Name: KEY

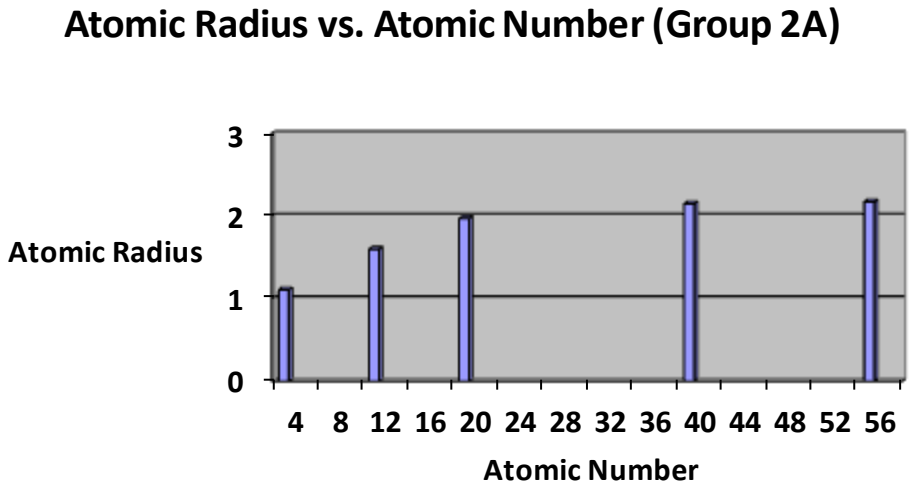
Periodic Trends Worksheet

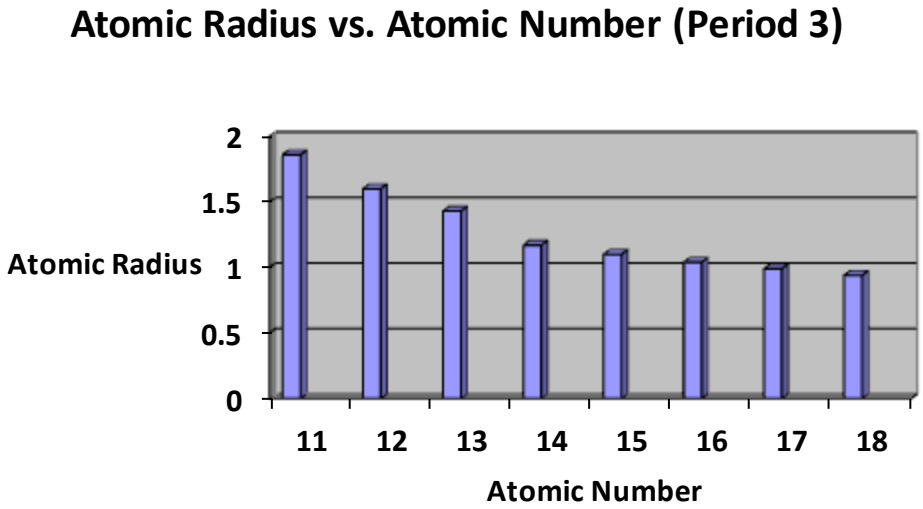
Atomic Radius

1. Using the data below, make a bar graph of atomic radius vs. atomic number for Group 2A and for Period 3 of the periodic table.

Group 2A		
Element	**Atomic Number**	**Atomic Radius**
Be	4	1.11
Mg	12	1.60
Ca	20	1.97
Sr	38	2.15
Ba	56	2.17

Period 3		
Element	**Atomic Number**	**Atomic Radius**
Na	11	1.86
Mg	12	1.60
Al	13	1.43
Si	14	1.17
P	15	1.10
S	16	1.04
Cl	17	0.99
Ar	18	0.94





Answer the following questions about atomic radius in complete sentences.

1. What trend in atomic radius do you see as you go down a group/family on the periodic table?

The atomic radius gets bigger as the atomic number increases.

2. What trend in atomic radius do you see as you go across a period/row on the periodic table?

The atomic radius gets smaller as you go across a period on the periodic table.

3. What causes these two trends?

As you go down the table, the elements have more electrons so their radius becomes larger. However, as you go across the table, the protons act as magnets and the more protons you have, the stronger the pull of electrons towards the nucleus making the radius smaller.

4. Circle the atom in each pair that has the largest atomic radius.

a) Al B b) S O c) Br Cl

d) Na Al e) O F f) Mg Ca

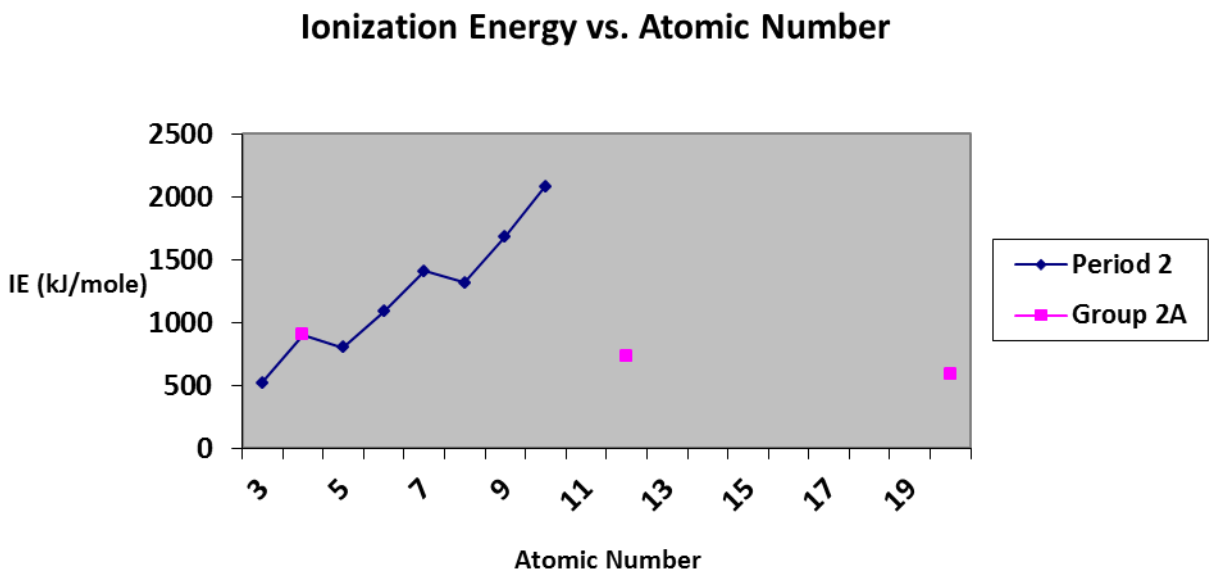
Ionization Energy

Ionization energy is the amount of energy required to remove an electron from an element. Using the ionization energies of the elements in Period 2 listed below, make a line graph the values vs. atomic number.

Period 2				
Element	**IE (kJ/mole)**		**Element**	**IE (kJ/mole)**
Li	519		N	1406
Be	900		O	1314
B	799		F	1682
C	1088		Ne	2080

On the same graph, make a line graph the first three atoms in Group 2A listed below in a different color.

Group 2A	
Element	**IE (kJ/mole)**
Be	900
Mg	736
Ca	590



Answer the following questions about ionization energy in complete sentences.

5. What trend do you notice for the ionization energies in Period 2?

They go up as the atomic number increases.

6. What trend do you notice for the ionization energies of Group 2A?

They go down as the atomic number increases.

7. Explain why this trend occurs.

Going down a group, the Ionization energy decreases because the electron is further away from the attraction of the protons in the nucleus. Lower ionization energy means it takes less energy to remove the electron from the atom.

Electronegativity

8. Define electronegativity

Electronegativity is how likely an atom is to attract a bonding pair of electrons.

10. What trend in electronegativity do you see as you go down a group/family on the periodic table?

Electronegativity decreases as you go down the group.

12. What trend in electronegativity do you see as you go across a period/row on the periodic table?

Electronegativity increases as you go across a period on the periodic table.

13. What causes these two trends?

14. Circle the atom in each pair that has the greater electronegativity.

a) Ca Ga b) Li O c) Cl S d) Br As e) Ba Sr f) O S

15. For each of the following, circle or highlight the correct element that best matches the statement on the right.

N	P	As	**smallest ionization energy**
K	Ca	Sc	**largest atomic mass**
Ga	Al	Si	**largest atomic radius**
V	Nb	Ta	**largest atomic number**
Si	Ge	Sn	**4 energy levels**
As	Se	Br	**6 valence electrons**
H	Li	Na	**nonmetal**
Hg	Tl	Pb	**member of transition metals**
Na	Mg	Al	**electron distribution ending in $3s^2 3p^1$**
Pb	Bi	Po	**metalloid**
Ca	Sc	Ti	**electron distribution ending in $4s^2 3d^2$**

Instructions Fill in the arrows below with the following terms: *increasing electronegativity, increasing atomic radius, increasing ionization energy.*