Mini-Lab ***[15 pts]*** *NAME* _____

Ionic Formulas and Naming *Lab Partner* _____

Period _____

Introduction: As chemists, we deal with a huge number of chemicals, some which are very large and complicated. Thus, chemists have come up with a systematic way of writing chemical formulas and naming compounds so that we can all communicate effectively. At first glance, chemical formulas may look complicated, but once you learn the systematic rules, it will become a snap.
Here are three of the most important rules:

1) The overall charge of a compound is always neutral (equal to 0). Thus, the total positive charge = total negative charge. Negative charges must exactly counterbalance positive charges.
2) The cation is written first. The anion is written second.
3) When naming, write the name of the positive ion first and then the name of the negative ion with the correct ending (-ide, -ate or -ite).

In this lab, you will be given a variety of pieces of paper with particular ions written on them. You will model the formulas of a variety of compounds by matching up the necessary ions like a puzzle.

Materials:

1 Bag containing cardboard cutouts representing the following ions (quantities in parentheses):

• Na^{+} (3)	• Cl^{-} (3)
• K^{+} (3)	• O^{2-} (3)
• NH_4^{+} (2)	• N^{3-} (2)
• Mg^{2+} (3)	• OH^{-} (3)
• Ca^{2+} (3)	• SO_4^{2-} (3)
• Fe^{2+} (1)	• PO_4^{3-} (2)
• Al^{3+} (2)	

Procedure: Ions → formula → name

a) Take a bag of ions and separate them into two piles: positively charged ions and negatively charged ions.
b) Find the appropriate ions needed to make each compound.
c) Write in the charges as superscripts above each symbol. (Look on ion pieces or use periodic table to determine charge from the ion's group.)
d) Fit your ions together to form electrically neutral (total charge = 0) compounds. When correct, your puzzle will be complete and it will be a full rectangle.
e) Write the correct formula for each compound by writing in the subscripts to indicate the number of each ion (e.g. $MgCl_2$, Na_2S, $AlBr_3$). *Use parentheses around* ***polyatomic ions*** (ions with more than one atom) if you have more than one in the compound, but *do not change the formula* (e.g. $Ca(NO_3)_2$, $(NH_4)_3PO_4$).
f) Use your rules of naming to determine the correct name for each compound. Examples include sodium chloride (NaCl), sodium sulfate (Na_2SO_4).

Ions (***Put in charges***)	**Compound Formula** (leave out charges)	**Compound Name**
1) K and Cl		
2) Ca and Cl		
3) Na and O		
4) Mg and O		
5) Al and Cl		
6) K and SO_4		
7) Al and PO_4		
8) Ca and PO_4		
9) NH_4 and SO_4		
10) Al and SO_4		
11) *Fe and OH		

*There are two different Fe ions; be sure to indicate which one you use.

Post-Lab Questions:

1) The overall charge of any compound is always _____.

   Thus, the total _____ charge must equal the total _____ charge.

2) Almost all the compounds in this activity are composed of metals and _____.

   Thus, there is a give and take of electrons between the atoms. This forms *ions*. Thus, all of these compounds are _____ compounds.

3) Notice that I said, "ALMOST" in question #2. Which cation (positive ion) in this activity is not a metal ion?

4) a. What ending is used for anions (negative ions) that are composed of only one element?

   b. What are the other two possible endings for anions?