

Pre AP Chemistry Summer Assignments

To my 2017-2018 Pre AP Chem Students,

These assignments are meant to help you prepare for the fast pace of next year's class. Most of the material is a review of topics you studied in middle school. The only new material are the Polyatomic Ion Flashcards. You are responsible to complete all assignments and submit the first week of school. If you do not know/remember something, you will need to find the information (use a computer or go to the library.) If you have questions, you can send a message through **Remind** or email me: ksellers@taylorisd.org I'm looking forward to meeting you all!

-Mrs. Sellers

- **Join the Pre AP Chem Remind:** <https://www.remind.com/join/ebh3aa>

- **Metals, Nonmetals, Metalloids Coloring Assignment**
 1. Color the metalloids green
 2. Color the nonmetals blue
 3. Color the metals yellow (including the two bottom rows)
 4. Color in the small circles in the title to match

- **Atomic Structure**

- **Density**
"The Case of the Lost Labels"

- **Elements and Compounds**

- **Balancing Equations**

- **Math in Chemistry**

- **Organizing Data**

- **Flashcards** (study and memorize!)

1. Make flashcards for the elements listed. (Element name on one side, symbol on the other side.)

Hydrogen H	Helium He	Lithium Li	Beryllium Be	Boron B	Carbon C	Oxygen O	Nitrogen N	Fluorine F
Neon Ne	Sodium Na	Magnesium Mg	Aluminum Al	Silicon Si	Sulfur S	Nitrogen N	Chlorine Cl	Argon Ar
Potassium K	Calcium Ca	Iron Fe	Copper Cu	Bromine Br	Silver Ag	Iodine I	Mercury Hg	Lead Pb

2. Make flashcards for the molecules listed. (Chemical formula on one side, name on the other.)

Water H ₂ O	Carbon Dioxide CO ₂	Methane CH ₄	Table Salt NaCl	Hydrochloric Acid HCl	Nitric Acid HNO ₃	Sulfuric Acid H ₂ SO ₄
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3. Make flashcards for the polyatomic ions listed. (Ion formula on one side, ion name on the other.)

Hydroxide OH ⁻	Chlorate ClO ⁻	Nitrate NO ₃ ⁻	Carbonate CO ₃ ²⁻	Sulfate SO ₄ ²⁻	Phosphate PO ₄ ³⁻	Ammonium NH ₄ ⁺
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Metals, Metalloids, & Nonmetals

1 1A 1 H 1.008 Hydrogen	2 2A 4 Be 9.012 Beryllium											13 3A 5 B 10.812 Boron	14 4A 6 C 12.011 Carbon	15 5A 7 N 14.007 Nitrogen	16 6A 8 O 15.999 Oxygen	17 7A 9 F 18.998 Fluorine	18 8A 2 He 4.003 Helium
2 3 Li 6.941 Lithium	12 Mg 24.305 Magnesium	3 3B	4 4B	5 5B	6 6B	7 7B	8 8B	9 9B	10 10B	11 1B	12 2B	13 3A 13 Al 26.982 Aluminum	14 4A 14 Si 28.086 Silicon	15 5A 15 P 30.974 Phosphorus	16 6A 16 S 32.066 Sulfur	17 7A 17 Cl 35.453 Chlorine	18 8A 10 Ne 20.180 Neon
3 11 Na 22.990 Sodium	12 Mg 24.305 Magnesium	21 Sc 44.956 Scandium	22 Ti 47.867 Titanium	23 V 50.942 Vanadium	24 Cr 51.996 Chromium	25 Mn 54.938 Manganese	26 Fe 55.845 Iron	27 Co 58.933 Cobalt	28 Ni 58.693 Nickel	29 Cu 63.546 Copper	30 Zn 65.39 Zinc	31 Ga 69.723 Gallium	32 Ge 72.64 Germanium	33 As 74.922 Arsenic	34 Se 78.96 Selenium	35 Br 79.904 Bromine	36 Kr 83.708 Krypton
4 19 K 39.098 Potassium	20 Ca 40.078 Calcium	39 Y 88.906 Yttrium	40 Zr 91.224 Zirconium	41 Nb 92.906 Niobium	42 Mo 95.96 Molybdenum	43 Tc (98) Technetium	44 Ru 101.07 Ruthenium	45 Rh 102.906 Rhodium	46 Pd 106.42 Palladium	47 Ag 107.868 Silver	48 Cd 112.412 Cadmium	49 In 114.818 Indium	50 Sn 118.711 Tin	51 Sb 121.760 Antimony	52 Te 127.60 Tellurium	53 I 126.904 Iodine	54 Xe 131.294 Xenon
5 37 Rb 85.468 Rubidium	38 Sr 87.62 Strontium	71 Lu 174.967 Lutetium	72 Hf 178.49 Hafnium	73 Ta 180.948 Tantalum	74 W 183.84 Tungsten	75 Re 186.207 Rhenium	76 Os 190.23 Osmium	77 Ir 192.217 Iridium	78 Pt 195.085 Platinum	79 Au 196.967 Gold	80 Hg 200.59 Mercury	81 Tl 204.383 Thallium	82 Pb 207.2 Lead	83 Bi 208.980 Bismuth	84 Po (209) Polonium	85 At (210) Astatine	86 Rn (222) Radon
6 55 Cs 132.905 Cesium	56 Ba 137.328 Barium	103 Lr (262) Lawrencium	104 Rf (267) Rutherfordium	105 Db (268) Dubnium	106 Sg (271) Seaborgium	107 Bh (272) Bohrium	108 Hs (270) Hassium	109 Mt (276) Meitnerium	110 Ds (281) Darmstadtium	111 Rg (280) Roentgenium	Mass numbers in parentheses are those of the most stable or most common isotope.						
7 87 Fr (223) Francium	88 Ra (226) Radium																

Lanthanide Series

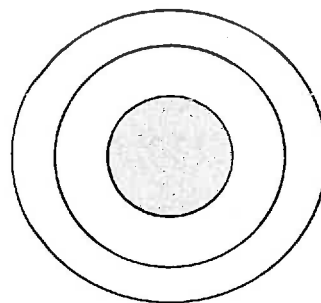
Actinide Series

57 La 138.905 Lanthanum	58 Ce 140.116 Cerium	59 Pr 140.908 Praseodymium	60 Nd 144.242 Neodymium	61 Pm (145) Promethium	62 Sm 150.36 Samarium	63 Eu 151.964 Europium	64 Gd 157.25 Gadolinium	65 Tb 158.925 Terbium	66 Dy 162.500 Dysprosium	67 Ho 164.930 Holmium	68 Er 167.259 Erbium	69 Tm 168.934 Thulium	70 Yb 173.055 Ytterbium
89 Ac	90 Th	91 Pa	92 U	93 Np	94 Pu	95 Am	96 Cm	97 Bk	98 Cf	99 Es	100 Fm	101 Md	102 No

Name _____

Part A: Atomic Structure

1. Draw five protons in the nucleus of the atom. Label them with their charge.
2. Draw six neutrons in the nucleus of the atom.
3. Draw two electrons in the first energy level and label them with their charge.
4. Draw three electrons in the second energy level and label them with their charge.
5. What element is represented by the diagram? _____



Part B: Atomic Calculations

6. Label the information provided in the periodic table.

8	←	_____
O	←	_____
Oxygen	←	_____
15.999	←	_____

7. What does the atomic number represent?

_____ or _____

8. What does the atomic mass represent?

_____ + _____

9. How would you figure the number of protons or electrons in an atom?

10. How would you figure the number of neutrons in an atom?

11. Use your knowledge of atomic calculations to complete the chart.

Element	Atomic Number	Atomic Mass	Protons	Neutrons	Electrons
Li	3	7			
P	15	31			
Cl		35	17		
Ni	28			31	
K		39			19
Ag	47			61	
H		1	1		
Si				14	14
W			74	110	
Ne				10	10

Part C: Electron Configuration

12. How many electrons can each level hold? 1st = _____ 2nd = _____ 3rd = _____

13. What term is used for the electrons in the outermost shell or energy level? _____

14. Scientists use two types of diagrams to show the electron configuration for atoms. Follow your teacher's directions to complete the diagrams.

Sulfur

Atomic # = 16

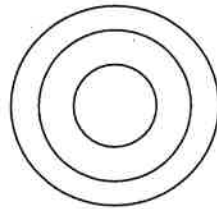
Atomic Mass = 32

Protons = _____

Neutrons = _____

Electron = _____

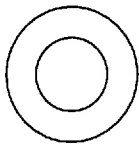
Bohr Diagram
Shows all electrons



Lewis Structure
Shows valence electrons

S

15. Calculate the missing information and then draw the Bohr Diagram and Lewis Structure for each element.



Atomic # = 3

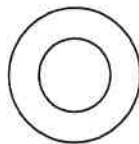
Mass # = 7

of P = _____

of N = _____

of E = _____

Li



Atomic # = 10

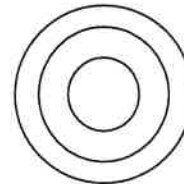
Mass # = 20

of P = _____

of N = _____

of E = _____

Ne



Atomic # = 12

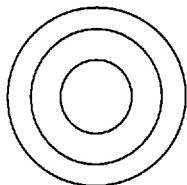
Mass # = 24

of P = _____

of N = _____

of E = _____

Mg



Atomic # = 17

Mass # = 35

of P = _____

of N = _____

of E = _____

Cl



Atomic # = 2

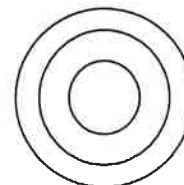
Mass # = 4

of P = _____

of N = _____

of E = _____

He



Atomic # = 14

Mass # = 28

of P = _____

of N = _____

of E = _____

Si

16. Answer the questions below based on the elements in question #15.

(1) Which elements had a filled outermost shell? _____

(2) Which element would be most likely to lose electrons in a chemical bond? _____

(3) Which element would be most likely to gain electrons in a chemical bond? _____

(4) Which elements are not likely to bond with other elements? _____ Why? _____

Name _____

Date _____

The Case of the Lost Labels

Essential Questions

How can we use physical properties to identify matter?

Vocabulary

Density, matter, volume, mass, g/ml, molecules

Objectives

1. Calculate density and identify elements using calculations.

You are trying to get a job as a chef at a nice restaurant. The owner of the restaurant explains that you will be hired if you can solve one problem: All of the liquids in the kitchen have lost their labels and the cooks can't tell one substance from another. You must identify all of the liquids successfully. In the kitchen you find a chart (shown below) with all the liquids and their densities.

To get the job, you must identify each mystery liquid by using mass, volume and density. You must use correct units of measurements and you must show your work for your calculations. You must also write a letter to the owner explaining how you were able to identify each liquid including how the three physical properties of mass, volume and density are related to each other.

Liquids and their Densities	
Liquid:	Standard Density:
Rubbing Alcohol	0.79 g/mL
Water	1.00 g/mL
Corn Syrup	1.38 g/mL
Cooking Oil	0.92 g/mL
Coke Classic	1.11 g/mL
Glycerine	1.26 g/mL

Your Data Table:

Complete the data table. Identify each liquid using the density chart above.

Mystery Liquid:	Mass (g)	Volume (mL)	Density (g/mL)	Identity of Mystery Liquid
#1	394.05 g	355 mL		
#2	552 g	400 mL		
#3	578 g	578 mL		
#4	138.6 g	110 mL		
#5	230 g	250 mL		
#6	197.5 g	250 mL		

Calculate the density of each liquid using the formula for density. Don't forget to include the units for density in your answer! The first mystery liquid has been set up completely for you. You may use a calculator.

Mystery Liquid #1

Density = mass/volume

Density = 394.05 grams / 355 milliliters

Density = _____grams/milliliter

Mystery Liquid #2

Density = m/v

Density = _____grams / _____milliliters

Density = _____g/mL

Mystery Liquid #3

D = m/v

D = _____ / _____

D = _____g/mL

Mystery Liquid #4

D = _____ / _____

D = _____ / _____

D = _____g/mL

Mystery Liquid #5

D = _____ / _____

D = _____ / _____

D = _____

Mystery Liquid #6

D = _____ / _____

D = _____ / _____

D = _____

Name _____ Per _____ Date _____

Elements and Compounds Homework

PART I:

Sort the substances into the proper columns. (USE YOUR PERIODIC TABLE!)

$C_6H_{12}O_6$	nitrogen	sulfur
hydrogen	silicon	
salt	Al	Ne
$MgCl_2$		water

Elements	Compounds

PART II:

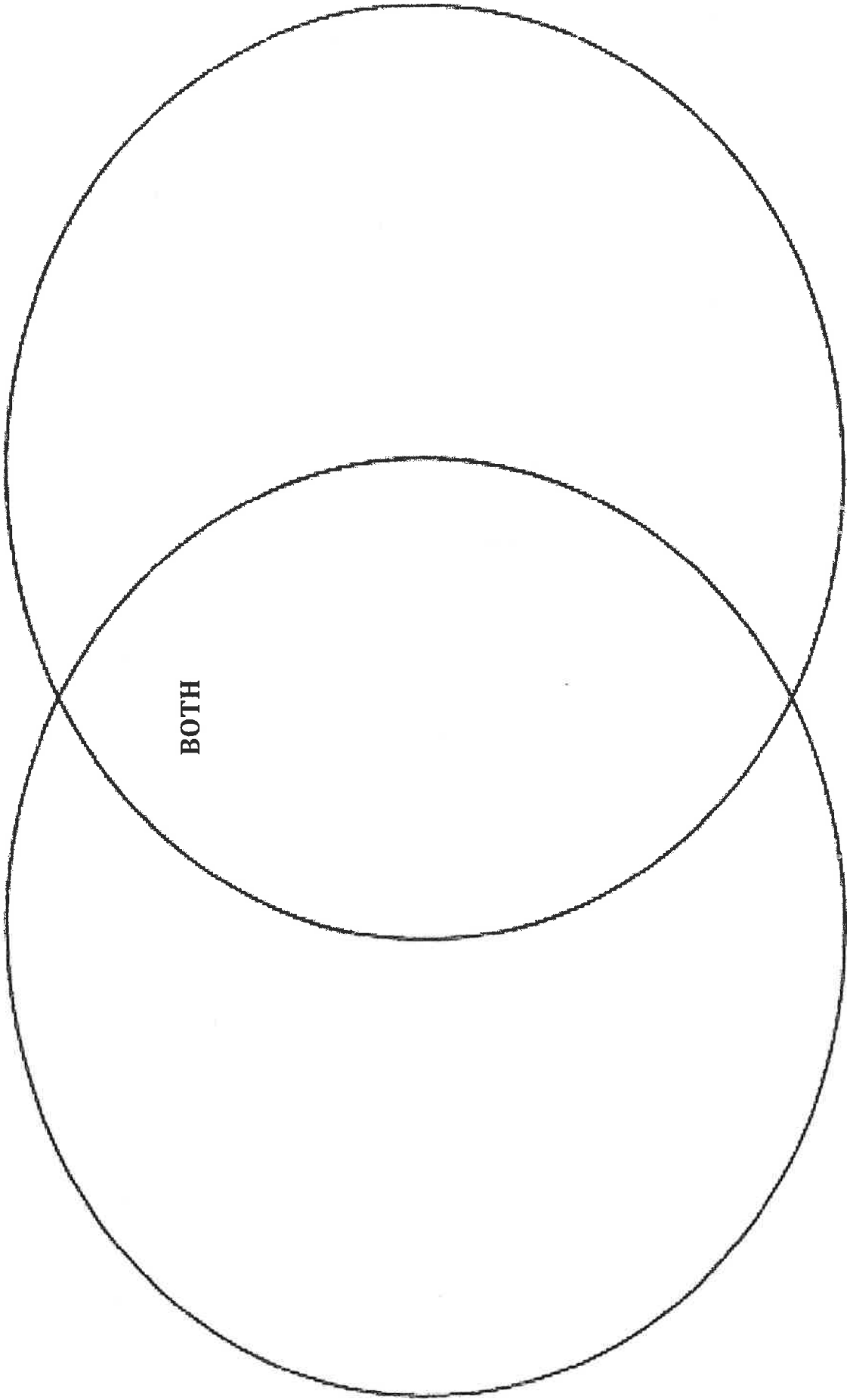
Fill in the Venn diagram on the back of this paper with the following:

- made of very small matter
- contains all of the same type of atom
- contains two or more atoms bonded together
- found on the periodic table
- can be written using chemical symbols
- examples are krypton, iodine, and lead
- examples are H_2O , carbon dioxide, and sugar

COMPOUNDS

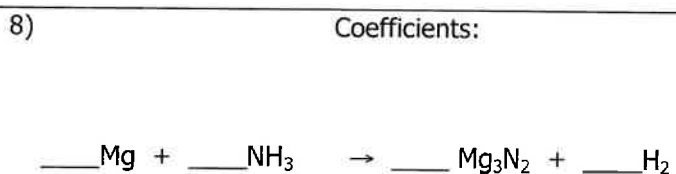
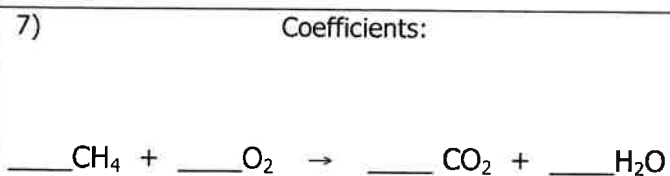
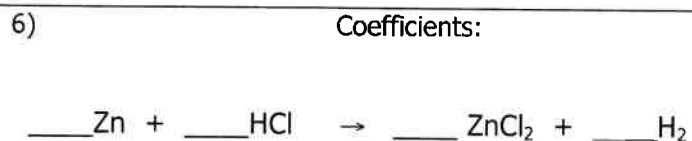
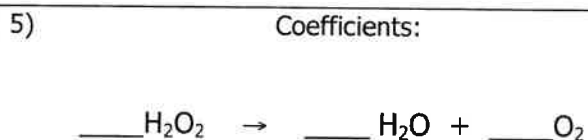
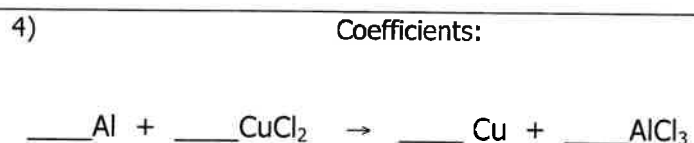
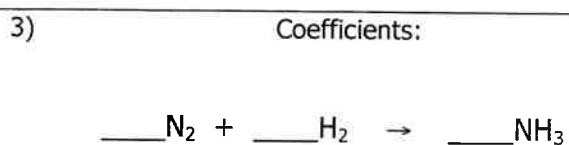
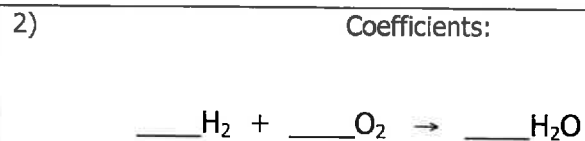
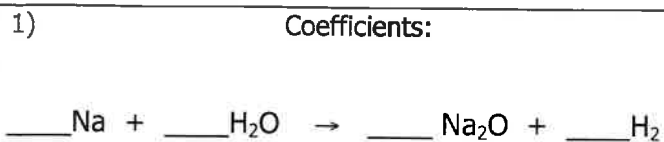
ELEMENTS

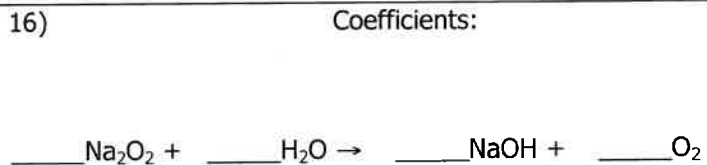
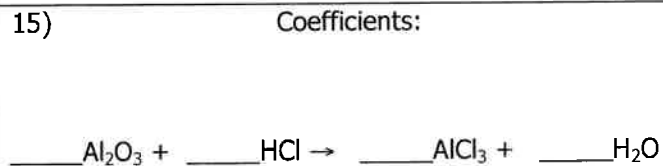
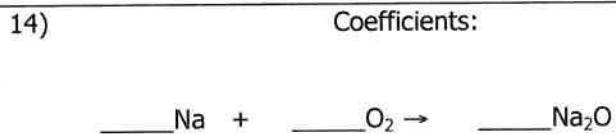
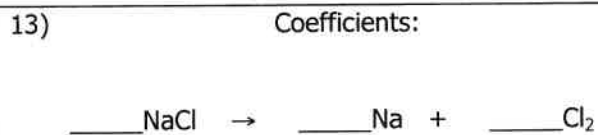
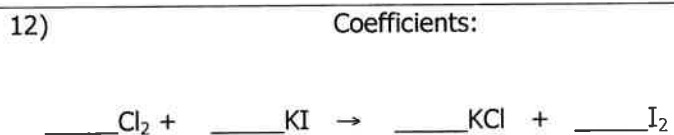
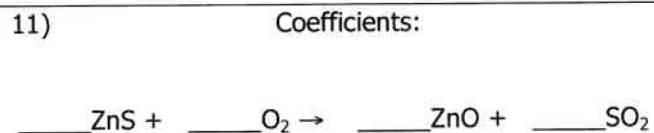
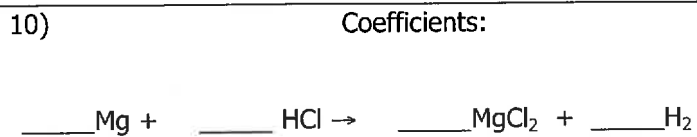
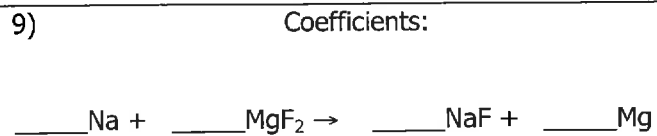
BOTH



Balancing Equations Worksheet

Name _____





Name: _____
Hour: _____ Date: _____

Chemistry: *The Mathematics of Chemistry*

Complete the following calculations. Include units on your answers.

1. $\frac{(127 \text{ m})}{(23 \text{ s})}$

2. $(5.22 \text{ m}) (4.29 \text{ m})$

3. $34 \text{ cm} + 21 \text{ cm} + 8 \text{ cm}$

4. $(0.45 \text{ mm}) (0.28 \text{ mm}) (0.85 \text{ mm})$

5. $\frac{(10 \text{ kg}) (30 \text{ m})}{(5 \text{ s})}$

6. $\frac{1.3 \text{ moles}}{3.4 \text{ L}}$

7. $\frac{(75 \text{ kg}) (5.25 \text{ m})}{(2.5 \text{ s}) (6.3 \text{ s})}$

8. $(56 \text{ N}) (2.5 \text{ m})$

9. $\frac{(1.27 \text{ J} + 0.22 \text{ J})}{(116 \text{ g}) (4.8^\circ\text{C})}$

10. $\frac{(7.54 \text{ N}) (0.246 \text{ m})}{(0.672 \text{ s})}$

11. $\frac{(8.13 \text{ kg})}{(0.452 \text{ cm}) (0.550 \text{ cm})}$

12. $\frac{54.0 \text{ g}}{4.10 \text{ L}}$

13. $\frac{26\,008 \text{ J}}{125 \text{ g}}$

14. $(645 \text{ atoms}) (2.00)$

Simplify the following expressions.

15. $\frac{5(5w - 4w)}{10}$

16. $\frac{1304 \times 7.631 \times 4.000}{(521.2)(0.4998)}$

17. $\frac{6a \times 5b^2}{3a^3}$

18. $(3.28d)(4.83d)(0.250)$

19. $\frac{(2a - 3b)(3b)}{(3c)(c)}$

20. $(4f + 13g)(2w)$

Solve each of the following expressions for x. (x = ??)

21. $2x - 14 = 8$

22. $4x - 2z = 3y + 8$ (if $y = 12$ and $z = -3$)

23. $H = WQx$

24. $x + 12 = 23FG$

25. $\frac{18KRx}{F^2} = E$

26. $T = LxS$

27. $15G - x = U$

28. $Y = \frac{T + 6}{x}$

29. $\frac{B^2H^5x}{E^4R} = \frac{T^3K}{Y}$

Organizing Data

How is data displayed to make it meaningful?

Why?

Scientists rely on data to describe nature and uncover relationships. The raw data—measurements taken in the lab—are most useful when they are organized in a way that makes the relationships clear. In this activity you will explore two common ways that scientists organize data to help in analysis.

Model 1 – Copper Samples

Group Number	Volume (cm ³)	Mass (g)	Substance
1	2.0	17.92	Copper
2	6.0	50.89	Copper
3	10.0	93.45	Copper
4	8.0	79.30	Copper
5	14.0	125.44	Copper
6	4.0	39.80	Copper
7	12.0	103.85	Copper

Room Temperature: 21.7 °C

1. What substance were the students working with to obtain the data in Model 1?
2. What variables did the students measure to produce the data in Model 1?
3. Briefly describe an experiment that the class might have done on the day that the data in Model 1 was collected. Discuss your answer with your group members to be sure there is consensus.
4. Consider the data in Model 1.
 - a. Which variable was the **independent variable** in the experiment, and why do you think it was the independent variable?
 - b. Which variable was the **dependent variable** in the experiment, and why do you think it was the dependent variable?
 - c. List two **controlled variables** in the experiment?



5. Consider the data in Model 1.
- How is the data organized?
 - Is the table in Model 1 organized in a way that helps determine a relationship between the independent and dependent variables in the experiment? Explain.
6. Propose a better way to organize the data in Model 1, and transcribe the data into the table below.

Group Number	Volume (cm ³)	Mass (g)	Substance

7. The data table in Question 6 should allow you to state a relationship between the variables involved in the class's experiment. Complete the following statement:

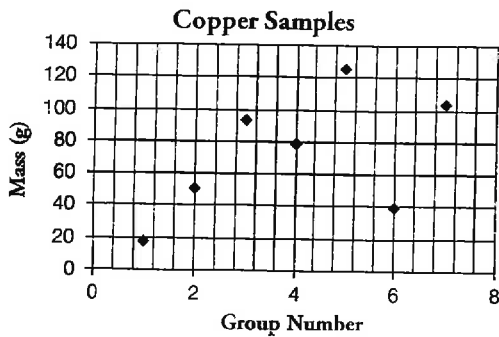
As the volume of copper increases, the mass of copper _____.

Read This!

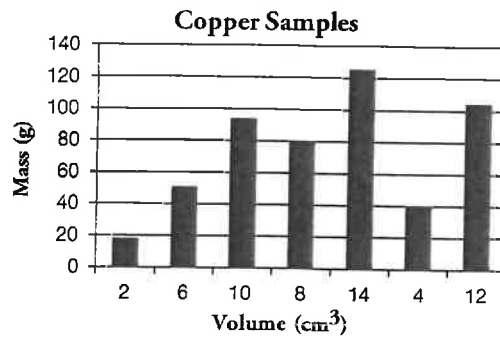
When scientists design an experiment they are usually looking for a cause-and-effect relationship between the independent variable and the dependent variable. Therefore, organizing the data by the independent variable is the easiest way to reveal a relationship. When the data is not organized, the relationships are not apparent.

Model 2 – Graphs for Copper Data

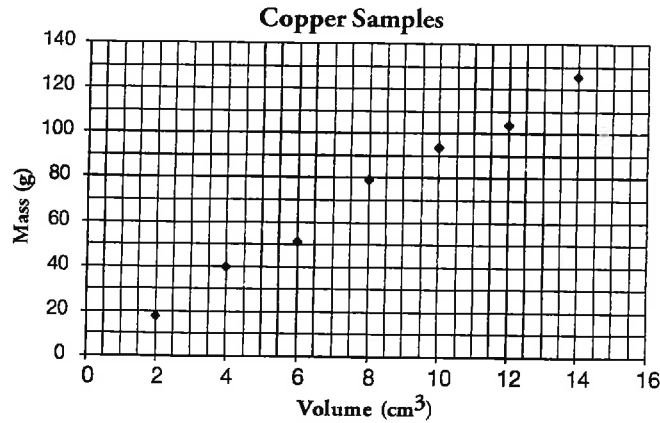
Graph A



Graph B



Graph C



8. Identify each of the graphs in Model 2 as a bar graph or a scatter plot.

9. One of the data points in graph B indicates that a volume of 8 cm³ has a mass of 80 g. Which other graph in Model 2 shows this same data?

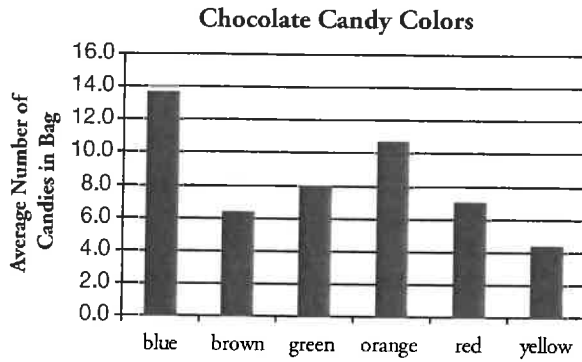
10. Of the three graphs in Model 2, which illustrates the relationship between the variables that you stated in Question 7 most clearly?

Read This!

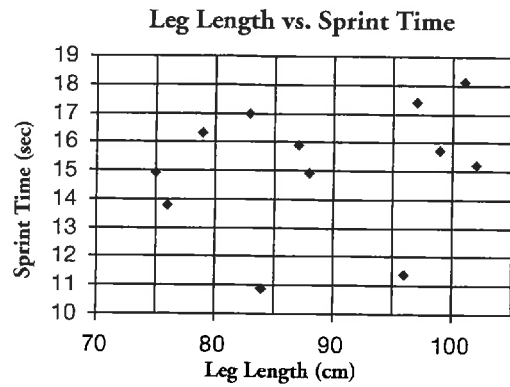
Scientists use graphs to clearly illustrate whether or not there is a relationship between variables. In most cases a scatter plot is used. Bar graphs are sometimes used if the independent variable is limited to specific numeric values (where the values in-between are not possible) or is non-numeric. A special type of bar graph called a histogram is used in cases where the scientist wants to show how often something happens.

Model 3 – More Examples of Graphs

Graph D



Graph E



11. Identify the independent variable and dependent variable for each of the graphs in Model 3.

	Graph D	Graph E
Independent Variable		
Dependent Variable		

12. Match the experimental questions below to the appropriate graph from Model 3.
- “Is the number of candies in a bag of chocolates dependent on the color of the candy?”
Graph _____
 - “Does the length of a person’s leg affect the time it takes them to sprint 60 yards?”
Graph _____
13. Why was the data for Graph D plotted in a bar graph?

14. Using the graphs in Model 2 and Model 3 as examples of proper graphs, identify the axis (x or y) where you would usually plot the independent variable.

15. For each of the following experiments, choose “scatter plot” or “bar graph” as the most appropriate way to display the data. Justify your answer.

a. Students heated oil on a hot plate at the #4 setting for different amounts of time. They wanted to answer the question “How long do you need to heat an oil bath to reach a given temperature?”

Volume Oil (mL)	Hot Plate Setting	Initial Temp. of Oil (°C)	Time Heated (min)	Final Temp. of Oil (°C)
250	#4	21	0	21
250	#4	21	5	30
250	#4	21	10	38
250	#4	21	15	47
250	#4	21	20	57

b. Students measured the height of each student in class. They wanted to answer the question “What is the most common height among 10th grade students?”

Height Range	Number of Students
under 4' 0"	1
4' 1" to 4' 6"	3
4' 7" to 5' 0"	5
5' 1" to 5' 6"	9
5' 7" to 6' 0"	3
over 6' 0"	1

c. The Fish and Wildlife agency measured the size of Pacific salmon for 1 year and recorded the average weight for each species.

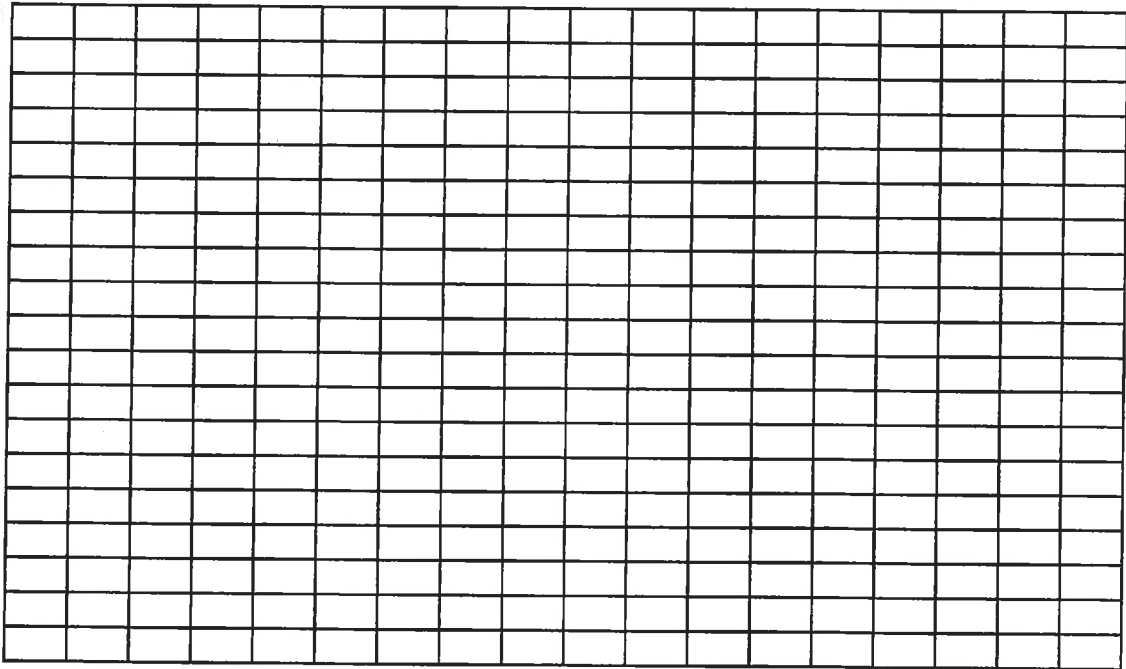
Salmon Species	Average Weight (lbs)
King	15
Sockeye	8
Silver	12
Chum	15
Humpback	5

d. The National Oceanic and Atmospheric Administration measured the pressure of the atmosphere at various altitudes.

Altitude (m)	Atmos. Pressure (atm)	Altitude (m)	Atmos. Pressure (atm)
0	1.000	16,132	0.100
2750	0.750	30,901	0.010
5486	0.500	48,467	0.001
8376	0.333		



16. Choose one of the data sets in Question 15 that you selected as appropriate for a scatter plot and graph it here. Remember to label the axes.



17. Choose one of the data sets in Question 15 that you selected as appropriate for a bar graph and graph it here. Remember to label the axes.

