**Quantum Number& Elec Configuration Webquest** Name\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ # \_\_\_\_\_\_

Open: <http://crescentok.com/staff/jaskew/isr/chemistry/class3.htm>

Click on **Quantum Numbers** and answer the following:

**Section 1: The Duel Nature of Light**

1. If Newtonian mechanics governed the workings of an atom, electrons would rapidly travel towards and collide with \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The shortest wavelengths on the electromagnetic spectrum belong to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. All electromagnetic radiation moves through a vacuum at a speed of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. The word "quantum" refers to

1. Planck's constant has a value of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. Although Einstein described the photoelectric effect, it was first discovered by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
3. Light may behave more like a wave or more like particles, depending on \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
4. On a line spectrum, the black regions correspond to

1. The lowest energy state of the electron is called \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. When energy level "n" increases, the radius of the electron orbit increases by \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

**Section 2:** **Quantum Numbers**

1. Louis de Broglie proposed that any particle of matter has a particular wavelength, calculated with the equation

1. The current atomic theory \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ describes the energy of an electron while describing its location only in terms of \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The Greek symbol *psi*, ψ, represents \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, used to describe electrons.

3. Name this diagram and describe what it shows.
4. All the possible values for the principal quantum number in the known atoms are

1. The values for the angular quantum number are represented by the letters

1. The magnetic quantum number describes the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. A set of orbitals with the same value of *n* is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

1. A set of orbitals with the same *n* and *l* values is called a(n) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. A shell with principal quantum number *n* will have \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ subshells.
3. A subshell with *l* = 0 has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ orbital(s).
4. A subshell with *l* = 2 has \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ orbital(s).
5. The maximum number of electrons in any shell *n*, is equal to \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
6. The fourth quantum represents the \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ of an electron.
7. The possible values of *ms* are \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
8. The Pauli exclusion principle states that

1. The "many-electron" atom has more than \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_
2. The mass of a neutron is 1.67 X 10−24 gram. One picometer (pm) = 1 X 10−12 meter. Calculate the velocity of a neutron whose wavelength is 500 pm.

* 1. Write de Broglie's equation.

* 1. Manulipate de Broglie's equation to solve for V.

* 1. Use dimensional analysis to solve the equation.

 **Section 3:**

**Open the Quiz** and write your answers below:

Scroll back to the top of the page and open **Electron Configuration**.

**Section 1: Electron Configuration**

Fll in these blanks about quantum numbers.

1. The maximum number of electrons in the third energy level is \_\_\_\_\_\_\_\_\_.

2. If **n** = 5, **l** = \_\_\_\_\_\_\_\_\_\_\_.

3. The maximum number for **n** is \_\_\_\_\_\_\_\_\_\_\_.

Name the elements whose electron configurations are:

4. 1s2 2s2 2p6 3s2 3p6

5. 1s2 2s2 2p6 3s2 3p6 4s2 3d3

6. 1s2 2s2 2p6 3s2 3p6 4s2 3d10 4p1

7. 1s2 2s2 2p6 3s2 3p6 4s2 3d10 4p6 5s2 4d10 5p6 6s2 5d1 4f6

Write electron configurations for these elements:

8. Potassium

9. Copper

10. Bromine

11. Gold

**Section 2: Orbital Diagrams**

Write the orbital diagrams for:

1. Mg
2. Cl
3. Cu
4. The ion of Mg
5. The ion of Cl
6. Explain why the transition elements have alternative configurations and orbital notations.

**Write an abbreviated electron configuration for:**

1. K
2. I

Take the Quiz at the bottom of the page and write your answers here: