NAME: KEY PER_____ DATE_____
ATOMIC STRUCTURE PRACTICE TEST #1

1. A sample of gas is electrically charged so that it glows red. The red color is emitted when...
   a. electrons in the gas sample are excited into new energy levels.
   (b) electrons in the gas sample return to their ground state energy levels.
   c. Protons in the gas sample are excited into new energy levels.
   d. Protons in the gas sample return to their ground state energy levels.

2. Electrons...
   a. circle the nucleus of an atom in orbitals like the planets orbit around the sun.
   (b) move around the nucleus in electron clouds, that are areas of probability where the electrons could possibly exist.
   c. are located in the nucleus.
   d. move in the highest energy orbitals available to them

3. The periodic table of elements is arranged as it is because...
   a. the table can be arranged in energy sublevel "blocks".
   b. it can be used to find the electron configurations of atoms.
   c. trends reoccur so that groups of elements share the similar chemical properties
   (d) all of the above

4. Chemistry and all of science moves towards states which include...
   a. higher energy and high disorder.
   b. higher energy and low disorder.
   c. lower energy and low disorder.
   (d) lower energy and high disorder.

5. Fill in the blanks.
_____ energy represents _____ stability.
   a. Higher, more
   (b) Higher, less
   c. Lower, less
   d. all of the above

6. Orbitals are regions of space around the nucleus where a/an _____ is likely to be located.
a. proton (b) electrons c. nucleus d. neutrons

7. What is the maximum number of electrons that can exist an any d ***orbital***.
a. 1 (b) 2 c. 3 d. 4 e. 5 f. 6

8. What is the maximum number of electrons that can exist an any d ***sublevel***.
a. 2 b. 6 (c) 10 d. 12 e. 14 f. 18

9. Circle True or False
Noble Gas (Group 18) elements have stable electron configurations and therefore are relatively unreactive.

10. Which of the following has an invalid sublevel designation?
a. 6s b. 3d c.2p d. 4d (e) 3f

11-13. Matching
a. Hund's Rule b. Aufbau Principle c. Pauli Exclusion Principle

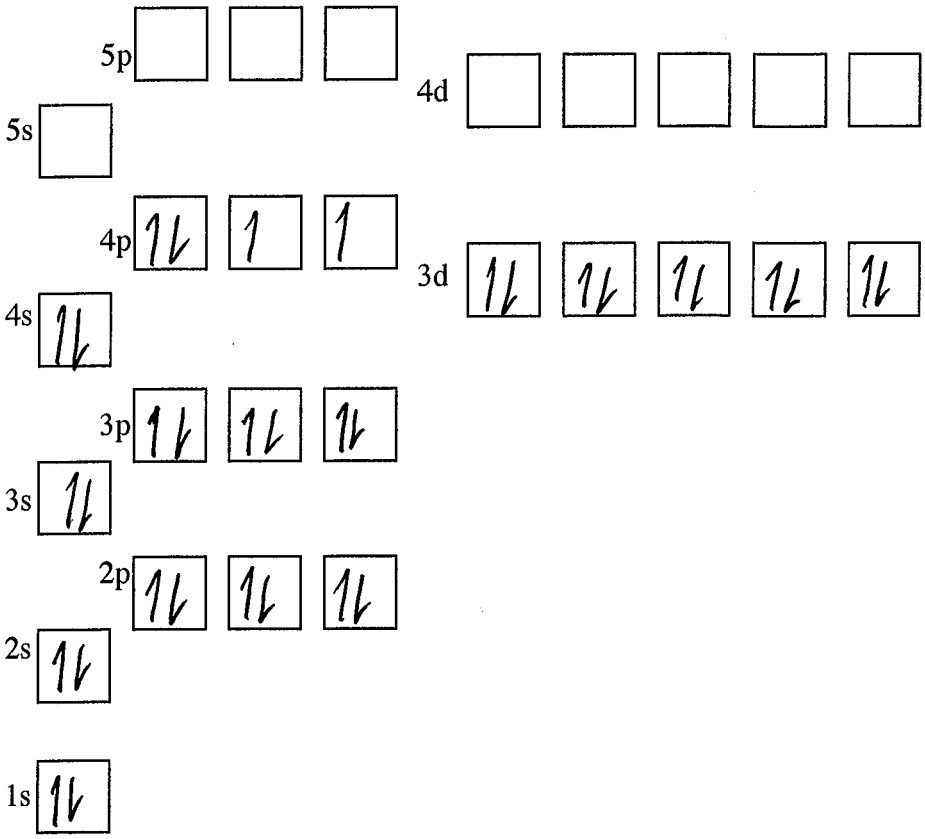
C 11. States that any orbital can hold a maximum of two electrons with opposite spins.

B 12. States that electrons fill beginning with the lowest energy levels first.

A 13. States that electrons fill orbitals of the same energy (degenerate orbitals) by adding one electron to each orbital all with the same spin, and then doubling up.

Fill in the blank
14. An atom is the smallest unit of an element which retains the properties of that element.

15. Fill in the following orbital diagram for Selenium (Se)



16. Arrange the following sublevels in order of increasing energy (Place 1 in the blank for the lowest energy and 8 for the highest energy).

2 3d 1 2s 4 5p 5 4f 6 6p 3 5s 7 5f 8 6d

17. Write the full electron configuration for Cs.

$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^6 5s^2 4d^{10} 5p^6 6s^1$

18. Write the complete electron configuration for the Al^{+3} ion. (Hint: first figure out how many electrons the ion has) $13p^+ 10e^-$

$1s^2 2s^2 2p^6$

19. Write the shorthand electron configuration (noble gas notation) of Fe.

$[Ar] 4s^2 3d^6$

20. Write the shorthand electron configuration (noble gas notation) of Bi.

$[Xe] 6s^2 4f^{14} 5d^{10} 6p^3$

21. Write the outer electron configuration (including only the last sublevel) for Au?

$5d^9$

22. What is the outer electron configuration (only the last sublevel) for Sn?

$5p^2$

23. Use the following data to calculate the average atomic mass of iron.

ISOTOPES	MASS (amu)	Percent Abundance
Fe-54	53.9396	5.845
Fe-56	55.9349	91.754
Fe-57	56.9354	2.119
Fe-58	57.9332	0.282

SHOW YOUR WORK AND CIRCLE FINAL ANSWER.

$$= \frac{(53.9396 \cdot 5.845) + (55.9349 \cdot 91.754) + (56.9354 \cdot 2.119) + (57.9332 \cdot 0.282)}{100} =$$

$= 55.8451 \text{ amu}$

24. FILL IN THE FOLLOWING ATOMIC STRUCTURE CHART

Nuclear Symbol	# p^+	#n⁰	#e^-	Atomic #	Mass #	Charge	Hyphen Notation
$^{35}_{17}Cl$	17	18	17	17	35	0	CHLORINE-35
$^{96}_{42}Mo^{+2}$	42	54	40	42	96	+2	XXXXXX
$^{197}_{79}Au$	79	118	79	79	197	0	GOLD-197
$^{138}_{58}Ce^{+2}$	58	80	56	58	138	+2	XXXXXX
$^{31}_{15}P^{-3}$	15	16	18	15	31	-3	XXXXXX
$^{118}_{50}Sn^{+4}$	50	68	46	50	118	+4	XXXXXX
$^{222}_{86}Rn$	86	136	86	86	222	0	RADON-222

25. A certain element "X" has five isotopes. Isotope 1 has a mass of 63.929 amu and an abundance of 48.89%. Isotopes 2 has a mass 65.926 amu and an abundance of 27.81%. Isotope 3 has a mass of 66.927 amu and a abundance of 4.11%. Isotope 4 has a mass of 67.925 amu and an abundance of 18.57%. Isotope 5 has a mass 69.925 amu and an abundance 0.62%. Calculate this element's average atomic mass and using the periodic table, identify the element.