QUANTUM NUMBERS & ORBITALS

1. Name the orbitals described by the following quantum numbers

   a) $n = 3, l = 0$ _____

   b) $n = 2, l = 1$ _____

   c) $n = 3, l = 2$ _____

   d) $n = 5, l = 3$ _____

2. Give the n and L values for the following orbitals

   a) 1s   _____

   b) 6p   _____

   c) 5f   _____

3. Place the following orbitals in order of increasing energy:

   1s, 3s, 4s, 6s, 3d, 4f, 3p, 7s, 5d, 5p

4. How many possible orbitals are there for:

   a) $n = 5$ _____

   b) $n = 10$ _____

5. Circle all of the following orbital destinations that are **not** possible:

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

6. Identify and circle what is wrong with each of the following ground-state electron configurations:

   a) $1s^2\, 2s^3\, 2p^3$

   b) $1s^2\, 2s^2\, 2p^3\, 3s^2$

   c) $1s^2\, 2s^2\, 2p^7\, 3s^2\, 3p^8$

7. Give two examples (i.e. list 2 elements that are examples) of:

    a) an atom with a half-filled subshell   _____

    b) an atom with a completely filled outer shell   _____

    c) an atom with its outer electrons occupying a
   half-filled subshell and a filled subshell   _____

8. Fill in the blanks with the correct response:
    a) The number of orbitals with the quantum numbers $n=3$, $l=2$ and $m_l = 0$ is _____.

    b) The subshell with the quantum numbers $n=4$, $l=2$ is _____.

    c) The m_l values for a d orbital are _____.

    d) The allowed values of l for the shell with $n=2$ are _____.

    e) The number of orbitals in a shell with $n=3$ is _____.

    f) The maximum number of electrons with quantum numbers with $n=3$ and $l=2$ is _____.

    g) When $n=2$, l can be _____.

    h) The number of electrons with $n=4$, $l=1$ is _____.

9. Write the values for the quantum numbers for the **bold** electron in the following diagrams:

    a)

        | ↑↓ | ↑↓ | ↑ | _____

            3p

    b) | ↑↓ | ↑ | **↑** | ↑ | ↑ | _____

            3d

    c) | ↑ **↓** | _____

       5s

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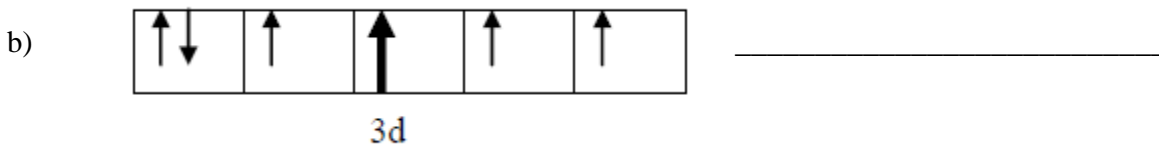
10. Given the following orbital diagram, write the set of quantum numbers for each electron that is marked:

1s   2s   2p   2p   2p   3s   3p   3p   3p
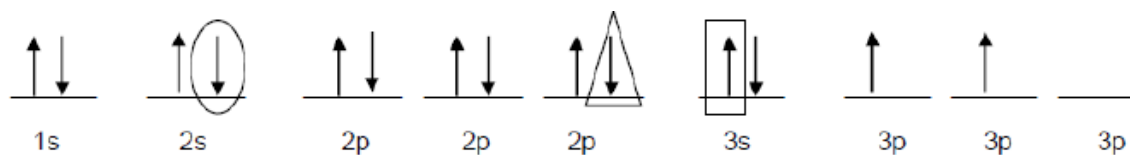
Circled = _____   Boxed : _____

Triangle = _____   Last one placed: _____

11. Indicate which of the following sets of quantum numbers could NOT occur **and explain why:**

a) 1,1,0,+1/2   _____

b) 2,1,0,+1/2   _____

c) 2,0,1,-1/2   _____

d) 2,1,0,0   _____

e) 3,2,0,-1/2   _____

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