Honors/AP Chem Summer Assignment

1) Read **Chapters 1 & 2** of Chemistry (you will get 2 textbooks in August: Brown& LeMay or Zumdahl.
   Here are three ways to do the first 2 chapters without the school's textbooks this summer:

buy the online textbook now (you will get a free code in August) that we will be using next year. Example:
https://pdf4colleges.com/Chemistry-The-Central-Science-12th-Edition-by-Theodore-E-Brown-Ebook-PDF-Version-p172843134
OR buy the test prep paperback that accompanies our book. Example:
https://www.abebooks.com/servlet/BookDetailsPL?bi=30015888553
OR use a free online introductory college chem (ICC) textbook. Example:
https://open.umn.edu/opentextbooks/textbooks/general-chemistry-principles-patterns-and-applications

Take notes on new terms and concepts, including all DRAWINGS for +10 each. Here is an example from a future chapter:

2) Watch any/all of the following podcasts if you need a Chem 1-2 refresher:
   https://www.youtube.com/playlist?list=PL43285691048DAD00

3) Complete the Worksheet below (+1 each Q= +20) **INCLUDE WORK for Q's 2,6,7,10**:

1) Make a Quizlet or flash cards for
   a) Polyatomic Ions: Names vs. Symbols-Charges: **nitrate, chlorate, bromate, iodate, permanganate, acetate, cyanide, thiocyanate, hydroxide, peroxide, chromate, dichromate, sulfate, oxalate, carbonate, silicate, mercury (I), mercury (II), hydronium, ammonium**
   b) Strong Acids/Bases: Names and Formulas**: The (7) Strong Acids (hydrochloric, hydrobromic, hydroiodic, nitric, sulfuric, chloric and perchloric acids) + (8) Strong Bases (lithium, sodium, potassium, rubidium, cesium, calcium, strontium, barium hydroxides**

Memorize for QUIZZES beginning the SECOND FRIDAY of school year.

4) $5 (x4) Workbook donation
5) Purchase a carbon copy (duplicate page) lab book from a College/University Bookstore or online, Mesa College had the lowest price in 2019.

Ch. 1, 2 Worksheet

1. Define and explain the differences between the following terms:

      a. law and theory
      b. theory and experiment
      c. qualitative and quantitative
      d. hypothesis and theory

2. A student performed an analysis of a sample for its calcium content and got the following results:

      14.92% 14.91%   14.88%   14.91%

The actual amount of calcium in the sample is 15.70%. What conclusion can you draw about the accuracy and precision of these results? What is the percent accuracy error?

3. Which of the following are exact numbers (infinite sig figs because they are definitions/ordinal numbers…not measurements)?

      a. the elevation of Breckenridge, Colorado, is 9,600 feet.

      b. there are 12 eggs in a dozen

      c. one yard is equal to .9144 meters.

      d. the announced attendance at a football game was 52,806.

      e. in 1983, 1759 Ph.D.s in chemistry were awarded in the U.S.

      f. there are 1,000,000,000 nm in one meter.

4. How many sig figs are in each of the following measurements (leading 0's NEVER count)

      a. 12 kg

      b. 1098 K

      c. 2001 mL

      d. 2.001×10^3 mL

      e. 0.0000101 g

      f. 1.01×10^{-5} g

      g. 1000. cm

      h. 22.04030 L

5. Perform each of the following mathematical operations and express each result to the correct number of sig figs assuming all numbers are measurements.

a. 4.184 x 100.62 x (25.27-24.16)

b. (8.925-8.904)/8.925 x 100

This calculation is performed frequently for % accuracy error. /Actual – Accepted/ divided by the Accepted x 100. The 100 is considered an exact number for percent.

c. (9.04-8.23 + 21.954 + 81.0) / 3.1416

d. $\dfrac{9.2 \times 100.65}{8.321 + 4.026}$

e. 0.1654 + 2.07 – 2.114

f. 8.27(4.987 -4.962)

g. Avg = $\dfrac{9.5 + 4.1+ 2.8 + 3.175}{4}$

6. Perform the following conversions using the unit factor method (AKA dimensional analysis)...try to use only positive powers of ten in your unit factors and convert to g,m,L first)
   a. 8.43 cm to millimeters
   b. 2.41 x 10^2 cm to meters
   c. 294.5 nm to centimeters
   d. 1.445 x 10^4 m to kilometers
   e. 235.3 m to millimeters
   f. 903.3 nm to micrometers

7. If the temperature in the room is 74 degrees Fahrenheit, what is the temperature on the Celsius scale? On the (absolute) Kelvin scale?

8. What is the difference between homogeneous and heterogeneous mixtures?

9. Classify the following as a pure substance (ID elements from compounds), a homogeneous mixture (solution) or heterogeneous mixture:
a. soil
b. the atmosphere
c. a carbonated soft drink
d. gasoline
e. gold
f. a solution of ethanol and water
g. water
h. saltwater
i. the ocean
j. iron
k. brass
l. uranium
m. wine
n. table salt
o. tea
p. boba tea
q. iced tea (with cubes)

10. Calculate the percent error for each of the following:
a. the density of an aluminum block determined in an experiment was 2.64 g/cm^3. (true value 2.70 g/cm^3)
b. the experimental determination of iron in iron ore was 16.48%. (true value 16.12%)
c. A balance measured the mass of a 1.000-g standard as .9981 g.

11. Make a chart of the discoveries, and how Dalton's model of the atom had to be modified, by J.J. Thomson, Henri Becquerel, Lord Rutherford.

12. Complete the following table

Symbol	Number of protons in Nucleus	Number of Neutrons in Nucleus	Number of Electrons	Net Charge of Atom or Ion
	33	42		3+
$^{128}_{52}$Te $^{2+}$			54	
	16	16	16	
	81	123		1+
$^{195}_{78}$Pt				

13. Complete the following table

Element	Metal or Nonmetal?	Most likely to gain/lose e-'s ?	What is the most likely ion to form for each?
Na	Metal	Lose	Lose 1 electron = Na $^{+1}$
Sr			
Ba			
I			
Al			
S			
Ra			
In			
P			
Te			
Br			
Rb			

14. Name the following compounds (ionic compounds do not use prefixes like mono, di, tri, tetra…but may need a *Roman Numeral to tell the transition metal cation charge)

NaCl	
Rb_2O	
CaS	
AlI_3	
*CrO_3	
*Cr_2O_3	
Al_2O_3	
NaH	
$CaBr_2$	
$ZnCl_2$	
$KClO_4$	
$Ca_3(PO_4)_2$	
$Al_2(SO_4)_3$	
*$Pb(NO_3)_2$	
NI_3	
PCl_3	
SF_2	
N_2F_4	
*CuI	
*CuI_2	
*CoI_2	
Na_2CO_3	
$NaHCO_3$	
S_4N_4	
SF_6	
NaOCl	
$BaCrO_4$	
NH_4NO_3	

15. Write the neutral formulas for the following

Sulfur difluoride	
Sulfur hexafluoride	
Sodium dihydrogen phosphate	
Lithium nitride	
Chromium (III)carbonate	
Tin (II) fluoride	
Ammonium acetate	
Ammonium hydrogen sulfate	
Cobalt (III) nitrate	

|	
Mercury (I) chloride	
Mercury (II) chloride	
Potassium chlorate	
Sodium hydride	

16.

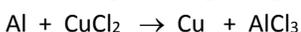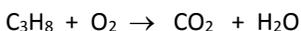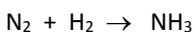| Ion	Number of protons	Number of electrons	If a cation, predict the formula of the simplest compound formed with the oxide ion	If an anion, predict the formula of the simplest compound formed with the aluminum ion
Na^+	11	10	Na_2O	
Fe^{2+}				
Fe^{3+}				
Ba^{2+}				
Cs^+				
Cl^-	17	18		$AlCl_3$
S^{2-}				
P^{3-}				
Br^-				
N^{3-}				

17. Predict the formula and the name of the binary compound formed between the following pairs of elements.
The designations 1A through 8A used for certain families of the periodic table are helpful for predicting the charges on ions in binary ionic compounds. The metals generally take on a positive charge equal to the family number, while the nonmetals take on a negative charge equal to the family number minus 8.

Elements	Common Ions Formed	Neutral Compound
Na and Cl	Na^+ Cl^-	NaCl
Ca and N		
K and O		
Rb and F		
Mg and S		
Ba and I		
Al and Se		
Cs and P		
In and Br		

18. By analogy with phosphate compounds, name the following:
Na_3AsO_4
H_3AsO_4
$Mg_3(SbO_4)_2$
NaH_2SbO_4
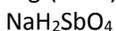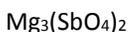
19. Balance the following equations:
$N_2 + H_2 \rightarrow NH_3$
$C_3H_8 + O_2 \rightarrow CO_2 + H_2O$
$Al + CuCl_2 \rightarrow Cu + AlCl_3$

20. What are all of the ratios (relationships) in question 19?
Example: if Zn + 2AgNO3 → 2Ag + Zn(NO3)2 then,   1 Zn: 2 AgNO3 and   1 Zn: 2 Ag and   2 AgNO3: 2 Ag; etc.