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

\[ \begin{array}{cccccc}
 & & & & & \\
| & & & & & \\
| & & & & & \\
1s & 2s & 2p & 2p & 2p & 3s & 3p \ \\
\end{array} \]

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