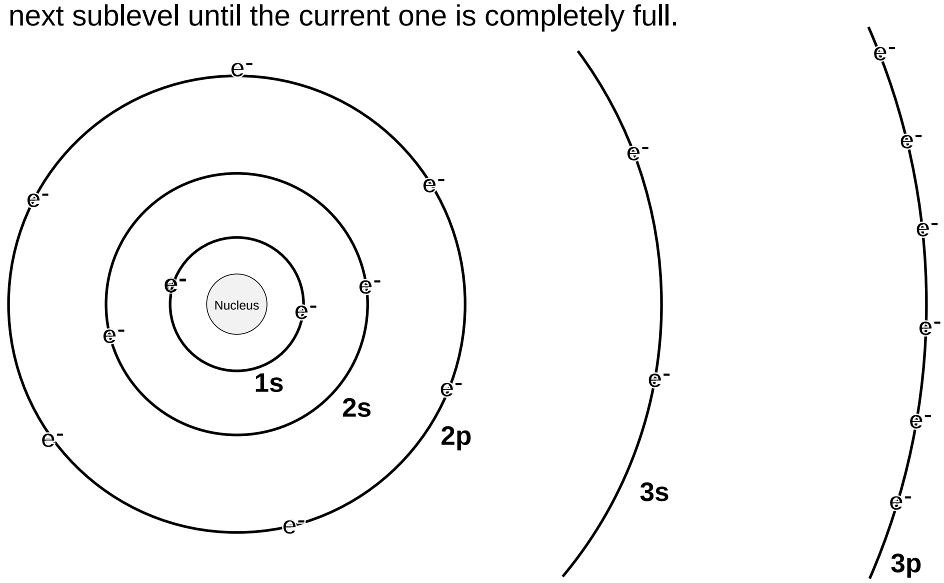
Student Handout 1 of 3: Periodic Law

Shielding its underlying premises and how to derive periodic trends using it:

1. Understand that electrons add to atoms according to sublevels and by and large you don't proceed to the next sublevel until the current one is completely full.



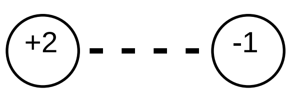
2. The other idea in shielding is that opposite charges attract (electrostatic attraction) and the greater the charge of the nucleus that an outer electron sees, the greater the force of attraction between that electron and the nucleus.

Shielding says that electrons essentially only see the positive charge of the nucleus that is not blocked out by electrons occupying inner sublevels.

For example,

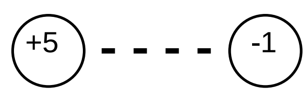
the outer electrons of Si ([Ne]$3s^2 3p^2$) essentially only see approximately +2 charge from the nucleus whereas the outer electrons of Cl ([Ne]$3s^2 3p^5$) essentially see a +5 charge from the nucleus.

force of attraction between



is less than

the force of attraction between



So the electrons of Cl are pulled in more tightly than that of Si. You can use this idea to predict trends in **Atomic Size** of atoms as you move across a period. The greater the charge difference between the shielded nucleus and the outer electrons, the greater attractive force and thus the smaller the atomic radius. As you go across the periods atomic radius decreases. (As you go down the groups you are simply adding energy levels and thus increasing atomic radius.)

Atomic Radius