

SCH 4U0: QUANTUM NUMBERS WORKSHEET

1. State the four quantum numbers, then explain the possible values they may have and what they actually represent.

n – Principal Quantum Number: represents the energy level the electron is in, linked to the periods of the periodic. Can be 1 to 7

l – Secondary Quantum Number/Orbital Shape Quantum number: represents the shape of the orbital- s, p, d, f, l is a range of n-1.
0, 1, 2, 3

m_l – Magnetic quantum number: represents the number of orbits possible. m_l is a range of $-l \rightarrow +l$

m_s – Spin Quantum number: represents the electron and its spin. Two possibilities $+1/2$, $-1/2$

2. State the number of possible electrons described by the following quantum numbers

a. $n = 3, l = 0$ 2

b. $n = 3, l = 1$ 6

c. $n = 3, l = 2, m_l = -1$ 2

d. $n = 5, l = 0, (m_l = -2, m_s = -1/2)$ Not possible
 $m_l = 0$

	orbital name
a.	3s
b.	3p
c.	3d
d.	5s

3. 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 $n=5, l=3$

4. What are the m_l values for 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 $m_l = -3, -2, -1, 0, 1, 2, 3$

6. How many possible orbitals are there for $n = 4$?

s-1, p-3, d-5, f-7 = 16 orbitals

7. Write the complete set of quantum numbers that represent the valence electron for the following elements:

- a. He $n=1, l=0, ml=0, ms=-1/2$
- b. V $n=3, l=2, ml=0, ms=+1/2$
- c. Ni $n=3, l=2, ml=0, ms=-1/2$
- d. Cu $n=3, l=2, ml=1, ms=-1/2$
- e. Br $n=4, l=1, ml=0, ms=-1/2$

8. Write the electron configurations for the elements above.

