ROSEDALE ACADEMY

Name _____

1-2F: QUANTUM NUMBERS PRACTICE WORKSHEET ANSWERS

1. Name the orbitals described by the following quantum number

   a. n = 3, ℓ = 0 **3s**

   b. n = 3, ℓ = 1 **3p**

   c. n = 3, ℓ = 2 **3d**

   d. n = 5, ℓ = 0 **5s**

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

   a. 1s **n = 1; l = 0**

   b. 3s **n = 3; l = 0**

   c. 2p **n = 2; l = 1**

   d. 4d **n = 4; l = 2**

   e. 5f **n = 5; l = 3**

3. Without referring to a text, periodic table or handout, deduce the maximum number of electrons that can occupy an:

   a. s orbital __**2**__ b. the subshell of p orbitals __**6**__ c. the subshell of d orbitals __**10**__

   d. the subshell of f orbitals__**14**__

4. What are the possible m_ℓ values for the each of the following types of orbitals?

   a. s **m_l = 0**

   b. p **m_l = -1, 0, +1**

   c. d **m_l = -2, -1, 0, +1, +2**

   d. f **m_l = -3, -2, -1, 0, +1, +2, +3**

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5. How many possible orbitals are there for n =

a. 4 **16 orbitals**

b. 6 **36 orbitals**

6. How many electrons can inhabit all of the n=4 orbitals? **32 total electrons**

7. 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 ____**1**___.

b. The subshell with the quantum numbers n=4, l=2 is ____**d**___.

c. The allowed values of l for the shell with n=2 are __**0, 1**_____.

d. The allowed values of l for the shell with n=4 are ___**0, 1, 2, 3**____.

e. The number of orbitals in a shell with n=3 is __ **9**_____.

f. The number of orbitals with n=3 and l=1 is __**3**_____.

g. When n=2, the possible values for m_l are ___**-1, 0, +1**_____.

h. The possible number of electrons with n=4, l=1 is ___**6**__.

i. The lowest value of n for which a d subshell can occur is n=____**3**___.

8. Which sets of quantum numbers are unacceptable? (Select a, b, c, or any combination)

a. n=3, l= -2, m_l= 0, m_s= +½ l cannot = -2

b. n=2, l= 2, m_l= -1, m_s= -½ l cannot = 2 if n = 2

c. n=6, l= 2, m_l= -2, m_s= +½