Remember that the most stable electron arrangement for an atom is a full valence shell.

Atoms will tend to either gain or lose electrons to end up with a full shell...this is how they form ions.

In the periodic table, the groups of elements (vertical columns) are arranged to place elements with similar electron formations together. These groups will form ions in similar ways, and will share some chemical properties.
1) Group I: the Alkali Metals
2) **Group 2: the Alkaline Earth Metals**
5) Group 17: the Halogens
4) Groups 13-16: Nonmetals
3) Groups 3-12: the Transition Metals

Many of these can form more than one ion.

Ex: $\text{Fe}^{2+} \rightarrow \text{Fe}^{3+}$
6) Group 18: the Noble Gases (or *Inert Gases*)
7) Hydrogen

When H reacts with another nonmetal, the result is an ACID.

\[ \text{HF}_{(aq)} \quad \text{H}_2\text{S}_{(aq)} \quad \text{HCl}_{(aq)} \]
Homework - Review Questions from last night

Complete Questions # 1-4 on page 189
1.  (a) How do metals form ionic compounds with non-metals?

Ionic compounds are formed when metals give up electrons to nonmetals, resulting in both atoms having full valence shells (stable structure).

The ionic compound is held together by the difference in the charges of the positive ions (metals) and negative ions (nonmetals).

When an ionic compound is formed, the total of all positive and negative charges must equal zero. This is because every electron which is given away (forming a positive ion) must be picked up by another atom (forming a negative ion).
When naming an ionic compound, always name the metal first, and the non-metal second.

The negative ion formed by the nonmetal is named by changing the ending to -ide.

When writing the formula, you also write the positive ion (metal) first, and the negative ion (nonmetal) second.
1. (b) Explain the process with an example.

\[
\text{Sodium (Na)} + \text{Oxygen (O)} \rightarrow \text{Sodium oxide (Na}_2\text{O)}
\]
2. Beryllium and fluorine react to form an ionic compound.
   (a) Which is the metal and which is the nonmetal?
   (b-g) Draw Bohr diagrams to show how electron transfer forms the compound, indicate the ionic charges, and name the compound.

**Be**

**F**

**Compound Formula:** $\text{BeF}_2$

**Compound Name:** Beryllium Fluoride
3. Repeat question 2 for the compound formed by aluminum and fluorine.

Compound Formula: 

Compound Name:
Homework

4. What part of the atom is involved in making chemical bonds?

Valence Electrons!
Lithium

1+
Li

Li

Li

\(\text{Li}_3\text{N}\)

Nitrogen

\(\text{N}^3-\)

\(\text{N}\)

Lithium nitride
Aluminum

\[ \text{Al}^{3+} \]

\[ \text{Al}^{3+} \]

Oxygen.

\[ \text{O}^{2-} \]

\[ \text{O}^{2-} \]

\[ \text{O}^{2-} \]

Formula: \( \text{Al}_2\text{O}_3 \)

Name: Aluminum Oxide
Homework for the weekend

Read section 5.8, pages 193-195 in your text.

Complete Questions #1-6 on page 195
Transition Metals

Balancing formulas that include transition metals follows the same rules as with any other ionic compounds, with one exception:

*Many of the transition metals have more than a single possible charge, so there may be multiple possible compounds formed with the same nonmetal.

For example, Copper may form either a 2+ or a 1+ ion. When combined with the nonmetal Sulfur, this gives two possible compounds.
Balance the two possible combinations of copper and sulfur:

\[ \text{Cu}^{2+} + \text{S}^{2-} \quad \text{Cu}^{1+} + \text{S}^{2-} \]

When naming compounds formed by transition metals, a Roman numeral indicates which ionic charge the transition metal carries.

\[ \text{Cu}_2\text{S}_2 \downarrow \text{Reduce} \]

Copper(II) Sulfide

\[ \text{Cu}_2\text{S} \]

Copper(I) Sulfide
Find formulas for the two possible compounds of cobalt and nitrogen.

Co^{2+} N_3^- | Co^{3+} N_3^-

\[ \text{Co}_3 N_2 \]  \[ \text{Cobalt(II) Nitride} \]

\[ \text{Cobalt(III) Nitride} \]

Name the compounds
<table>
<thead>
<tr>
<th>Transition Metals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Find formulas for the two possible compounds, and name them.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Nickel and oxygen</th>
<th>Titanium and sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{Ni}^{2+} \text{O}^{2-}$</td>
<td>$\text{Ti}^{4+} \text{S}^{2-}$</td>
</tr>
<tr>
<td>$\text{Ni}:\text{O}$</td>
<td>$\text{Ti}:\text{S}_2$</td>
</tr>
<tr>
<td>$\text{NiCl}^{(II)}_{0.5} \text{H}_2$</td>
<td>$\text{TiCl}^{(IV)}_{1.5} \text{Sulphide}$</td>
</tr>
<tr>
<td>$\text{NiCl}^{(II)}<em>{0.5} \text{O}</em>{2.4}$</td>
<td>$\text{Ti}^{3+} \text{S}^{2-}$</td>
</tr>
<tr>
<td>$\text{NiCl}^{(III)}_{0.5} \text{Sulphide}$</td>
<td>$\text{Ti}_2\text{S}_3$</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Iron and nitrogen</th>
<th>Mercury and sulfur</th>
</tr>
</thead>
<tbody>
<tr>
<td>$\text{Fe}^{3+} \text{N}$</td>
<td></td>
</tr>
<tr>
<td>$\text{Fe}:\text{N}$</td>
<td></td>
</tr>
<tr>
<td>$\text{Fe}<em>{1.5} \text{N}</em>{2}$</td>
<td></td>
</tr>
<tr>
<td>$\text{Fe}<em>{2.5} \text{N}</em>{3}$</td>
<td></td>
</tr>
</tbody>
</table>

**Title:** Feb 12-6:47 PM (24 of 34)
Silver and phosphorous.

$\text{Ag} + \text{P}^\text{3-} \rightarrow \text{Ag}_3\text{P}$

Silver phosphide
Transition Metals

Name the following compounds:

- CuCl
- Ti$_3$N$_4$
- CuF$_2$
- CrS
- Fe$_3$P$_2$
- Fe$_2$O$_3$
- CoBr$_3$
- Ni$_3$N$_2$
- PbI$_4$
$\text{Fe}^{2+} \rightarrow \text{Fe}_2\text{P}_3$  \hspace{1cm} \text{Iron (II) Phosphide}
Exothermic - give off heat (feel hot)

Endothermic - absorb heat (feel cold)
Magnesium Ion.

\[ p:12^+ \quad n:12 \quad e:12^{10^-} \]

\[ 12^+ \quad 10^- \quad \frac{10^-}{2^+} \]
Oxygen Ion

P 8
N 8
C 810

P 8
e - 8
Complete the Ionic Compounds Sheet
Drawing the Formation of Ionic Compounds

Sodium Chloride

Na

P: 11 +
E: 10 -
1+

Cl

P: 17 +
E: 18 -
1-

NaCl

Sodium chloride
Lithium & Oxygen

Lithium oxide

$\text{Li}_2\text{O}$