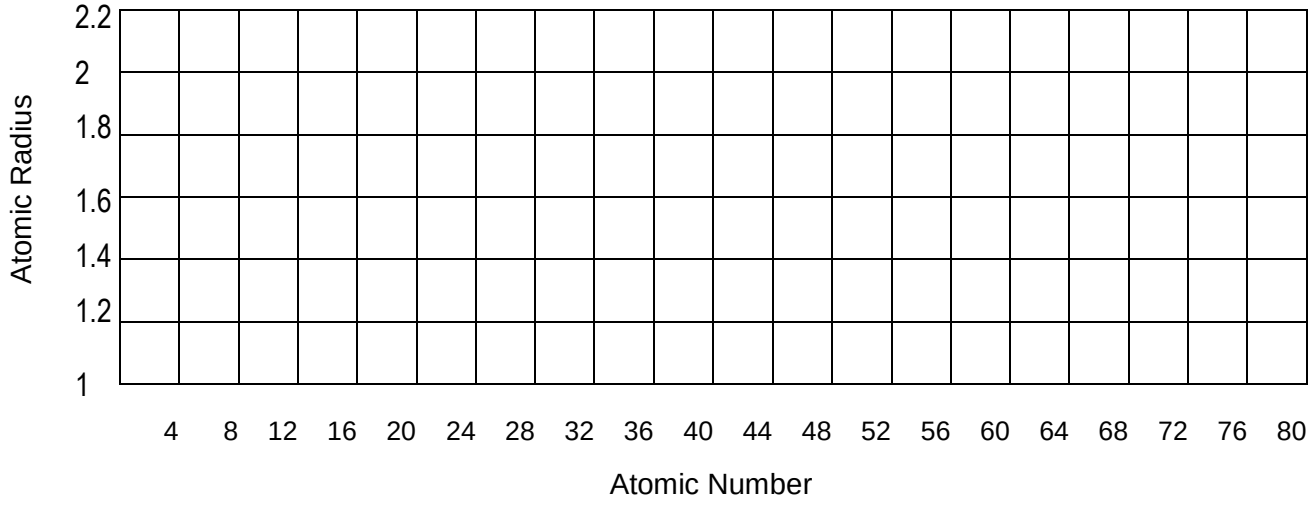
Periodic Trends Worksheet

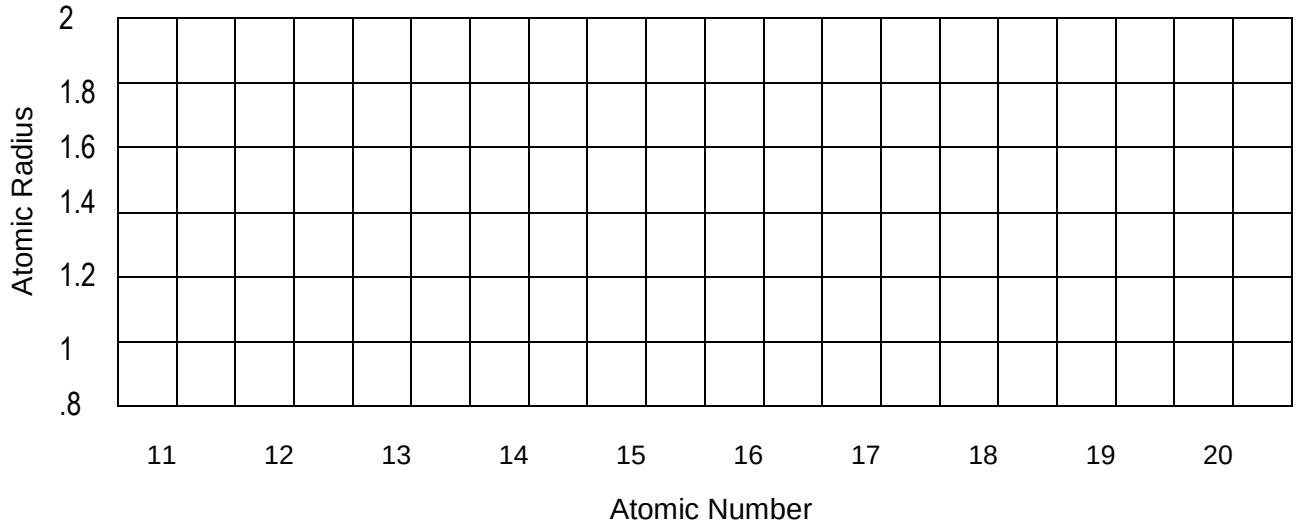
Name _____

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





2. What trends do you notice for the atomic radii of Group 2A?

3. What trends do you notice for the atomic radii of Period 3?

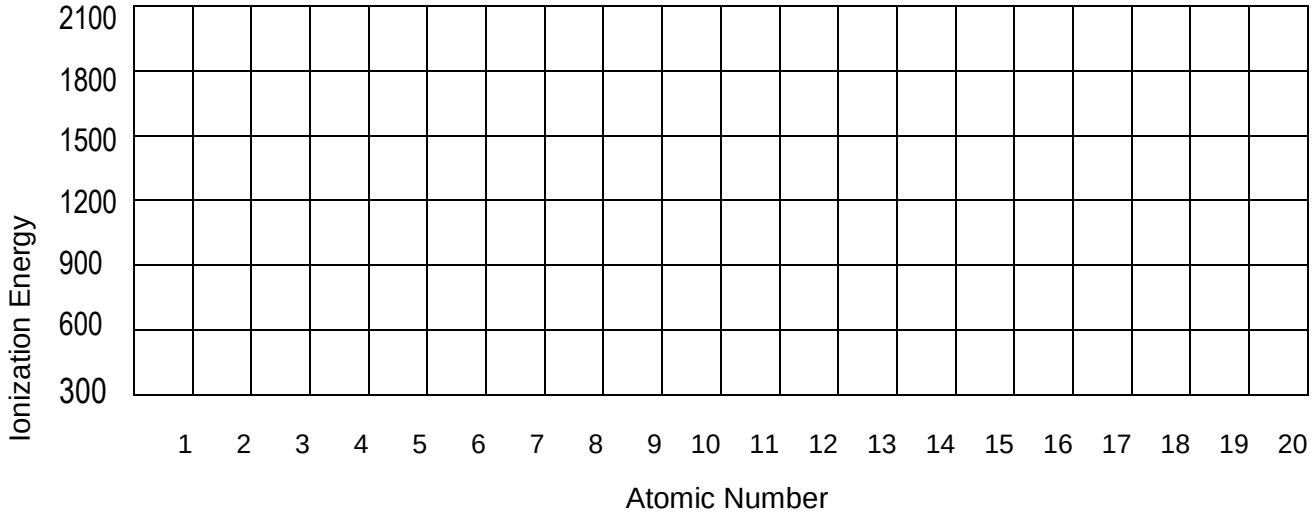
4. Explain why this trend occurs.

5. 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

6. 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



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

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

9. Explain why this trend occurs.

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

Li	Si	S	**metal**
N	P	As	**smallest ionization energy**
K	Ca	Sc	**largest atomic mass**
S	Cl	Ar	**member of the halogen family**
Al	Si	P	**greatest electron affinity**
Ga	Al	Si	**largest atomic radius**
V	Nb	Ta	**largest atomic number**
Te	I	Xe	**member of noble gases**
Si	Ge	Sn	**4 energy levels**
Li	Be	B	**member of alkali metals**
As	Se	Br	**6 valence electrons**
H	Li	Na	**nonmetal**
Hg	Tl	Pb	**member of transition metals**
Na	Mg	Al	**electron distribution ending in s^2p^1**
Pb	Bi	Po	**metalloid**
B	C	N	**gas at room temperature**
Ca	Sc	Ti	**electron distribution ending in s^2d^2**

ANSWER KEY

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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.

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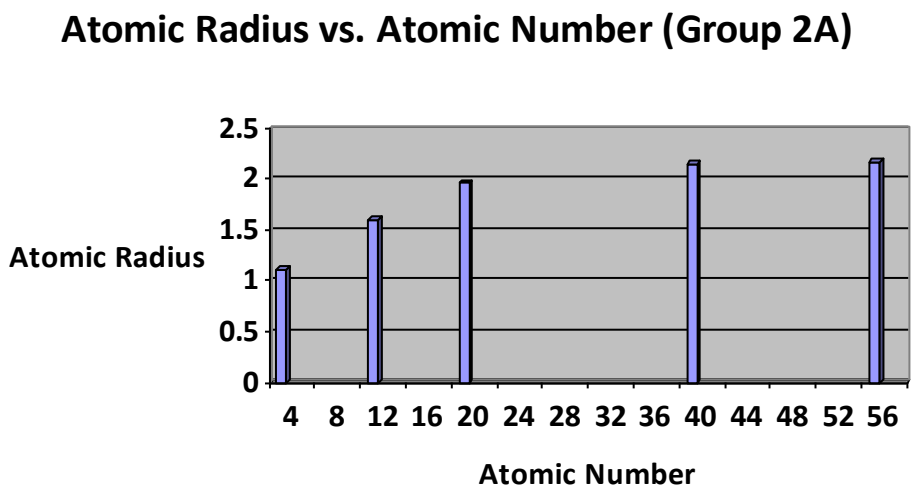

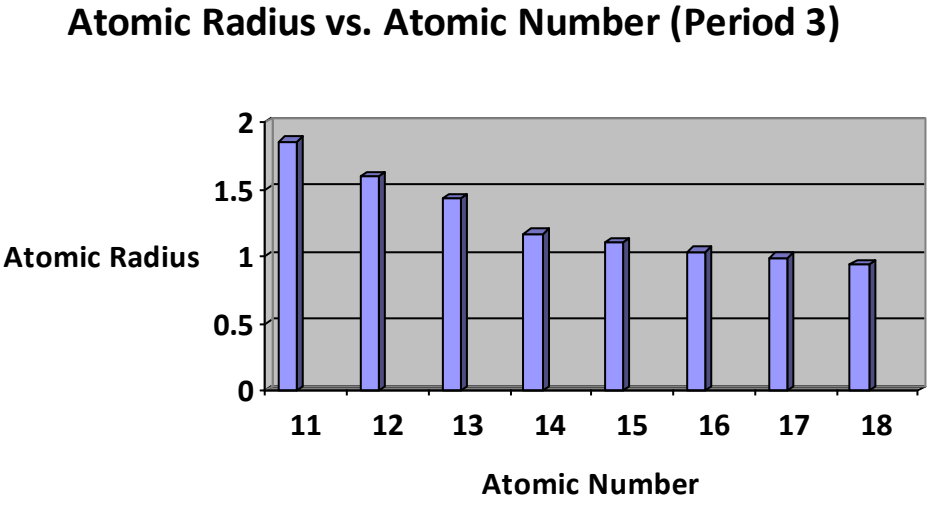

2. What trends do you notice for the atomic radii of Group 2A?
   The atomic radius gets larger as atomic number increases.

3. What trends do you notice for the atomic radii of Period 3?
   The atomic radius gets smaller as atomic number increases.

4. Explain why this trend occurs. Going from left to right across a period, the size gets smaller. Electrons are in the same energy level, but there is more nuclear charge (more protons). The increased charge pulls electrons in closer.

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

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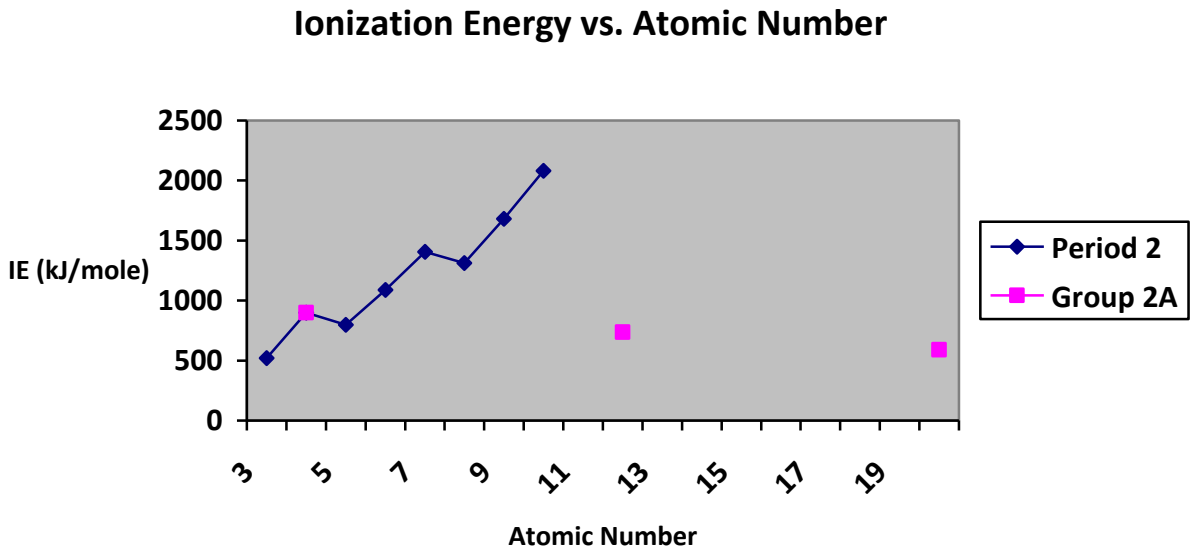

7. What trend do you notice for the ionization energies in Period 2?
   They go up as the atomic number increases.

8. What trend do you notice for the ionization energies of Group 2A?
   They go down as the atomic number increases.

9. Explain why this trend occurs. Going down a group, the IE decreases because the (e-) is further away from the attraction of the (+) nucleus. A lower IE means is takes less energy to remove the (e-).

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

Li	Si	S	**metal**
N	P	**As**	**smallest ionization energy**
K	Ca	**Sc**	**largest atomic mass**
S	**Cl**	Ar	**member of the halogen family**
Al	Si	**P**	**greatest electronegativity**
Ga	Al	Si	**largest atomic radius**
V	Nb	**Ta**	**largest atomic number**
Te	I	**Xe**	**member of noble gases**
Si	**Ge**	Sn	**4 energy levels**
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Na	Mg	**Al**	**electron distribution of:** $1s^2\ 2s^2p^6\ 3s^2p^1$
Pb	Bi	**Po**	**metalloid**
B	C	**N**	**gas at room temperature**
Ca	Sc	**Ti**	**electron distribution of:** $1s^2\ 2s^2p^6\ 3s^2p^6d^2\ 4s^2$

Source: http://www.gpb.org/files/pdfs/gpbclassroom/chemistry/periodicTableTrendsWkst.pdf