**Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Molecular Geometry VSEPR Lab**

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Guiding Question: How do non-bonded electron pairs affect the geometry, bond angle, and hybridization of compounds?

Pre-Lab:

1. Define VSEPR.
2. Explain the difference between bonded and non-bonded electron pairs.
3. Justify how to determine molecular polarity.

Procedure: Draw the Lewis dot structure for the molecule. Count the number of bonded and non-bonded pairs around the **central atom**. Determine the model piece needed to create your molecule (linear with 2 holes, planar with 3 holes, tetrahedral with 4 holes, trigonal bipyramidal with 5 holes, or octahedral with 6 holes). Then create your molecule and decide its overall geometry and bond angles, hybridization, and polarity. An example is given.

| **Molecule** | **Lewis Structure** | **Pairs on the Central Atom** | **Model**  **Piece Needed** | **Geometry** | **Bond Angle** | **Hybridization** | **Polarity** |
| --- | --- | --- | --- | --- | --- | --- | --- |
| H2O | http://1.bp.blogspot.com/-OlnUXIHKtDg/Teh5ekJUTjI/AAAAAAAAAD8/UIgoC2JK2PI/s1600/770px-Water-2D-flat.png | 2 single bonds  2 lone pairs | Tetrahedral | Bent | 109.5 |  |  |
| CF4 |  |  |  |  |  |  |  |
| NH3 |  |  |  |  |  |  |  |
| OF2 |  |  |  |  |  |  |  |
| HF |  |  |  |  |  |  |  |
| PF5 |  |  |  |  |  |  |  |
| SF4 |  |  |  |  |  |  |  |
| ClF3 |  |  |  |  |  |  |  |
| XeF2 |  |  |  |  |  |  |  |
| SF6 |  |  |  |  |  |  |  |
| BrF5 |  |  |  |  |  |  |  |
| XeF4 |  |  |  |  |  |  |  |

Follow Up Questions:

1. For the following compounds draw the Lewis structure and give the geometry. What do they all have in common?

N2 Br3- CO2

1. For the following compounds with 4 elements, draw the Lewis structure, give the geometry, and state what property made them all different shapes:

BF3 NH3 ClF3

1. For the following compounds with 5 elements, draw the Lewis structure, give the geometry, and state what property made them all different shapes:

SiH4 SeI4 XeI4

1. For the following compounds with 6 elements, draw the Lewis structure, give the geometry, and state what property made them all different shapes:

AsF5 IF5

1. Complete the T-chart below by adding all the compounds from the questions above that are nonpolar and polar in the correct column with their geometry.

| Nonpolar | | Polar | |
| --- | --- | --- | --- |
| Molecule | Geometry | Molecule | Geometry |
|  |  |  |  |
|  |  |  |  |
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|  |  |  |  |
|  |  |  |  |
|  |  |  |  |
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1. In terms of lone (unshared) pairs, what is similar about the shapes listed as polar in the data chart and question above?
2. Will all shapes that are fully bonded (no lone or unshared pairs on the central atom) always be considered nonpolar? Provide examples to support your answer.