Name: _____ Date: _____ Period: _____ Pg: _____

Atomic Structure Unit Review – Answer Key

Organization of the Periodic Table:

1. The periodic table is arranged in order of increasing atomic number.
2. State the periodic law: elements with similar properties are grouped together.

3. Metals are on the (left, right) side of the metalloid line.
4. Nonmetals are on the (left, right) side of the metalloid line.
5. List 3 properties of metals:
   - Lusterous
   - Hard solids (except Hg)
   - Conductors
6. List 3 properties of nonmetals:
   - Non-lusterous
   - Brittle solids, liqids, and gases
   - Poor conductors
7. Alkaline earth metals are in group 2A
8. Alkali metals are in group 1A
9. Representative/Transition metals are in group B
10. Noble gases are in group 8A
11. Halogens are in group 7A

**Bonus: Who created the periodic table? Mendeleev

Theories of Atomic Models:

12. Describe Dalton's model of the atom. Was he correct?
    Dalton believed the atom was an indivisible solid. His model was incorrect because the atom can be further divided into subatomic particles.
13. Describe Thomson's model of the atom. What part is still in effect today?
    Thomson's model of the atom was the plum pudding model. The current model of the atom still has negatively charged electrons and an equal positive charge in a neutral atom.
14. Describe Rutherford's model of the atom. How did he come up with this model?
    Rutherford performed the gold foil experiment in which he discovered that the atom is mainly empty space, and there is a small, dense, positively charged nucleus.
15. Describe Bohr's model of the atom.
    Bohr's model had a positively charged nucleus and electrons that orbited the nucleus in fixed energy levels.
16. How is the Cloud model different from Bohr's model of the atom?
    In the cloud model, electrons have a dual nature – they behave as both particles and waves. The electrons can be found in energy clouds.
17. What is the most **probable** location for an electron? "clouds"
18. Where are protons and neutrons found? In the nucleus
19. The majority of the atom is: empty space

Structure of the Atom

Complete the following table:

	Element/Ion	Atomic #	Mass #	Protons	Neutrons	Electrons	Charge
20.	$^{25}_{12}Mg^{2+}$	12	25	12	13	10	2+
21.	$^{35}_{17}Cl^{-}$	17	35	17	18	18	1-
22.	$^{32}_{20}Ca$	20	32	20	12	20	0
23.	$^{24}_{12}Mg^{2+}$	12	24	12	12	10	2+

24. Atoms in questions 20 & 23 are an example of a/an isotope
25. The relative average of all mass numbers for each isotope of an element equals the element's atomic mass
26. Calculate Calcium's atomic mass: *Show all work*

Ca-40	96.941%
Ca-42	.647%
Ca-43	.135%
Ca-44	2.086%
Ca-46	.004%
Ca-48	.187%

40.1156 amu

27. Identify the element/ion with 15 protons and 18 electrons: P^{3-}
28. Identify the element/ion with 38 protons and 36 electrons: Sr^{2+}
29. Identify the element/ion with 53 protons and 54 electrons: I^{-}
30. Identify the element/ion with 19 protons and 18 electrons: K^{+}

Electron Configurations

31. $1s^2 2s^2 2p^6 3s^2 3p^5$

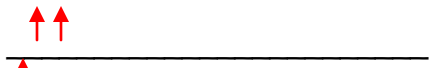
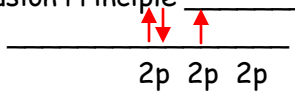
This element is in period 3. This element is in group 7A and has 7 valence electrons and 1 unpaired electron. This element is Cl. The letters indicate the shape of the orbital.

Write the electron configurations for the following atoms:

32. S $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^4$
33. S^{2-} $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6$
34. K $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^1$
35. Se $1s^2\ 2s^2\ 2p^6\ 3s^2\ 3p^6\ 4s^2\ 3d^{10}\ 4p^4$

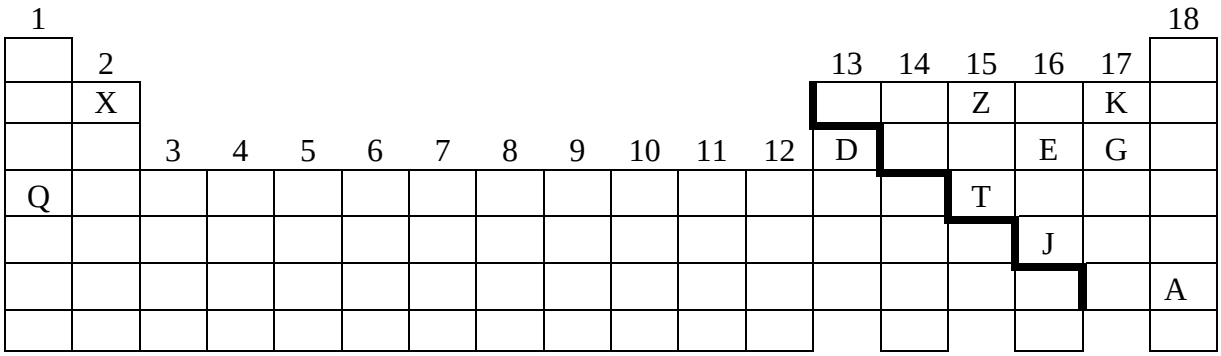
Identify each element based on the following electron configurations:

36. $1s^2 2s^2 2p^6 3s^1$ Sodium (Na)
37. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^8$ Nickel (Ni)
38. $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$ Bromine (Br)

39. Draw a violation of Pauli's Exclusion Principle 
40. Draw a violation of Hund's Rule 

41. Draw a violation of Aufbau's Principle 1s, 2s, 2p, 3s, 3p, 3d, 4s (4s comes before 3d)
42. Energy level 4 can have 4 sublevels: s, p , d, f
43. The "s" sublevel can hold 2 electrons
44. The "p" sublevel can hold 6 electrons
45. What is true of electron configurations of all noble gases? They have a full octet (8 valence electrons), their s and p orbitals are full

Periodic Trends:



46. Which element has the highest electronegativity? K
47. Which halogen has the smallest atomic radius? K
48. Which element will hold its outer shell electron(s) the tightest? A
49. Which element does not form compounds? A
50. What is ionization energy? The energy required to remove an electron from an atom

51. Fill in the following chart:

Group #	# Valence Electrons	Common Charge
1A	1	1^+
2A	2	2^+
3A	3	3^+
4A	4	4+/4-
5A	5	3^-
6A	6	2^-
7A	7	1^-
8A	8	0