Worksheet 2.5
Periodic Trends

1. Here are the atomic radii (in pm) for the third row of the periodic table:

Na	Mg	Al	Si	P	S	Cl	Ar
186	160	143	118	110	103	100	98

   a. Make a plot of the atomic radius (y axis) vs atomic number (element, on the x axis)

   b. What factors affect the size of an atom?

   c. Explain why the atomic radius decreases across the row in the periodic table. What causes a heavier atom (with more subatomic particles) to be smaller in size than a lighter atom?

2. Another property of atoms is called the ionization energy. It is the energy required to remove an electron from an atom in the gas phase.

Here is a table of the first ionization energies (energy required to remove the outermost electron) for the third row of the periodic table (in kJ/mol):

Na	Mg	Al	Si	P	S	Cl	Ar
496	738	577	788	1060	1000	1258	1520

a. Make a plot of the first ionization energy (y axis) vs atomic number (element, on the x axis)

b. Compare your graph from Q2 to that in Q1. Are the trends you see in each graph related? How so?

c. Explain why (in general) the first ionization energy **increases** across the period. (Don't worry about the dips at Al and S).