ALT 1 Tic Tac Toe Review—Board A

1. Classify each of the following as chemical change or physical change: A. shredding paper B. charcoal burning C. steel rusting D. fireworks	2. Which element is paired with the wrong symbol? A. sulfur, S B. potassium, P C. nitrogen, N D. silicon, Si	3. Classify each of the following as an element, compound or mixture. A. an egg B. a cake C. dry ice (CO_2) D. iron (Fe)
4. The formula for density is: $D = \frac{mass}{volume}$ A student finds that 6.62 grams of a substance occupies a volume of 12.3 cm^3. What is the density of the substance?	5. Classify each as an element, mixture or a compound. A. sulfur B. salad oil C. apple juice D. Pizza	6. The formula for density is: $D = \frac{mass}{volume}$ Platinum's density is 22.5 g/cm^3 What is mass of 5.42 cm^3 of platinum?
7. What is the symbol of the nonmetal in Group 4A?	8. What are the symbols of the two elements that are liquid a room temperature?	9. What is the name of a row on the periodic table?

1. A. shredding paper PC B. charcoal burning CC C. Steel rusting CC D. fireworks are CC
2. B. potassium, P The correct symbol is K
3. A. an egg is a mixture B. a cake is a mixture C. dry ice (CO_2) is a compound D. iron powder (Fe) is an element
4. Density equals mass ÷ volume. D = 6.62 g ÷ 12.3 cm^3 = 0.538 g/ cm^3
5. A. Element B. mixture C. Mixture D. mixture
6. Density = $\frac{mass}{volume}$ we rearrange to solve for mass and the equation is: mass = volume x density

   5.42 cm^3 x 22.5 g/cm^3 = 122 g

7. A. the nonmetal in Group 4A is Carbon (C)
8. mercury (Hg) and bromine (Br)
9. A period.

ALT 1 Tic Tac Toe Review—Board B

1. Which of the following is an element? A. calcium carbonate B. Calcium chloride C. Calcium	2. Which of the following is NOT a metalloid? A. Ge B. Sb C. Al D. Po	3. Which group is known as the Halogens?
4. Which group is known as the Alkali Metals?	5. What is the name of the Group 8A elements?	6. Which is the most reactive nonmetal?
7. Which is the most reactive metal?	8. How many periods are there in the periodic table?	9. The modern periodic table organized in order of ____? A. Atomic mass B. Atomic number C. Reactivity D. Color of element

1. C. calcium (Ca) the others are compounds
2. C Al is aluminum, a metal
3. 7A
4. 1A
5. Noble gases
6. Fluorine (F)
7. Francium (Fr)
8. 7
9. B. atomic number

ALT 1 Tic Tac Toe Review—Board C

1. What do we call a pure substance that is a chemical combination of two or more elements in a certain ratio (ex. H_2O)? A. Phase B. Period C. Element D. Compound	2. Which of the following is NOT a common sign a chemical reaction has occurred? A. Solid forms from two solutions combined. B. Gas bubbles form C. Change in color or odor D. Change in state (phase) of matter	3. The copper cycle is an illustration of what principle of chemistry? A. Metals conduct B. Metals melt C. Mass is conserved D. Metals are solids
4. A student starts the copper cycle with a mass of 5.0 g copper metal. After completing the series of chemical reactions, what is the mass of copper metal isolated in the last step?	5. In the chemical reaction: $Pb(NO_3)_2$ *(aq)* + 2KI *(aq)* → $2KNO_3$ *(aq)* + _____*(s)*. What is the formula for the solid? [Hint: apply Law of Conservation of Mass]	6. Which is the least dense liquid in the graduate? 
7. Melting crayons is an example of a A. Physical property B. Physical change C. Chemical property D. Chemical change	8. Which of the following units would best describe a volume of water used in an experiment? A. Grams B. Meters C. Milliliters D. Newtons	9. The formula for density is mass/volume. What is the density of 5 L of a substance with mass 2 kilograms?

1. D. compound
2. D. change in state of matter (eg. Ice melting or water freezing)
3. C. Mass is conserved (Law of Conservation of Mass)
4. It should be about 5 grams +/- some mass due to experimental error
5. PbI_2
6. The top layer (green)
7. B. physical change
8. mL milliliters
9. 0.4 kg/L must have units correct to score!

ALT 2 Tic Tac Toe Review—Board A

1. What are the charges and masses of the three main subatomic particles?	2. . How many protons are in a neutral atom of each element? A. copper (Cu) B. Zinc (Zn) C. Barium (Ba) D. Argon (Ar)	3. Isotopes of an atom have different _____? A. numbers of electrons B. numbers of neutrons C. numbers of protons
4. . How many protons and neutrons are in the element? $^{16}_{8}O$	5. How many protons and neutrons are in the element? $^{108}_{47}Ag$	6. An atom is identified as **platinum-195.** What does the number represent? How many protons does it have?
7. How many total electrons can go in the second electron shell?	8. What element is represented by the shell diagram? 	9. How many electron shells go around the nucleus of a potassium (K) atom?

1. Electrons, -1, 0; protons, +1, 1 amu; neutrons, no charge, 1 amu
2. A. 29 each; B. 30 each; C. 56 each; D. 18 each The atomic number tells the number of protons; number of electrons is the same in a neutral atom
3. B numbers of neutrons
4. 8 protons and 8 neutrons [16-8]
5. 47 protons and 61 neutrons [108-47]
6. mass of the isotope of platinum; Pt has 78 protons
7. 8 electrons in shell 2
8. Beryllium atomic number 4
9. Four since potassium is in the fourth period of the table

ALT 2 Tic Tac Toe Review—Board B

1. How many electrons in each of the following neutral atoms? A. Be B. As C. He	2. How many atoms of each element are shown in the chemical formula? $Pb(NO_3)_2$	3. Identify the error in the shell model of a neutral Ca atom: 
4. Explain how to use the periodic table to estimate the mass number for the most common isotope of an element.	5. How many neutrons are in an atom of Carbon-13?	6. What happens when an unstable isotope undergoes alpha decay?
7. What is the average atomic mass of **magnesium**, including correct units?	8. Which ion is represented in the shell model? 	9. Explain why the noble gases are unreactive?

1. 4, 33, 2
2. 1 Pb (lead), 2 N(nitrogen), and 6 O (oxygen)
3. Incorrect valence electrons. Should have 8 in shell #3 and 2 in shell #4
4. Round the average atomic mass to the nearest whole number.
5. 13-6 = 7
6. The nucleus ejects an alpha particle. [OR: two protons and two neutrons; He nucleus]
7. 24.31 amu. Find Mg on the periodic table and read the avg atomic mass
8. Li+ since it has 3 protons and only two electrons [must say or include the charge for a correct answer]
9. Noble gases have a filled valence shell with 2 or 8 electrons and therefore they are unreactive

ALT 3 Tic Tac Toe Review—Board A

1. What is the name of the compound, $ZnCl_2(s)$?	2. What is the chemical formula for the compound barium chloride?	3. What is the likely charge on a lithium cation?
4. What is the charge on a nitride anion?	5. How many electrons does the neutral atom gain or lose to form each ion? A. Fe^{3+} B. O^{2-} C. Cd^{2+}	6. How can the periodic table be used to determine the charge of a main group element?
7. What is the name of the compound Na_2CO_3?	8. What is the name of the compound: $Sr(OH)_2$	9. What is the chemical formula for a compound made of Li^+ and O^{2-}?

1. Zinc chloride
2. $BaCl_2$ [Ba^{2+} and Cl^{1-}]
3. 1+ cation it is a metal in group 1A
4. 3- anion nitrogen is a nonmetal in group 5A
5. A. Lose 3; B. gain 2; C. lose 1
6. Group number tells valence electrons; metals lose valence electrons and nonmetals add electrons to the valence shell. Ions form to get a filled valence shell like a noble gas.
7. Sodium carbonate
8. $Sr(OH)_2$ strontium hydroxide
9. Li_2O [2 atoms of Li+ balance out one atom of O^{2-}]

ALT 3 Tic Tac Toe Review—Board B

1. Which of the following has ionic bonds? A. H_2O B. $CaCl_2$ C. $Ca(s)$ D. $C(s)$	2. How many atoms of each element are shown in the chemical formula? $Pb(NO_3)_2$	3. When a solid produced by a chemical reaction separates from the solution this is called a __?
4. When metals form ions they tend to _____ electrons and form _____.	5. How many valence electrons does *rubidium* have?	6. How many core electrons does *rubidium* have?
7. Describe the pattern of valence electrons across a period for the main group elements.	8. Lithium oxide is __? A. Made up of only monoatomic ions B. An ionic compound C. A molecular compound D. A and B	9. Which of the following is the correct ion symbol for *oxide*? A. O^{1-} B. O^{1+} C. O^{2-} D. O^{2+}

1. B calcium chloride made up of a metal and nonmetal
2. 1 Pb (lead), 2 N(nitrogen), and 6 O (oxygen)
3. Precipitate
4. Lose cations
5. Rb has 1 valence electron
6. 36 core electrons (Total # electrons minus valence electrons]
7. Increases by 1 for groups 1A to 8A
8. D
9. C [Group 6A so it adds two valence electrons