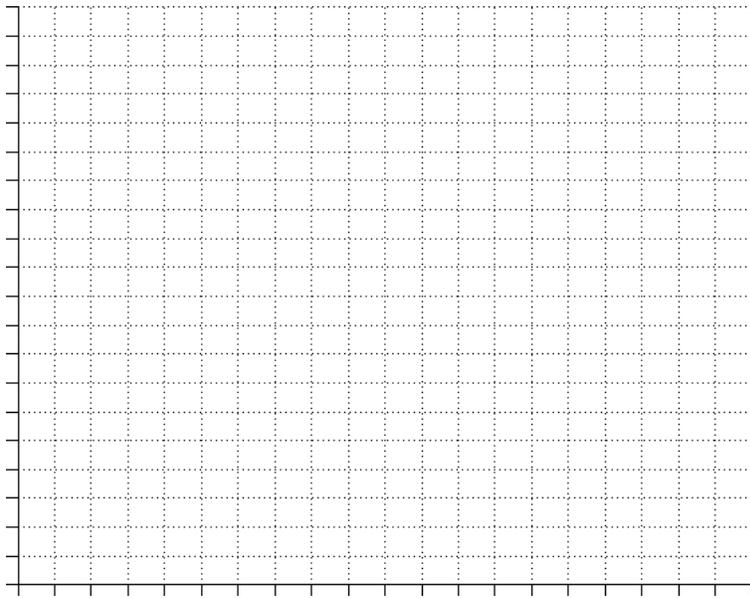
b. Draw a best-fit line for the data. Calculate the slope of the line.

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*

   Scenario #1

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

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 cm²: <u>area</u>, <u>derived unit</u>)*

a. 12.3 km:

f. 370 ns:

b. 273 K:

g. g/mL:

c. 0.98 atm:

h. 75.2 mg:

d. 52.5°C:

i. 0.590 kL:

e. 87.2 cm³:

j. 4.18 J:

10. *Perform the following conversions. Show your work, including the ratio used to make this conversion. (1 mL = 1 cm³)*

a. 459 mL =_____L

k. 56.4 km =_____m

b 0.09 cm³ =_____mL

l. 5 hm =_____nm

c. 62 μmol =_____mmol

m. 8.9 mmol =_____mol

d. 44 mm =_____cm

n. 68 kg =_____g

e. 0.32 g =_____kg

o. 44.8 ms =_____ns

f 0.00021 Gg =_____mg

p. 120 cg =_____μg

g 4.9 m =_____cm

q. 55 daL =_____mL

11. Isolate the indicated variables in the following chart:

Velocity	Density	Energy of Light	Combined Gas Law	Ideal Gas law
$V = \dfrac{d}{t}$	$D = \dfrac{m}{V}$	$E = h\nu$	$\dfrac{P_1 V_1}{T_1} = \dfrac{P_2 V_2}{T_2}$	$PV = nRT$
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.

13. Complete the chart below

State	Shape (fixed, varies)	volume (fixed, varies)	Compressibility (yes, no)	Particles move (yes, no)	Energy
Solid					
Liquid					
Gas					

14. *For each property on the left, please identify each as 1) physical or chemical and, if it's a physical change, then 2) intensive or extensive*

Property of Copper	Physical Property	Chemical Property	Intensive Property	Extensive Property
Reddish brown with luster				
Good conductor of heat and electricity				
Will react will nitric acid				
Can be melted and mixed with zinc				
Density = 8.95g/cm^3				
Will form a blue-green carbonate in moist air				
Has a mass of 63.5g				
Can be shaped into sheets (malleable) and wires (ductile)				
Melting Point = 1083°C				
Has a volume of_____cm^3				
Will form a deep blue solution when added to ammonia				

15. *For each of the following changes, describe it as a "physical change" or a "chemical change"*

    a. Grass is cut: _____

    b. Iron reacts with water: _____

    c. Water boils: _____

    d. Sodium carbonate is mixed with hydrochloric acid and the container becomes

       cold : _____

    e. A piece of magnesium is cut into two pieces: _____

    f. A soccer ball is left outside. The next morning the soccer ball has decreased in

       volume: _____

    g. Two solutions are mixed in a beaker. A yellow color appears and sinks to the bottom of the

       beaker.: _____

    h. Sodium metal is placed in water. The sodium fizzles on top and the solution becomes

       hot: _____

    i. A piece of magnesium is exposed to flame. The result is a white light and a white powdery

       substance. : _____

    j. A piece of silver tarnishes (form of corrosion): _____

    k. A piece of glass is broken into smaller pieces: _____

    l. Ethanol vaporizes at 70°C: _____

    m. A piece of copper become hot when left in the sun: _____

    n. Fat solidifies when placed in the freezer: _____

    o. A tooth decays: _____

    p. Iron rusts: _____

16. *For each of the following, classify as a **pure substance** or **mixture**. For pure substances provide the sub-classification of **element** or **compound**. For mixtures, provide the sub-classification of **homogeneous** or **heterogeneous**. For these sub-classifications, provide the appropriate sub-sub- category, if possible, of **solution**, **suspension**, or **colloid**. For solutions, identify if it is an **alloy** as well if appropriate. You can use abbreviations to save room.*

    a. Diamond (C) _____

    b. $C_6H_{12}O_6$ _____

    c. Sodium Carbonate _____

    d. Air _____

    e. Granite _____

    f. Stainless Steel _____

    g. Potassium _____

    h. Gasoline _____

    i. Fog _____

    j. Chex mix _____

    k. Ink _____

    l. Beach sand _____

    m. H_2 _____

    n. $Al_2(SO_4)_3$ _____

o. Milk _____

p. Pd _____

q. Apple juice _____

r. Muddy water _____

s. H₃PO₄ _____

t. Ice _____

17. Complete the following chart:

Element Symbol	Element Name	Metal or Nonmetal?	Solid, Liquid, or Gas?	Group Number	Period Number
Li					
Ca					
	Magnesium				
	Aluminum				
N					
	Phosphorus				
O					
	Sulfur				
	Chlorine				
Xe					

18. A horizontal row of elements in the periodic table is called a(n) _____

19. The symbol for the element in Period 2, Group 13, is _____

20. A vertical row of elements in the periodic table is called a(n) _____

21. Would an element that is soft and easily cut likely be a metal or a nonmetal? _____

22. Who is known as the "father" of modern chemistry? _____

23. What property must be carefully considered when distilling two liquids? _____

24. In the following reaction, **C_2H_6** **$+ O_2$** $\rightarrow$ **$H_2O + CO_2$**, identify which are products and which are reactants?

Products:_____   Reactants: _____

25. What are the two most abundant elements in the Earth's crust?

1._____   2. _____

26. Most elements are classified as_____and exist in the_____phase at room temperature.

27. What are the only two elements that are liquids at room temperature?

1._____   2. _____

28. *Some measurements or descriptions of properties are listed below. Write which of the following properties is being described in each case:* **combustibility, density, melting point, ductility, malleability, volume, tendency to corrode**

    a. 15 dm^3 a. _____

    b. can easily be hammered into sheets   b. _____

    c. 2.8 g/cm^3 c. _____

    d. burns when heated in the presence of O_2 d. _____

    e. shiny metal forms a chalky white layer on its surface   e. _____

    f. 500°C   f. _____

    g. can easily be drawn into a wire   g. _____

29.   *Select the most appropriate branch of chemistry from the following choices to best describe each of the investigations:* **organic chemistry, analytical chemistry, biochemistry, theoretical chemistry**.

    a. A forensic scientist uses chemistry to find information at the scene of a crime.   a. _____

    b. A scientist uses a computer model to see how an enzyme will function.   b. _____

    c. A professor explores the reactions that take place in a human liver.   c. _____

    d. An oil company scientist tries to design a better gasoline.   d. _____

    e. An anthropologist tries to find out the nature of a substance in a mummy's wrap.   e. _____

    f. A pharmaceutical company examines the protein on the coating of a virus.   f. _____

30. *For each of the following types of chemical investigations, determine whether the investigation is:*

basic research, **applied research**, *or* **technological development**.

 a. A laboratory in a major university surveys all the reactions involving bromine._____

 b. A pharmaceutical company explores a disease in order to produce a better medicine._____

 c. A scientist investigates the cause of the ozone hole._____

 d. A chemical company develops a new biodegradable plastic._____

 e. A laboratory explores the use of ozone to inactivate bacteria in a drinking-water system._____