The Quantum Mechanical Model

- Finally in 1926 Erwin Schrödinger took the atom to its current shape, the Quantum Mechanical Model
- Restricts the energy of electrons to certain values (similar to Bohr) but unlike Bohr it does not describe an exact path that the electron follows.
- Instead of path, says there are 3-D areas around the nucleus, which represents where an electron would be found 90% of the time.

Atomic Orbitals

- Both the Bohr and QM model have energy levels for electrons.

However...

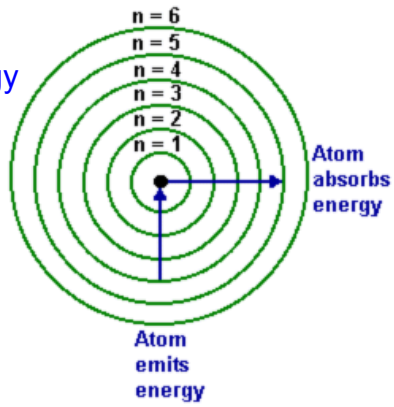
direct path

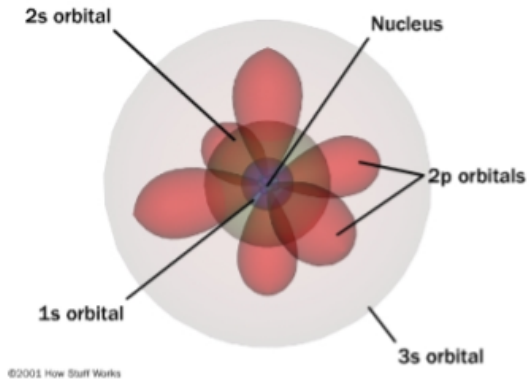
- Bohr's model = orbits

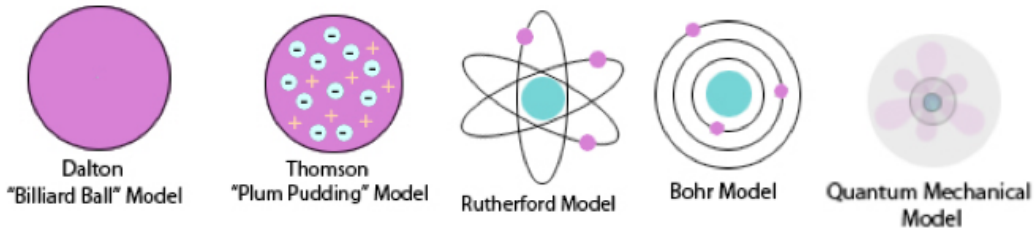
3D area

QM model = orbitals

n = energy level







NJ → Monmouth County → Little Silver

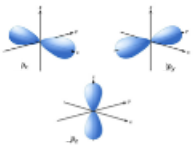
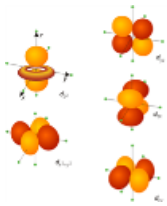
Energy levels → Sublevels → Orbitals

largest

smaller

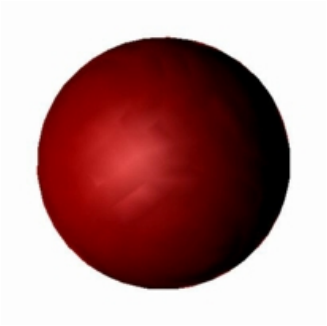
smallest

Each sublevel can be broken down into orbitals

Sublevel	Orbitals
s	1
p	3 
d	5 
f	7

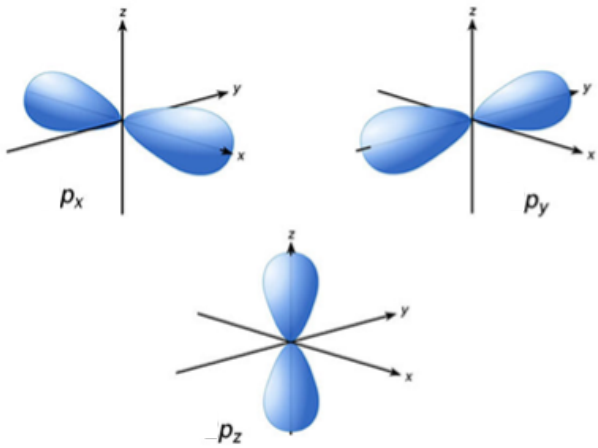
Energy Level	Sublevel
1	1s
2	2s, 2p
3	3s, 3p, 3d
4	4s, 4p, 4d, 4f
5	
6	
7	

s orbital



- spherical shape

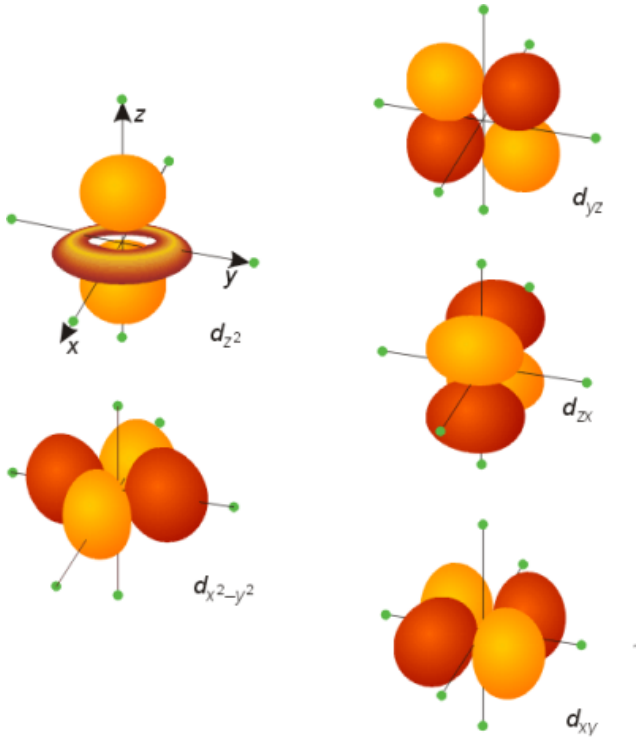
p orbitals



- shaped like dumbbells

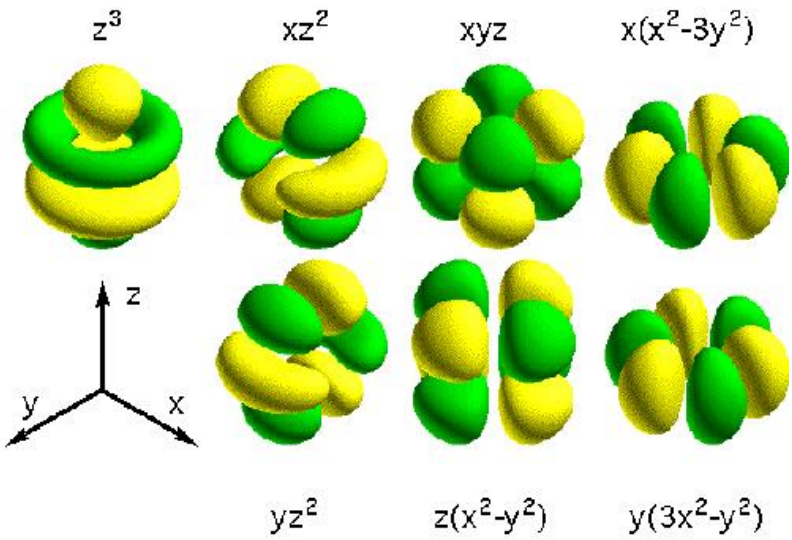
- there are 3 p orbitals (x, y, z)

d orbitals



- there are 5 d-orbitals
- two sets of dumbbells that are at right angles to each other.

f orbitals



- don't worry about remembering shape
- just know they exists and that there are 7 f orbitals

Each orbital can hold 2 electrons.

Sublevel	# of orbitals	# of electrons in each sublevel
s	1	
p	3	
d	5	
f	7	

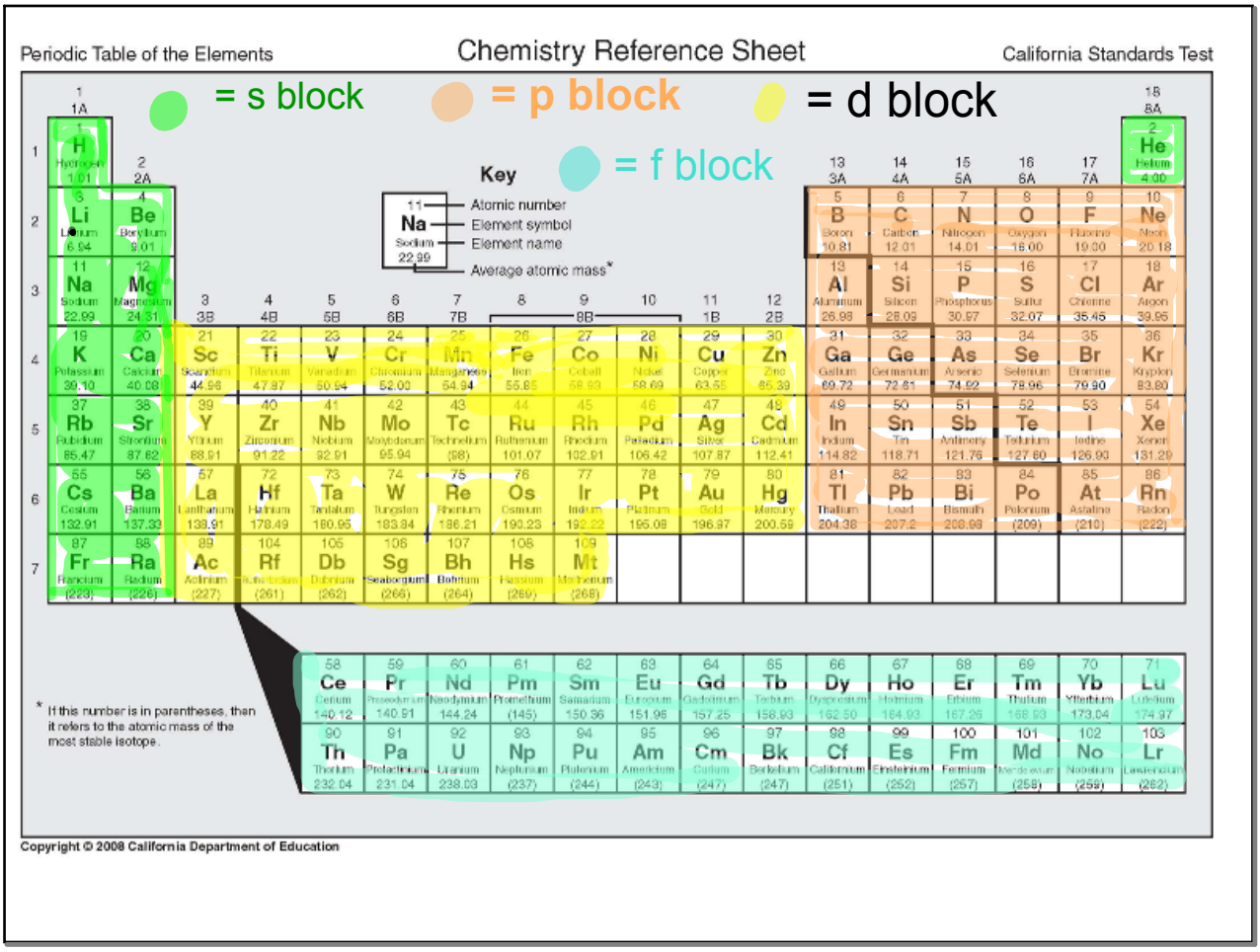
Electron Configuration

$1s^1$

row #
energy level #
possibilities are 1-7
(7 rows)

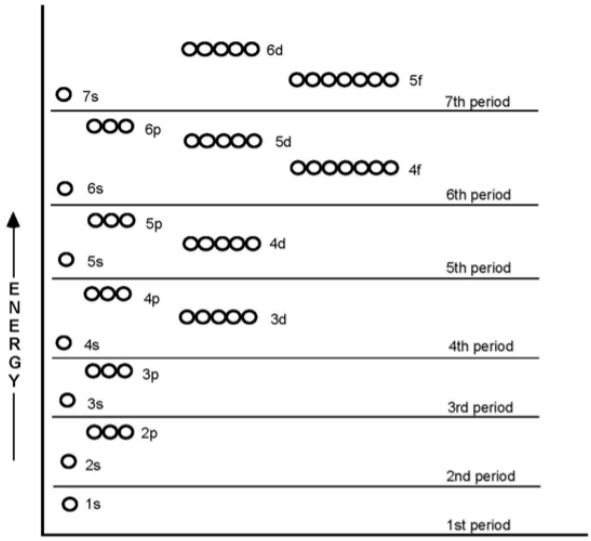
sublevel
possibilities are
s, p, d, or f

s: 1 or 2
p: 1-6
d: 1-10
f: 1-14
Total e- should equal
Atomic #



Hydrogen	1 e^-	$1s^1$
Helium	2 e^-	$1s^2$
Lithium	3 e^-	$1s^2 2s^1$
Beryllium	4 e^-	$1s^2 2s^2$
Boron	5 e^-	$1s^2 2s^2 2p^1$
Flourine	9 e^-	$1s^2 2s^2 2p^5$
Magnesium	12 e^-	$1s^2 2s^2 2p^6 3s^2$
Iron	26 e^-	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
Bromine	35 e^-	$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{10} 4p^5$

[Ar] $4s^2 3d^6$



Mr. Gracias Page 4 of 6