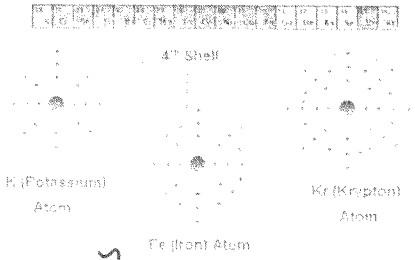
Name:_____ Block:_____ **Trends: Ion Charge in the Main Block Elements**

- Octet Rule states: atoms will gain, lose, or share e⁻ to achieve 8 valence e⁻
- If you change the (electrons / protons) in an atom, you change the identity of that atom • The **charge** on an atom is due to the change in (electrons / protons)

Group	Element That Represents the Group	Noble-Gas Notation (Helps identify outer-most electrons)	# of valence e⁻	Draw the electron dot diagram	How many electrons must be gained to obey the octet rule?	How many electrons must be gained to obey the octet rule?	What is the easiest way to obey the octet rule?	Resulting in more protons or electrons?	Is it a cation or anion?	Ion Symbol	Trend Main Block Elements Ion Charge	Electron Configuration of the ION Identical to which noble gas	Atomic Size Change
1	Na	**$[Ne]3s^1$**	**1**	**Na•**	**7**	**1**	**lose 1 e⁻**	**1 more p^+**	☒ cation ☐ anion	**Na^+**	**Group 1 IONS** have 1+ charge	$1s^2 2s^2 2p^6$ Identical to **Neon**	**Smaller** b/c lost e⁻ =more p^+ than e⁻ = more nucleus attraction
2	Mg	$[Ne]3s^2$	2	$\cdot Mg \cdot$	6	2	lose 2e⁻	2 more p^+	☒ cation ☐ anion	Mg^{2+}	**Group 2 IONS** have 2+ charge	$1s^2 2s^2 2p^6$ Identical to Neon	Smaller
13	Al	$[Ne]3s^2 3p^1$	3	$\cdot \dot{A}l \cdot$	5	3	lose 3e⁻	3 more p^+	☒ cation ☐ anion	Al^{3+}	**Group 13 IONS** have 3+ charge	$1s^2 2s^2 2p^6$ Identical to Neon	Smaller
14	***There is no trend for the Group 14 Elements. Lead (Pb) & Tin (Sn) are like most of the Transition Metals.***												
15	P	**$[Ne]\ 3s^2 3p^3$**	**5**	$\cdot \dot{\underset{\cdot\cdot}{P}} :$	**3**	**5**	**gain 3 e⁻**	**3 more e⁻**	☐ cation ☒ anion	**P^{3-}**	**Group 15 IONS** have 3- charge	$1s^2 2s^2 2p^6 3s^2 3p^6$ Identical to **Argon**	**Bigger** b/c gain e⁻ =more e⁻ than p^+ = less nucleus attraction
16	S	$[Ne]3s^2 3p^4$	6	$\cdot \ddot{\underset{\cdot\cdot}{S}} :$	2	6	gain 2e⁻	2 more e⁻	☐ cation ☒ anion	S^{2-}	**Group 16 IONS** have 2- charge	$1s^2 2s^2 2p^6 3s^2 3p^6$ Identical to Argon	Bigger
17	Cl	$[Ne]3s^2 3p^5$	7	$: \ddot{\underset{\cdot\cdot}{Cl}} :$	1	7	gain 1e⁻	1 more e⁻	☐ cation ☒ anion	Cl^{1-}	**Group 17 IONS** have 1- charge	$1s^2 2s^2 2p^6 3s^2 3p^6$ Identical to Argon	Bigger
18	Ne	$[He]2s^2 2p^6$	8	$: \ddot{\underset{\cdot\cdot}{Ne}} :$	Ø already has 8	Ø already has 8	N/A already has 8	N/A no change in e⁻	Neither	A complete octet (8 valence e⁻) makes Neon (a Noble gas) unreactive	**Group 18** Noble Gases **do NOT form ions**	Keeps its own e⁻ configuration $1s^2 2s^2 2p^6$ Does not lose or gain electrons	no change in electrons ∴ stays the same

Every atom in a **period** has the same: energy level

All atoms in Period 4 have ____ Energy Levels



Number each group (use group name when applicable)

n = any energy level

- Write the group e⁻ configuration (use quantum letter **n** pg 160 table 4)
- **Draw** the general electron dot diagrams (pg 184 table 10)

1 Alkali Metals	2 Alkaline Earth Metals	Transition Metals 3-12	13	14	15	16	17 Halogens	18 Noble Gasses
H								He ns^2 :X:
ns^1 ·X	ns^2 :X	goes down energy level therefore N/A	ns^2np^1 :X·	ns^2np^2 ·X·	ns^2np^3 :X·	ns^2np^4 ·X:	ns^2np^5 :X:	ns^2np^6 :X:
Valence e⁻ 1	2	2	3	4	5	6	7	8 (except He=2)
Gain/lose e⁻ lose 1	lose 2	varies don't follow the octet rule!	lose 3	not enough info	gain 3	gain 2	gain 1	already Stable
charge 1+	2+		3+		3-	2-	1-	already Stable N/A

Every atom in a **group** has the same: Valence e⁻

All atoms in group 2 have ____ electrons in their outer energy levels