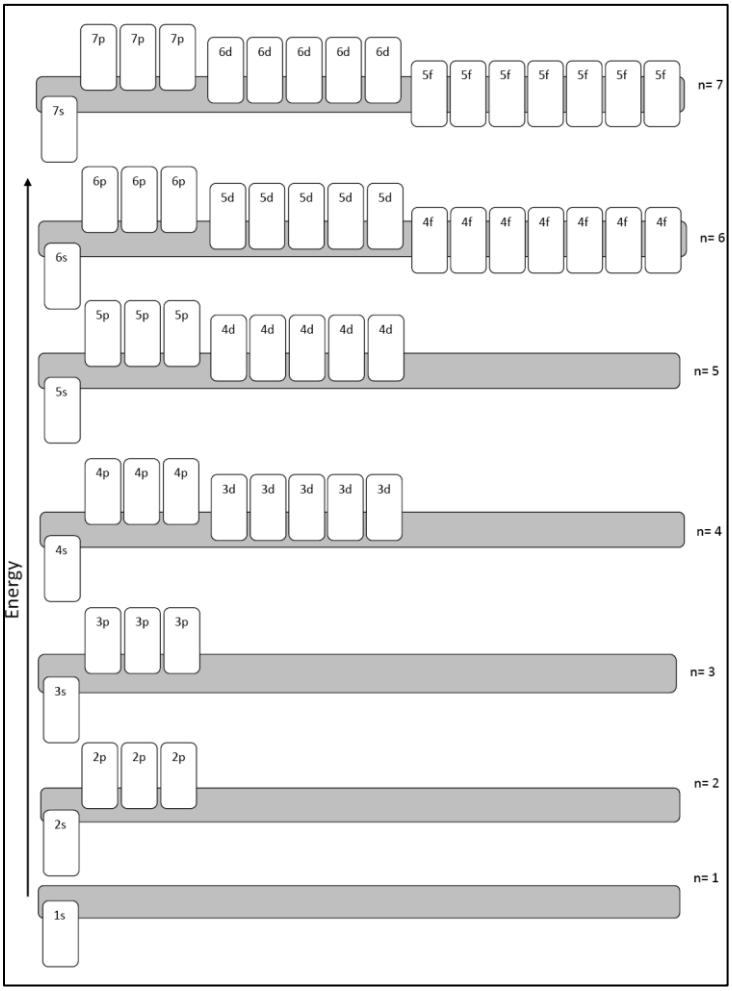
Week 5 Packet – Honors Chem

This is *hopefully* all the handouts we will use this week in Honors Chem. Due to the challenging logistics of this year, please offer grace if I miss a handout or if things change during the week. **Please note** – You do not *have* to print. I am just providing the option to make things easier for those who want to print. All of these pages are on the class website, always! www.mychemistryclass.net

***I will put the glue ins for the notes on the front and/or back of the packet cover page like this – since you don't need the cover page for anything you can always just cut these out and glue them in. Trying to save some paper for those of you who are printing! ☺**

N-11



N-10 Electron Configuration – an "address" for the electrons in an atom

An Orbital is:

How do we describe orbitals?

1.
2.
3.
4.

Different orbitals are in different energy levels

Different orbitals have different shapes

Different orbitals have different orientations

Each orbital is only allowed to have two e^-s

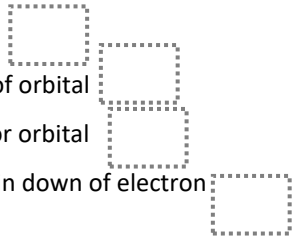
Where do e- live? What is the address for one?

State ------> Energy level

City ------> Type/shape of orbital

Street ------> Orientation or orbital

House # ------> Spin up or spin down of electron



They can get REALLY long

$1s_{+½}$, $1s_{-½}$, $2s_{+½}$, $2s_{-½}$

$2p_{x\ +½}$, $2p_{x\ -½}$, $2p_{y\ +½}$

$2p_{y\ -½}$, $2p_{z\ +½}$, $2p_{z\ -½}$

Want to describe where ALL the e- in an atom were?

Shrink it down and only list:

1.
2.
3.

Example:

Steps to finding all the electrons

1. Pick an _____
2. Find the number of _____
3. Start putting electrons into the _____
4. Use an _____
5. List which _____ you used and _____ electrons in each one

Rules for putting electrons in an orbital diagram:

1. Aufbau Principle

An electron occupies the lowest energy orbital that it can.

Means:

2. Pauli Exclusion Principle

No two e^-s in the same atom can have the same set of 4 quantum numbers

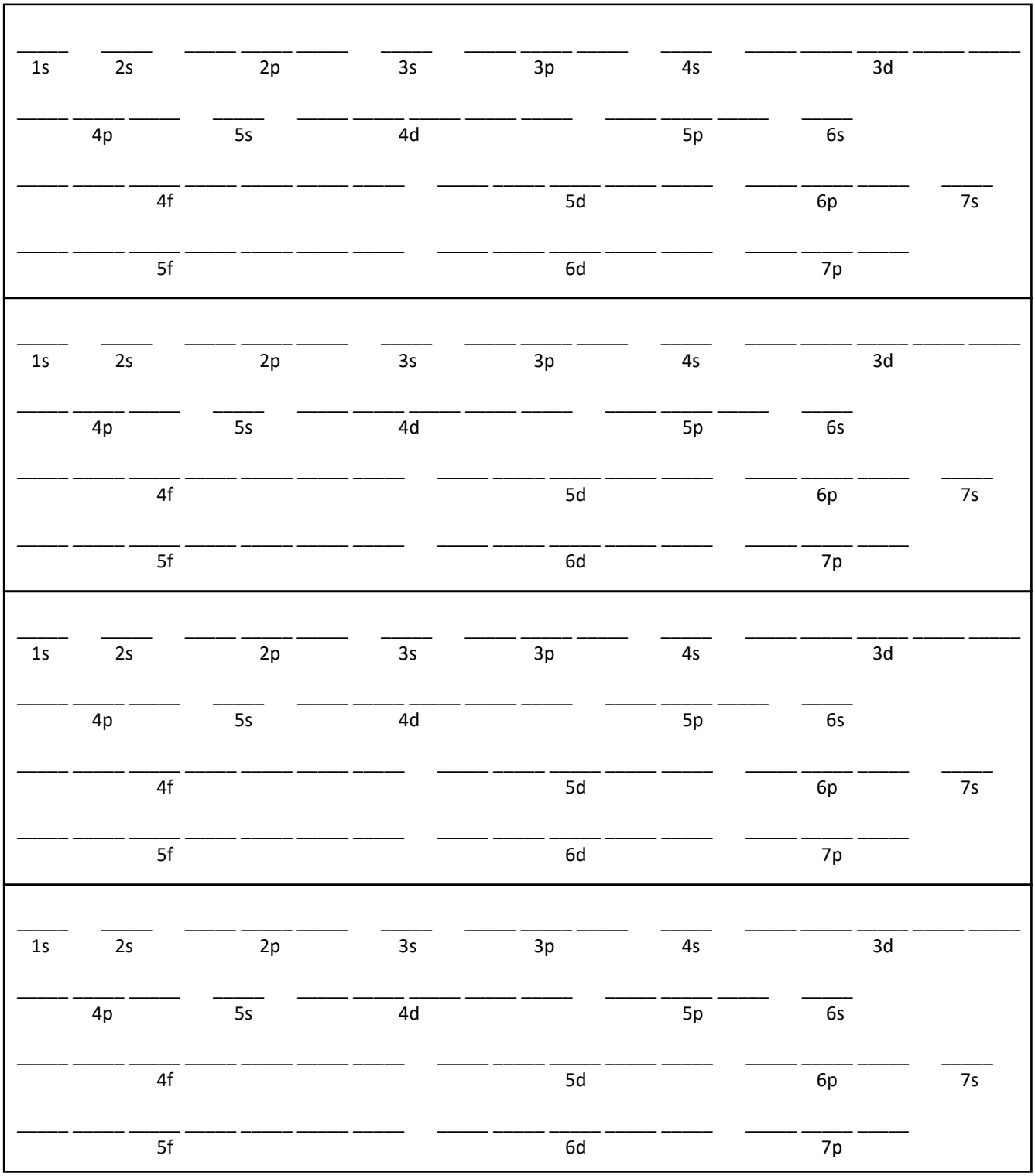
Means:

3. Hunds Rule

Orbitals of equal energy are each occupied by one e^- before any orbital is occupied by a second e^-.

Means:

N-11


1s
2s
2p
3s
3p
4s
3d
4p
5s
4d
5p
6s
4f
5d
6p
7s
5f
6d
7p
1s
2s
2p
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4s
3d
4p
5s
4d
5p
6s
4f
5d
6p
7s
5f
6d
7p

Dougherty Valley HS Chemistry
Orbitals

Worksheet #1

Name: **Period:** **Seat#:**

1) An orbital is:

2) What is the difference between an orbital and an orbit (Bohr Model)?

3) What are the four things we need to adequately describe where an electron is inside an atom?

a.

b.

c.

d.

4) Fill in the following chart:

Orbital Type	Description of Shape	# of orbitals in a set	# electrons allowed in one of the orbitals	# electrons allowed in a set of the orbitals
s				
p				
d	Complex lobes			
f	Even more complex			

5) Describe each rule for writing the "address" of an electron - in your own words! Then draw a visual representation for this rule. If we were to try and make a little classroom poster to remind us of the rule what would it look like? Think of how things like road signs and warning signs are drawn – bold pictures with minimal words.

Rule	Written Description	Visual Representation
Aufbau Principle		
Pauli Exclusion Principle		
Hund's Rule		

Dougherty Valley HS Chemistry
Orbital Diagrams

Worksheet #2

Name: **Period:** **Seat#:**

Fill in the chart below using an ↑and ↓ as electrons - find the total number of electrons and use that as well as the Periodic Table to find the identity of each element.

Element	Total # e-	Orbital Filling																	Electron Config.
		1s	2s	$2p_x$	$2p_y$	$2p_z$	3s	$3p_x$	$3p_y$	$3p_z$	4s	$3d_1$	$3d_2$	$3d_3$	$3d_4$	$3d_5$	$4p_x$	$4p_y$	$4p_z$	
Na																			
																			$1s^2 2s^2 2p^5$
H																			
S																			
																			$1s^2 2s^2 2p^6 3s^2 3p^1$
																			$1s^2 2s^2 2p^6 3s^2 3p^6 4s^1$
Ca																			
Mg																			
																			$1s^2 2s^2 2p^6$

Element	# e-	1s	2s	$2p_x$	$2p_y$	$2p_z$	3s	$3p_x$	$3p_y$	$3p_z$	4s	$3d_1$	$3d_2$	$3d_3$	$3d_4$	$3d_5$	$4p_x$	$4p_y$	$4p_z$	**Electron Config.**
																				$1s^2 2s^2 2p^6 3s^2 3p^2$
C																				
																				$1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^6$
Br																				

1) Circle which of the following orbital destinations are possible.

a) 7s b) 1p c) 5d d) 2d e) 4f f) 5g g) 6i

2) Circle which of the following electron configurations is ruled out by the Pauli exclusion principle.

a) $1s^2 2s^2 2p^7$ b) $1s^2 2s^2 2p^6 3s^3$ c) $1s^2 2s^2 2p^6 3s^2 3p^6 4s^2 3d^{12}$ d) $1s^2 2s^2 2p^6 3s^2 3p^6$

3) Explain why the following ground-state electron configurations are not possible:

Q	Config.	Reason it is wrong
a)	$1s^2 2s^3 2p^3$	
b)	$1s^2 2s^2 2p^3 3s^6$	
c)	$1s^2 2s^2 2p^7 3s^2 3p^8$	
d)	$1s^2 2s^2 2p^6 3s^2 3p^1 4s^2 3d^{14}$	

4) Draw a section of an orbital diagram that would violate each of the following rules

Aufbau Principle	Pauli Exclusion Principle	Hund's Rule