Name:_____ Period:_____ Date:_____

What Is VSEPR?

Exploring The ***V***alence ***S***hell ***E***lectron ***P***air ***R***epulsion (VSEPR) model.

Go to the Purdue University website to explore VSEPR theory.
http://www.chem.purdue.edu/gchelp/vsepr/structur2.html

Start by clicking on What is VSEPR?

Explain in your own words what VSEPR theory is used for?

_____
_____
_____
_____

Now explore the Compare Two Structures link. Try changing the display to explore different combinations.

Describe in words what a linear molecule looks like.

_____
_____

Describe what a trigonal planar molecule looks like.

_____
_____

Describe what a tetrahedral molecule looks like.

_____
_____

So why do molecules form in these ways? Based on what you observed, what do you think determines the shape of the molecule?

_____
_____
_____
_____

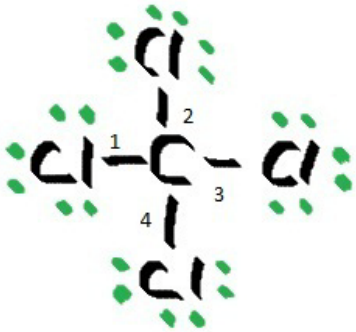
Let's explore further to determine if you are correct.

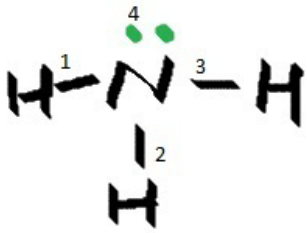
Click on the VSEPR Rules link to learn how molecules get their shape.

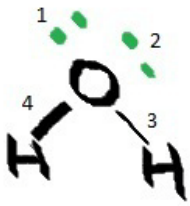
Rules for VSEPR

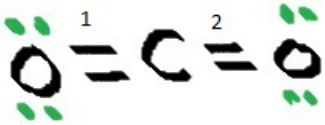
1. Draw the Lewis structure for the molecule or ion.

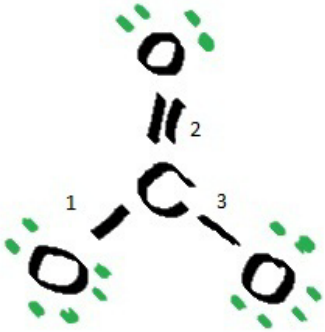
Examples of counting areas of high electron density - Count all bonded pairs and lone pairs of electrons touching the central atom.











2. Count the total number of regions of high electron density (bonding pairs and unshared electron pairs) around the central atom.

Click on the Examples link for more practice.

Now try it on your own: Count the regions of high electron density in the molecules given in the Test My Knowledge link, record three of these below.

Compound	Draw the Lewis Dot Structure	# of areas of high e^- density

3. Identify the most stable arrangement of the regions of high electron density as *ONE* of the following:
   a. linear
   b. trigonal planar
   c. tetrahedral

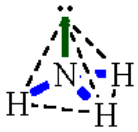
Note: There are more complicated geometric structures for central atoms with expanded octets. We have not learned these yet, but you are welcome to explore these further on the website.

Click on Arranging Regions of High Electron Density to help you fill in the chart below.

# regions of high electron density	best arrangement	description
2		
3		
4		

4. Now, determine the positions of the atoms based on the types of electron pairs present (i.e., bonding pairs vs. unshared pairs). Fill in the chart below to help you learn the different geometric configurations.

5. Identify the molecular structure based on the positions of the ATOMS (NOT the electron pairs) Click on Molecular Structures Based on VSEPR Theory to help you fill in the chart below.

Compound	Draw the Lewis Dot Structure	# of areas of high e^- density	Types of regions	Molecular structure	*Draw VSEPR Model*
$BeCl_2$			2 bonded 0 lone		
BF_3				trigonal planar	
NO_2^-		3			
NH_4^+			4 bonded 0 lone		
NH_3					
NH_2^-				bent	

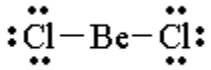
Name:_____ **Period:**_____ **Date:**_____

DIRECTIONS : Now that you have explored the VSEPR theory, we are going to try some practice. For each practice problem follow the rules for VSEPR theory to determine the molecular shape.

RULES FOR VSEPR THEORY

1. Draw the Lewis structure for the molecule or ion.
2. Count the total number of regions of high electron density (bonding and unshared electron pairs) around the central atom.
3. Identify the most stable arrangement of the regions of high electron density.
4. Determine the positions of the atoms based on the types of electron pairs (i.e., bonding pairs vs. unshared pairs).
5. Identify the molecular structure based on the positions of the *ATOMS* (NOT the electron pairs).

Example Problem #1: $BeCl_2$

	2	Linear	Cl – Be – Cl	Linear
Lewis Structure	**# e⁻ Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Problem #2: SO_3

Lewis Structure	**# e⁻ Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Problem #3: CH_4

Lewis Structure	**# e⁻ Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Problem #4: H_2O

Lewis Structure	**# e^- Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Problem #5: H_3O^+

Lewis Structure	**# e^- Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Now that you have tried these on your own. Go back to the Purdue University website and check how you did on each practice problem. http://www.chem.purdue.edu/gchelp/vsepr/structur2.html These are practice problems # 2, 3, 6 and 11 on the site.

Now that you have the hang of it, try these.

Problem #6: NO_3

Lewis Structure	**# e^- Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**

Problem #7: SiF_3

Lewis Structure	**# e^- Density Regions**	**Best Arrangement**	**Atom Position**	**Molecular Structure**