Unit 9 – Bonding and the Shapes of Molecules – Learning Targets

	Beginning	Progressing	Mastered	
1	☐	☐	☐	I can describe that an atom's ability to bond to other atoms depends upon the number of valence electrons that atom possesses.
2	☐	☐	☐	I can predict the number of bonds an atom can form from its electron configuration or from its Lewis Dot Diagram.
3	☐	☐	☐	I can describe ionic bonds as the electrostatic bonds between a metal atom, which loses one or more electrons, and a non-metal atom, which gains one or more electrons, in order to fill its valence shell.
4	☐	☐	☐	I can define the terms *ionic bond* and *covalent bond*.
5	☐	☐	☐	I can explain the essential differences between an ionic bond and a covalent bond.
6	☐	☐	☐	I can use the differences in the electronegativities between two atoms to determine if a bond between them will be ionic, covalent, or polar covalent (partway between ionic and covalent).
7	☐	☐	☐	I can describe the physical and chemical properties of ionically bonded compounds, including higher melting and boiling points, lower vapor pressure, and crystalline lattice structure.
8	☐	☐	☐	I can compare the physical properties of two unknown substances and determine which one is ionic and which one is covalently bonded.
9	☐	☐	☐	I can describe covalent bonds as the shared pairs of electrons between non-metal atoms which result in a full valence shell for each atom.
10	☐	☐	☐	I can use the electronegativities of the bonding atoms to predict whether a covalent bond will be a polar or non-polar covalent bond.
11	☐	☐	☐	I can describe the physical and chemical properties of covalently bonded compounds, including lower melting and boiling points and higher vapor pressures.
12	☐	☐	☐	I can describe covalent molecules as forming the structures of living things (proteins, DNA, etc.) and of useful materials such as polymers.
13	☐	☐	☐	I can describe that, in metals, the outermost electrons are held so loosely that they are able to easily move among atoms, resulting in the characteristic properties of metals, such as malleability and electrical conductivity.
14	☐	☐	☐	I can use the Octet Rule and the number of valence electrons which each atom in a molecule has, to calculate the number of covalent bonds within that molecule.
15	☐	☐	☐	I can use physical models and the idea that shared pairs of electrons (covalent bonds) will repel each other to determine the shapes of covalent molecules.
16	☐	☐	☐	I can use the electronegativities of the atoms in a simple covalent molecule and the possible number of bonds each atom can form to determine which atom should be the "central" atom.

17☐ ☐ ☐ I can predict the geometry (shape) of the simple covalent molecule around the "central" atom, as linear, bent, planar triangular, trigonal pyramidal, tetrahedral. (Students may also be introduced to expanded octet geometries such as trigonal bipyramidal, octahedral, and their derivatives.)

18☐ ☐ ☐ I can define the terms *polarity* and *symmetry* as they apply to covalent molecules.

19☐ ☐ ☐ I can use the symmetry or lack of symmetry of a molecule to determine if it is non-polar or polar.

20☐ ☐ ☐ I can define intermolecular attractions (hydrogen bonds, permanent dipole-dipole interactions, and induced dipole-dipole interactions).

21☐ ☐ ☐ I can predict the effects that strong and weak intermolecular attractions have on the properties of substances including melting and boiling points, volatility, and vapor pressure.