Name _____ Rec. TA/time _____

Show **ALL** your work or **EXPLAIN** to receive full credit.

1.   (2 pts) Select the combination of statements which are **CORRECT**.

      1) The mass number of an atom is the number of neutrons in the nucleus.
      2) The number of protons in atom is its atomic number.
      3) The number of electrons is greater than the number of protons in a cation.
      4) The masses of a proton and a neutron are both approximately 1 amu.
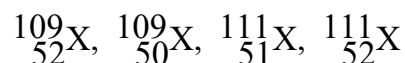   5) Isotopes of an element differ in the number of neutrons.

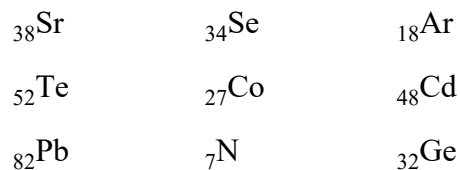   a) 1, 3, 4   b) 2, 3   c) 1, 2, 3   d) 1, 4, 5   e) 2, 4, 5

2.   (2 pts) Consider the following species. Which of these are isotopes of each other?

$$^{109}_{52}X, \quad ^{109}_{50}X, \quad ^{111}_{51}X, \quad ^{111}_{52}X$$

3.   (4 pts)   An element has two naturally occurring isotopes, ^{35}X and ^{37}X, with atomic masses of 34.969 amu and 36.966 amu, respectively. The natural abundances of ^{35}X and ^{37}X are 55.78% and 44.22%, respectively. Calculate the atomic weight of this element.

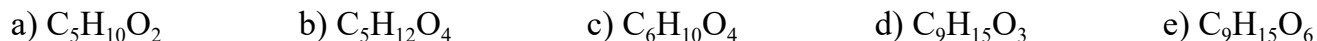4. (2 pts) Examine the following group of elements.

$_{38}$Sr $\quad\quad$ $_{34}$Se $\quad\quad$ $_{18}$Ar

$_{52}$Te $\quad\quad$ $_{27}$Co $\quad\quad$ $_{48}$Cd

$_{82}$Pb $\quad\quad$ $_{7}$N $\quad\quad$ $_{32}$Ge

The number of **representative (main-group) metals** is(are):
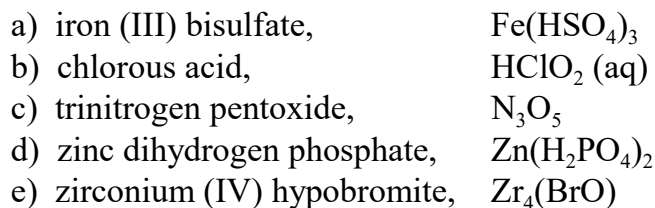
The number of **metalloids** (semimetals) is(are):

5. (2 pts) Which of the following formulas are possible molecular formulas for the empirical formula $C_3H_5O_2$?

a) $C_5H_{10}O_2$ $\quad\quad$ b) $C_5H_{12}O_4$ $\quad\quad$ c) $C_6H_{10}O_4$ $\quad\quad$ d) $C_9H_{15}O_3$ $\quad\quad$ e) $C_9H_{15}O_6$

6. (3 pts) Fill in the blanks in the table below for the isotope indicated.

Symbol	number of protons	number of neutrons	number of electrons	atomic number	mass number
$^{138}_{56}Ba^{2+}$					138

7. (2 pts) Which of the following pairs of names and formulas is **INCORRECT**?

a) iron (III) bisulfate, $\quad\quad$ $Fe(HSO_4)_3$
b) chlorous acid, $\quad\quad$ $HClO_2$ (aq)
c) trinitrogen pentoxide, $\quad\quad$ N_3O_5
d) zinc dihydrogen phosphate, $\quad\quad$ $Zn(H_2PO_4)_2$
e) zirconium (IV) hypobromite, $\quad\quad$ $Zr_4(BrO)$

8. (5 pts) Balance the following equation. What is the <u>sum</u> of the <u>coefficients</u> of the **REACTANTS**? (If present, don't forget the coefficients of 1.)

$$\underline{\quad} C_{12}H_{22}O_6 \quad + \quad \underline{\quad} O_2 \quad \rightarrow \quad \underline{\quad} CO_2 \quad + \quad \underline{\quad} H_2O$$
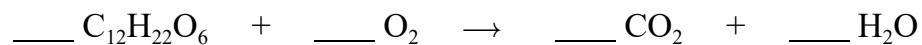
9. (4 pts) Balance the following equation. (**Must show all work. This means to show your steps and show the atoms are balanced. Show coeff. of 1.**)

$$\underline{\quad} Sc(OH)_3 \quad + \quad \underline{\quad} H_2SO_4 \quad \rightarrow \quad \underline{\quad} Sc_2(SO_4)_3 \quad + \quad \underline{\quad} H_2O$$
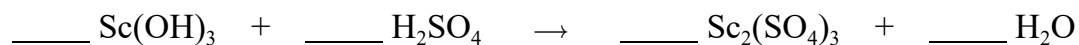
10. (4 pts) Calculate the **mass percent** composition of **phosphorus** in $Ca_3(PO_4)_2$. (At. wts: Ca = 40.08, P = 30.97, O = 16.00) (**Must show all work.**)

USEFUL INFORMATION

$$1 \text{ amu} = 1.66 \times 10^{-24} \text{ g}$$

$$\text{Avogadro's number} = 6.02 \times 10^{23} \text{ particles/mole}$$

	IA	IIA	IIIB	IVB	VB	VIB	VIIB		VIIIB		IB	IIB	IIIA	IVA	VA	VIA	VIIA	VIIIA
1	1.008 **H** 1																	4.003 **He** 2
2	6.941 **Li** 3	9.012 **Be** 4											10.811 **B** 5	12.011 **C** 6	14.007 **N** 7	15.999 **O** 8	18.998 **F** 9	20.179 **Ne** 10
3	22.990 **Na** 11	24.305 **Mg** 12											26.98 **Al** 13	28.09 **Si** 14	30.974 **P** 15	32.06 **S** 16	35.453 **Cl** 17	39.948 **Ar** 18
4	39.098 **K** 19	40.08 **Ca** 20	44.96 **Sc** 21	47.88 **Ti** 22	50.94 **V** 23	52.00 **Cr** 24	54.94 **Mn** 25	55.85 **Fe** 26	58.93 **Co** 27	58.69 **Ni** 28	63.546 **Cu** 29	65.38 **Zn** 30	69.72 **Ga** 31	72.59 **Ge** 32	74.92 **As** 33	78.96 **Se** 34	79.904 **Br** 35	83.80 **Kr** 36
5	85.47 **Rb** 37	87.62 **Sr** 38	88.91 **Y** 39	81.22 **Zr** 40	92.91 **Nb** 41	95.94 **Mo** 42	98 **Tc** 43	101.07 **Ru** 44	102.91 **Rh** 45	106.42 **Pd** 46	107.87 **Ag** 47	112.41 **Cd** 48	114.82 **In** 49	118.69 **Sn** 50	121.75 **Sb** 51	127.60 **Te** 52	126.90 **I** 53	131.39 **Xe** 54
6	132.91 **Cs** 55	137.33 **Ba** 56	138.91 **La** 57	178.39 **Hf** 72	180.95 **Ta** 73	183.85 **W** 74	186.21 **Re** 75	190.23 **Os** 76	192.22 **Ir** 77	195.08 **Pt** 78	196.97 **Au** 79	200.59 **Hg** 80	204.38 **Tl** 81	207.2 **Pb** 82	208.98 **Bi** 83	209 **Po** 84	210 **At** 85	222 **Rn** 86
7	223 **Fr** 87	226.03 **Ra** 88	227.03 **Ac** 89	261 **Rf** 104	262 **Ha** 105	263 **Sg** 106	262 **Ns** 107	265 **Hs** 108	266 **Mt** 109	269 110	272 111	277 112						

Lanthanide Series	140.12 **Ce** 58	140.91 **Pr** 59	144.24 **Nd** 60	145 **Pm** 61	150.36 **Sm** 62	151.96 **Eu** 63	157.25 **Gd** 64	158.93 **Tb** 65	162.50 **Dy** 66	164.93 **Ho** 67	167.26 **Er** 68	168.93 **Tm** 69	173.04 **Yb** 70	173.04 **Lu** 71
Actinide Series	232.04 **Th** 90	231.04 **Pa** 91	238.03 **U** 92	237.05 **Np** 93	**Pu** 94	**Am** 95	**Cm** 96	**Bk** 97	**Cf** 98	**Es** 99	**Fm** 100	**Md** 101	**No** 102	**Lr** 103

A PERIODIC CHART OF THE ELEMENTS
(Based on ^{12}C)