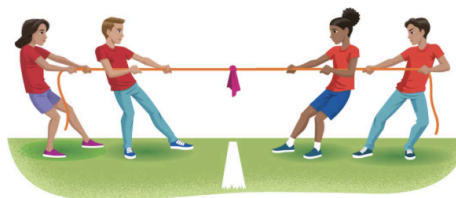


Final Exam Review Sheet

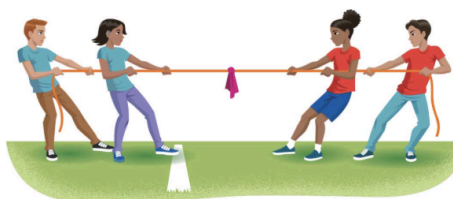
1. Electronegativity and Bonding

- **Electron Tug-of-War** Atoms are in a tug-of-war for bonding electrons, much like a knot in a rope is pulled toward opposite sides in a tug-of-war game.

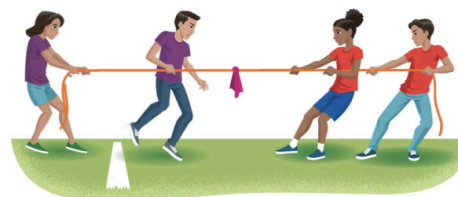
The knot in the rope is in the middle of the two teams because they are pulling with equal force. Likewise, electrons are shared equally between atoms in a **nonpolar covalent bond**.



One team is pulling harder than the other. The knot is pulled to their side. In **polar covalent bonds**, electrons are pulled closer to the atom that has the higher electronegativity.



One team has pulled much harder than the other team and has won the game. In **ionic bonds**, the atom with higher electronegativity pulls the electron(s) away from the other atom.



- Ionic bonds have an electronegativity difference greater than 2.0.
- A **polar covalent bond** is a bond in which electrons are shared but not shared equally between the atoms. The electronegativity difference of polar covalent bonds is between 0.4 and 2.0.
- A **nonpolar covalent bond** is a bond in which the electrons are shared equally. Nonpolar covalent bonds have minimal electronegativity differences (0.4 or less).

2. Periodic Trends

- **Atomic Radius**

Decreases left to right across a period and increases down a group

- **Ionization Energy**

Increases from left to right across a period and decreases down a group

- **Electronegativity (Electron Affinity)**

Increases from left to right across a period and decreases down a group

Groups (Families)

These are the **vertical columns** on the periodic table. Elements in the same group share similar chemical properties because they have the same number of valence electrons.

Periods

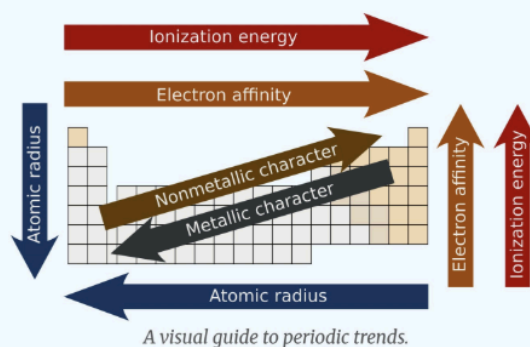
These are the **horizontal rows**. Elements in the same period have the same number of atomic orbitals (energy levels). Atomic properties change predictably across a period.

Key Periodic Trends

Atomic Radius: The distance from the nucleus to the outermost electron. It generally *decreases* from left to right across a period and *increases* down a group.

Ionization Energy: The energy required to remove an electron from an atom. It generally *increases* from left to right across a period and *decreases* down a group.

Electronegativity: An atom's ability to attract shared electrons in a chemical bond. It *increases* from left to right and *decreases* down a group.



** Please review your midterm exam and past quizzes.

** Focus on your class notes, and final class review.

