

# Unit 3 - Let's Get into Shape - Geometry, Bonding and Forces

Content Area: **Science**  
Course(s): **Chemistry Honors**  
Time Period: **October**  
Length: **4 weeks**  
Status: **Published**

## Transfer Skills

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The arrangement of atoms in a molecule determine the types of intermolecular forces, bonding and properties of substance.

## Enduring Understandings

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An atom's electron configuration determines who it interacts with to form bonds.

The octet rule is used to determine how atoms bond covalently with one another by sharing electrons.

Electronegativity can determine the polarity of atoms, their type of bond, and the strength of intermolecular forces.

The Lewis dot structure and electron domain placement determine the shapes and therefore the properties of molecules.

Strength of the intermolecular forces affects physical and chemical properties

## Essential Questions

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How does chemical bonding determine the properties of a substance?

How do the electronic structures of atoms determine the way in which they form chemical compounds?

How do electrons affect the shape of the molecule?

How does the molecular structure influence the properties of a substance?

How does the degree of polarity between two different atoms affect bonding?

## Content

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cation, anion, octet rule, metallic bond, lattice energy, multiple bond, polar covalent, non-polar covalent bond, van der Waals forces, dipole interaction, London Dispersion Forces, induced dipole Temporary dipole,

VSEPR theory, resonance, hybrid, sigma and pi bonds, binary compound, polyatomic ion, oxidation number

## Skills

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Draw electron dot structures of the representative elements.

Use the theory of metallic bonding to explain the physical properties of metals.

Differentiate between polar covalent, non-polar covalent and ionic bonds using electronegativity differences as well as location of elements on the periodic table.

Explain the role and location of electrons in covalent bonds and ionic bonds.

Determine the effect that multiple bonds have on the molecular geometry of a molecule and ion. Explain and draw resonance structures

Predict the shape of molecules and polarity using the VSEPR theory.

Describe the various intermolecular forces in a molecule and the affect they have on properties

## Resources

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## Standards

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SCI.9-12.5.1.12.A	Students understand core concepts and principles of science and use measurement and observation tools to assist in categorizing, representing, and interpreting the natural and designed world.
SCI.9-12.5.1.12.A.1	Refine interrelationships among concepts and patterns of evidence found in different central scientific explanations.
SCI.9-12.5.1.12.A.2	Develop and use mathematical, physical, and computational tools to build evidence-based models and to pose theories.
SCI.9-12.5.1.12.A.3	Use scientific principles and theories to build and refine standards for data collection, posing controls, and presenting evidence.
SCI.9-12.5.1.12.B.1	Design investigations, collect evidence, analyze data, and evaluate evidence to determine measures of central tendencies, causal/correlational relationships, and anomalous data.

SCI.9-12.5.1.12.B.2	Build, refine, and represent evidence-based models using mathematical, physical, and computational tools.
SCI.9-12.5.2.12	All students will understand that physical science principles, including fundamental ideas about matter, energy, and motion, are powerful conceptual tools for making sense of phenomena in physical, living, and Earth systems science.
SCI.9-12.5.2.12.A.2	Account for the differences in the physical properties of solids, liquids, and gases.
SCI.9-12.5.2.12.B	Substances can undergo physical or chemical changes to form new substances. Each change involves energy.
SCI.9-12.5.2.12.B.1	Model how the outermost electrons determine the reactivity of elements and the nature of the chemical bonds they tend to form.