8 • Electron Configurations and Periodicity
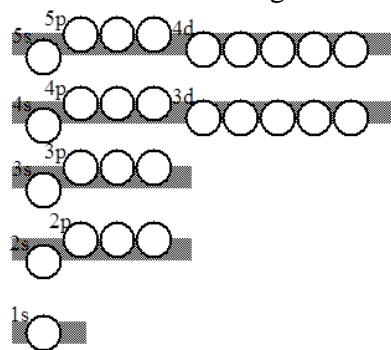
STATION 1 – ORBITALS AND ELECTRONS

1. The number of **electrons** that can occupy a 3d orbital is _____.

2. The highest energy orbital in boron, B, is _____.

3. The orbital **farthest** from the nucleus in Cr is _____.

4. The number of **orbitals** when n=3 is _____.

5. The number of **electrons** that have n=2 is _____.

6. The orbital that fills **after** the 6s is _____.

7. Circle the orbital representations that **could** exist: $4s^3$ $5g^{18}$ $3p^4$ $2p^8$ $6d^3$ $1s^1$ $7f^{15}$

8. When Zn becomes an ion, it loses its **electrons** from the _____ orbital.
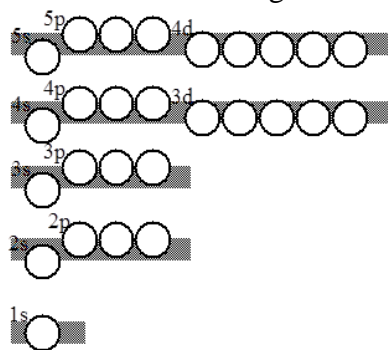
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STATION 2 – ELECTRON CONFIGURATIONS

Fill in the orbital diagram for S.   Fill in the orbital diagram for Cu.

Write the short form and long form **electron configurations** for **S** and **Cu**.

S	Cu
long:	long:
short:	short:

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Write in the last orbital filled in each zone of the periodic table.

1										18

Circle the following element(s) that would be **paramagnetic**:   Zn   Mg Mn^{2+} N O^{2-} Co^{2+}

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The Period 3 Elements are:

Na	Mg	Al	Si	P	S	Cl	Ar

Which Period 3 element has the following five ionization energies? _____

IE_1	IE_2	IE_3	IE_4	IE_5
736 kJ	1445 kJ	7730 kJ	10,600 kJ	13,600 kJ

Which Period 3 element has the following five ionization energies? _____

IE_1	IE_2	IE_3	IE_4	IE_5
787 kJ	1575 kJ	3220 kJ	4350 kJ	16,100 kJ

Which period 3 element has the largest 3rd ionization energy? _____

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For each pair of elements, circle the element with the **larger ionization energy**:

F & Cl	Na & Be	Mg & Al	N & O	C & O

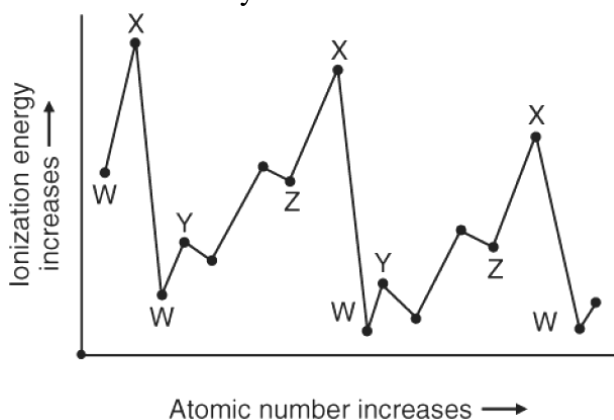Which element, Mg or Ca has the larger first ionization energy? _____ Explain.

Write the equation for the first ionization of Mg: _____

Write the equation for the first ionization of Cl: _____

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This is a graph of the ionization energies for the first 20 elements by atomic number.

Determine which families are W, X, and Y:

W is the _____ family and the _____ family.

X is the _____ family.

Y is the _____ family.

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STATION 7 – ELEMENTS & ELECTRON CONFIGURATIONS

Identify the elements with the following electron configurations:

	$1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^6\, 4s^2$		$[Ne]\, 3s^1$
	$[Ar]\, 4s^2\, 3d^6$		$1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^1$
	$1s^2\, 2s^2\, 2p^5$		$[Kr]\, 4d^7\, 5s^2$
	$[Xe]\, 6s^2\, 4f^4$		$1s^2\, 2s^2\, 2p^6\, 3s^2\, 3p^6\, 3d^5\, 4s^1$

Write the long form electron configuration for Fe^{3+}:

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STATION 8 – QUANTUM NUMBERS

Write the **quantum numbers** for each of the electrons in oxygen, O (Z = 8):

n	l	m_l	m_s

Write the **quantum numbers** for the outer electron of rubidium, Rb (Z=37):

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For each pair of elements, circle the element with the **larger atomic radius**:

Mg & Ca	N & O	Sn & As	K & K$^+$	I and I$^-$

As you move down a family (column) of elements, the atomic radius _____ (increases, decreases) because _____.

As you move across a period (horizontal row) of elements, the atomic radius _____ (increases, decreases) because _____.

Put these five elements in order from **smallest** atomic radius to **largest** atomic radius. F Br Ca K Cs

Smallest | | | | | | Largest

8 • Electron Configurations and Periodicity

For each pair of elements, circle the element with the **larger atomic radius**:

Mg & Ca	N & O	Sn & As	K & K$^+$	I and I$^-$

As you move down a family (column) of elements, the atomic radius _____ (increases, decreases) because _____.

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Put these five elements in order from **smallest** atomic radius to **largest** atomic radius. F Br Ca K Cs

Smallest | | | | | | Largest