Review 2: Periodic Trends Answers

1. a. An ion is a charged atom (unequal number of protons and electrons).
   b. An atom can gain or lose electrons
   c. Ionization energy required to lose an electron.

2. a. The energy released when an electron is added to an atom.
   b. They both increase as you go left to right across the periodic table and up a group. If an atom has a high IE (hard to lose) then it will have a high EA (easy to gain).

3. Atomic radius is the distance from the nucleus to the valence electrons.
4. Chart:

Characteristic	Direction of Movement	Trend
First ionization energy	Left to right	Increases
First ionization energy	Up	Increases
Atomic radius	Left to right	Decreases
Atomic radius	Down	Increases
Reactivity of metals	Down	Increases
Reactivity of metals	Left to right	Decreases
Reactivity of nonmetals	Left to right	Increases
Reactivity of nonmetals	Down	Decreases

5. a. Decreasing AR: larger to smallerAR Ba, Mg, Be (energy levels)
   b. Increasing AR: smaller to larger AR Se, Ga, Ca (attraction of electrons)
   c. Increasing IE: smaller to larger IE (larger to smaller AR) Xe, Ar, He (energy levels)
   d. Decreasing IE: larger to smaller IE (smaller to larger AR) Kr, Br, K (attraction of electrons)
   e. Lower first IE: N (larger-attraction of electrons-easier to remove an electron)
   f. Lower first IE: K (larger-attraction of electrons-easier to remove an electron)
   g. Lower EA: K (larger-attraction of electrons-less energy gained when adding an electron)
   h. Higher EA: O (smaller-better attracts electrons-more energy gained when adding an electron)

6. a. i. Metals with a high reactivity have a low IE ii. Nonmetals with a high reactivity have a high IE
   b. i. Metals with a high reactivity have a large radius ii. Nonmetals with a high reactivity have a small radius
   c. As the radius increases the IE decreases (larger AR → easier to remove e).

7. Family 15 because they have 5 valence electrons. Large jump in IE shows the location of the noble gases.

8. Noble gases (group 18) because they have a full valence shell and don`t typically form bonds.

9. a. X is a metal (wants to lose electrons)
   b. Z is a nonmetal (wants to gain electrons)
   c. nonmetal (Z)
   d. Z (nonmetals don`t want to lose electrons)
   e. X (can give up 2 electrons)
   f. Z (increase in nuclear charge - can better attract the electrons)

10. Group 2 (two valence electrons)

11. First IE generally increases as the AR decreases because the electrons are more attracted to the nucleus and harder to remove.

12. K has a larger radius –metals want to lose electrons and it is easier to do so when the valence shell is further from the nucleus.

13. Cl (Ar is a noble gas-full valence shell)

14. Rates of reactions increase when the temperature is increased- Cl is more reactive then Br so will be not as stable as Br in the higher temperature

15. A & B F & G P & Q X & Y
    P Bi Po S Cs Na Ba Mg