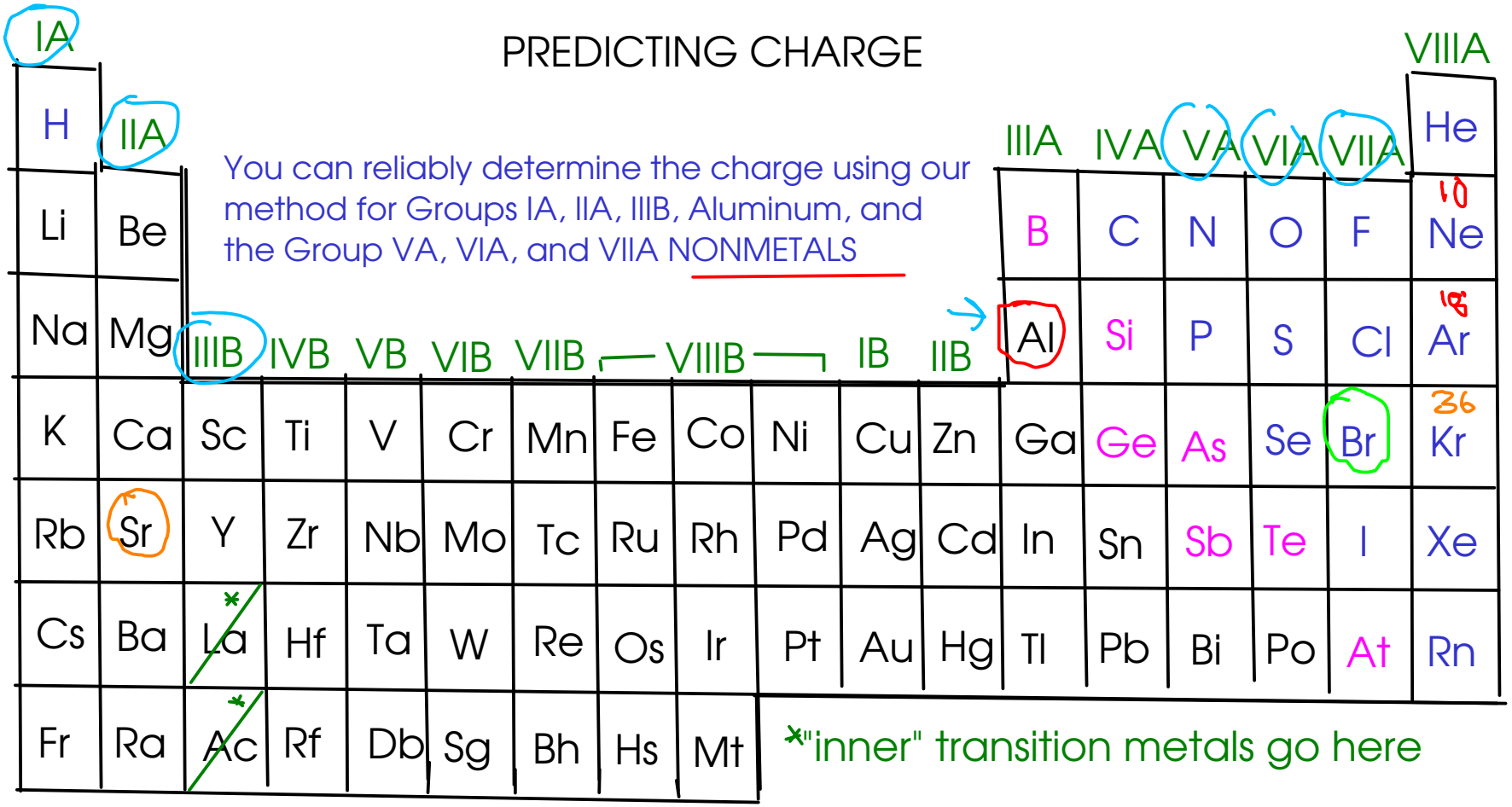
PREDICTING CHARGE



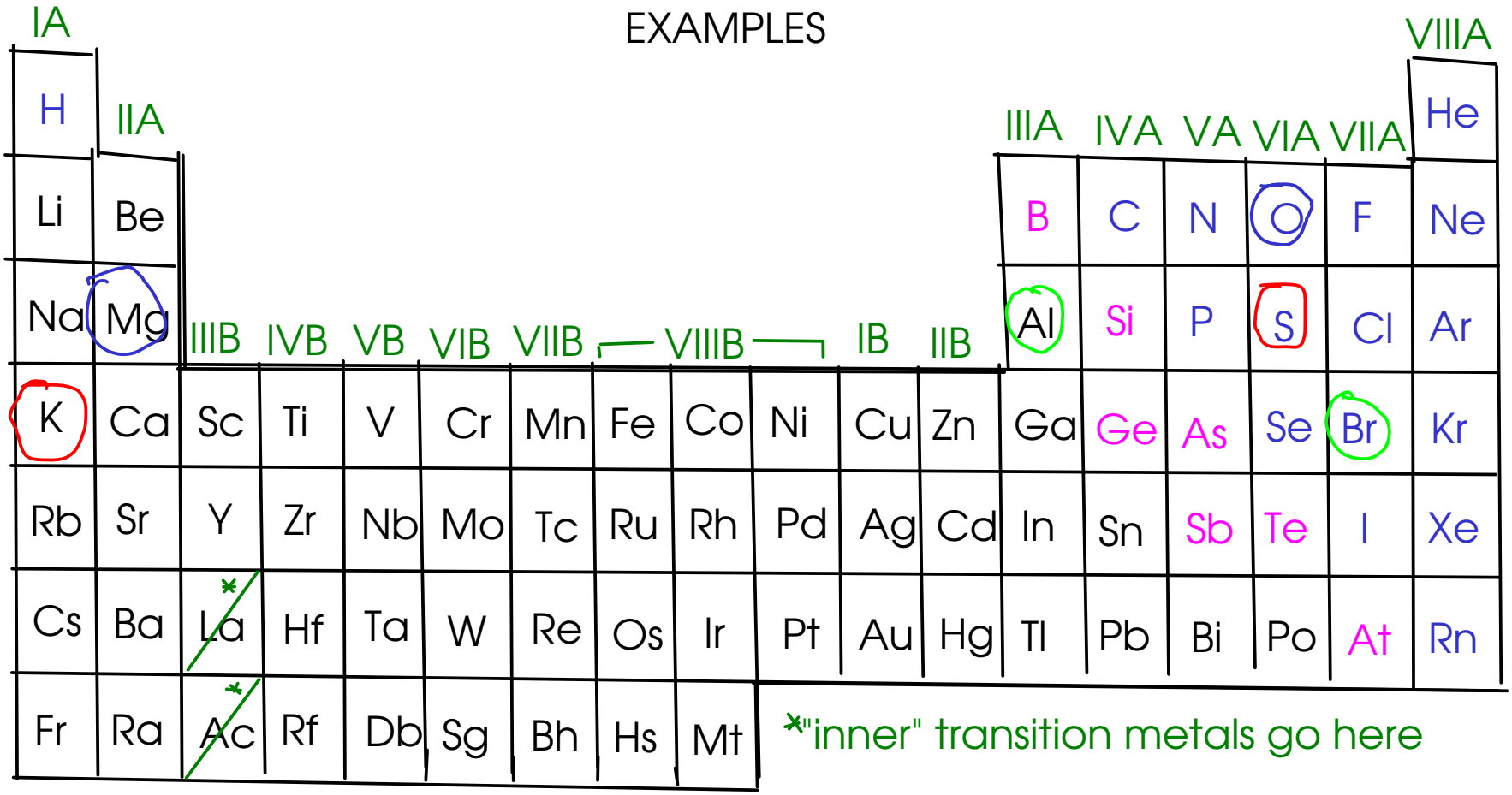
You can reliably determine the charge using our method for Groups IA, IIA, IIIB, Aluminum, and the Group VA, VIA, and VIIA NONMETALS

Aluminum (Al): At atomic number 13, it is three electrons away from neon (Ne), and 5 electrons away from argon (Ar). Prediction: Aluminum will lose three electrons to form the cation Al^{3+}

Bromine (Br): At atomic number 35, bromine is one electron away from krypton (Kr). Prediction: Bromine will gain one electron to form the anion Br^{-}

Strontium (Sr): At atomic number 38, strontium is two electrons away from krypton. Prediction: Strontium will lose two electrons to form the cation Sr^{2+}

EXAMPLES



Find the formulas of:

(1) an ionic compound containing Al and Br

(2) an ionic compound containing Mg and O

(3) an ionic compound containing S and K

Al^{3+} Br^{-}

Mg^{2+} O^{2-}

S^{2-} K^{+}

Find the formula of:
* an ionic compound containing Al and Br

Al^{3+} Br^- .
Br^-
Br^-

$AlBr_3$

Find the formula of:
* an ionic compound containing Mg and O

Mg^{2+} O^{2-}

MgO

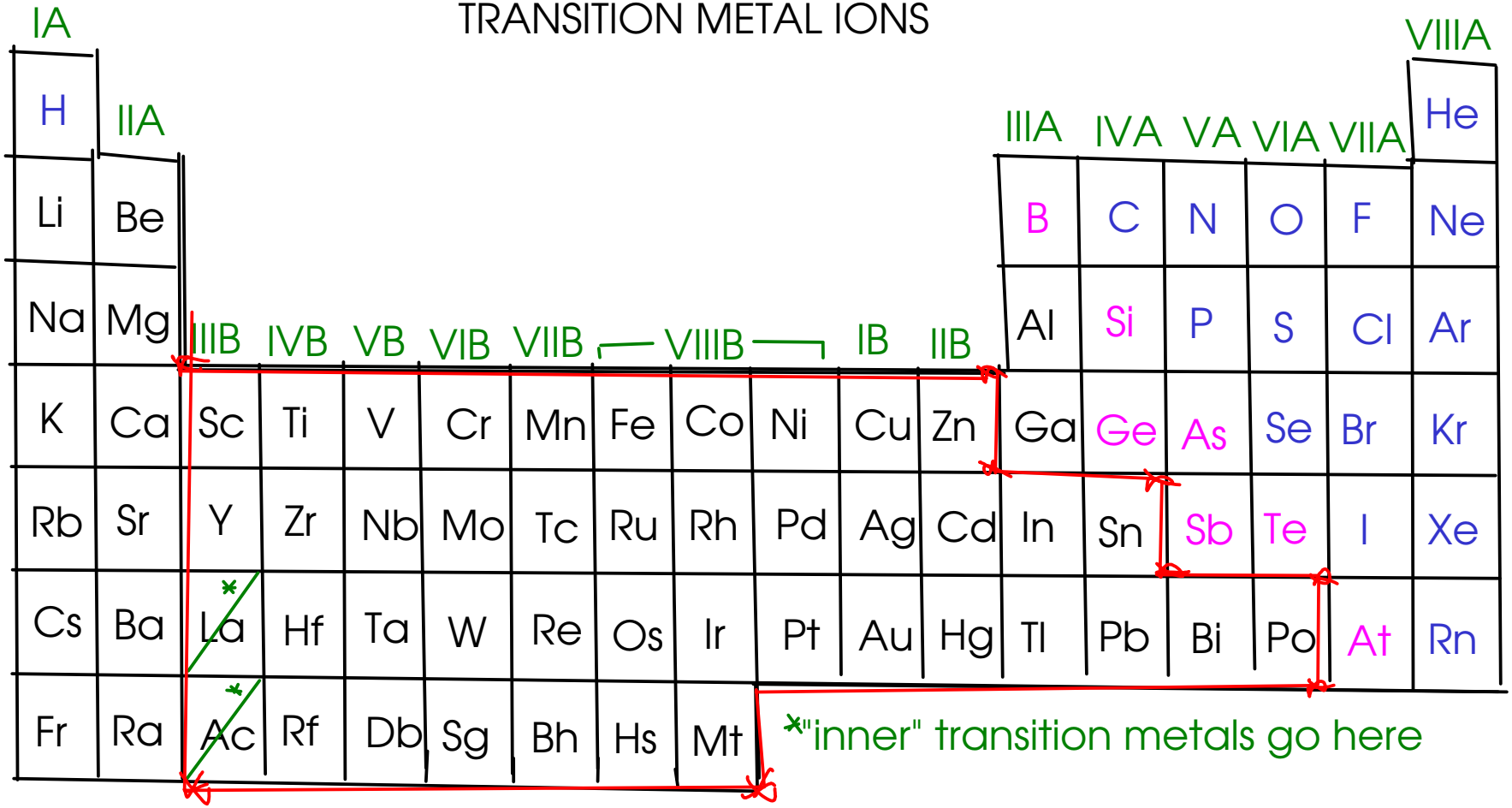
Find the formula of:
* an ionic compound containing S and K

S^{2-} K^+
K^+

K_2S ~~SK_2~~

Remember: When writing the formulas of ionic compounds, always put the CATION first!

TRANSITION METAL IONS



The transition metals always form CATIONS!

However, many transition metals are capable of forming SEVERAL DIFFERENT CATIONS!

Example: Iron (Fe) forms two cations, depending on the situation: Fe^{2+} or Fe^{3+}

TRANSITION METAL CATIONS

- So how do you know which cation you're dealing with? For now, you'll have to be told

- Either the chemical formula of an ionic compound or the name of an ionic compound can tell you what charge is on the transition metal cation.

Examples:

Fe_3N_2

Fe^{2+} N^{3-}

Fe^{2+} N^{3-}

Fe^{2+}

+6 −6

This compound has iron ions with a +2 charge. This form of iron is called "iron(II)" pronounced "iron two"!

FeN

Fe^{3+} N^{3-}

+3 −3

This compound has iron ions with a +3 charge. This form of iron is called "iron(III)" pronounced "iron three"!

POLYATOMIC IONS

- Some MOLECULES can gain or lose electrons to form CATIONS or ANIONS. These are called POLYATOMIC IONS

- Polyatomic ions form ionic compounds in the same way that single-element ions do.

Example: CO_3^{2-} : carbonate ion

Compare these formulas!

Al^{3+} O^{2-}
Al^{3+} O^{2-}
O^{2-}

Al_2O_3

Al^{3+} CO_3^{2-}
Al^{3+} CO_3^{2-}
CO_3^{2-}

$Al_2(CO_3)_3$

* Use parenthesis when an ionic compound's formula contains more than one of a polyatomic ion.

A chart of common polyatomic ions is available on the course web site!