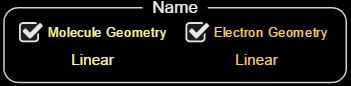
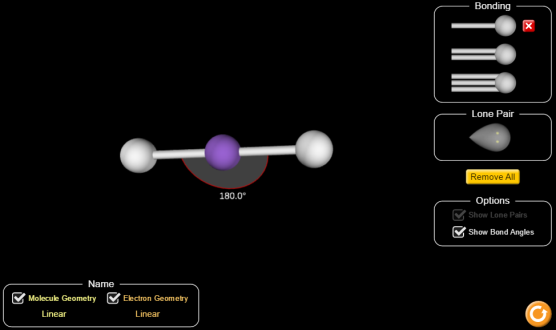


Click to run in

**PhET Molecule Shapes html5**

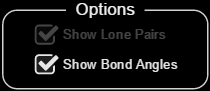
**CLICK!**



***Set-up***: Choose “Model”

Check the two “Name” tools and the “Show Bond Angles” box.

Play with the sim adding bonds and lone pairs.



***Part 1 Directions***: Draw pictures of 4 different molecules you create using bonds and lone pairs. Record geometries and angles, below.

|  |  |  |  |
| --- | --- | --- | --- |
| Picture 1 | Picture 2 | Picture 3 | Picture 4 |
| Molecule geometry | Molecule geometry | Molecule geometry | Molecule geometry |
| Electron geometry | Electron geometry | Electron geometry | Electron geometry |
| Bond angles | Bond angles | Bond angles | Bond angles |

***Part 1 Questions***:

1. How many bonds can you add total? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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1. How many lone pairs can you add total? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

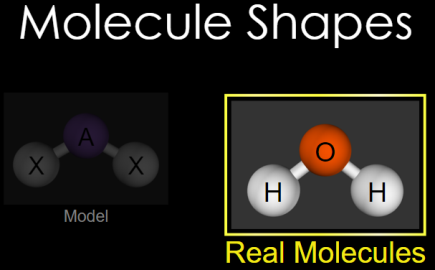
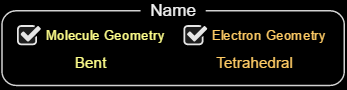
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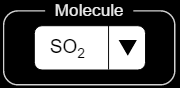
1. How many bonds and lone pairs can you add total? \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_

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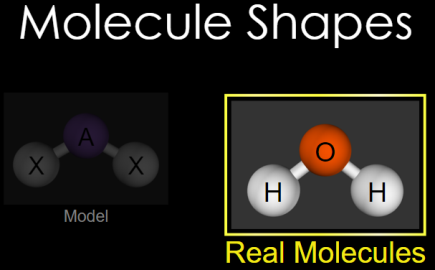
1. How can you make the molecule geometry be DIFFERENT than the Molecule geometry?
2. Molecules have shape! Drag and rotate them around.

|  |  |
| --- | --- |
| Which molecule geometries are 1D or 2D? (give at least 3!) | Which molecule geometries are 3D? (give at least 3!)  AA31 Labs |

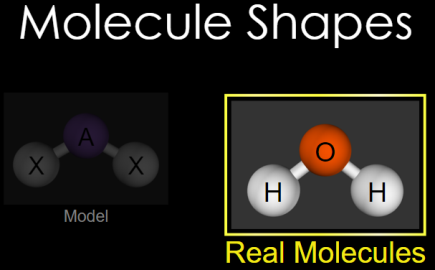
***Part 2 Set-up:***  Click Check boxes:



|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| ***Part 2 Directions:*** Turn molecules around with mouse. Describe each molecule in the table, below |  |  |  | NH3 |
|  |  |  |  | CH4 |
|  |  |  |  | SF4 |
|  |  |  |  | XeF4 |
|  |  |  |  | BrF5 |
|  |  |  |  | PCl5 |
|  |  |  |  | SF6 |

****

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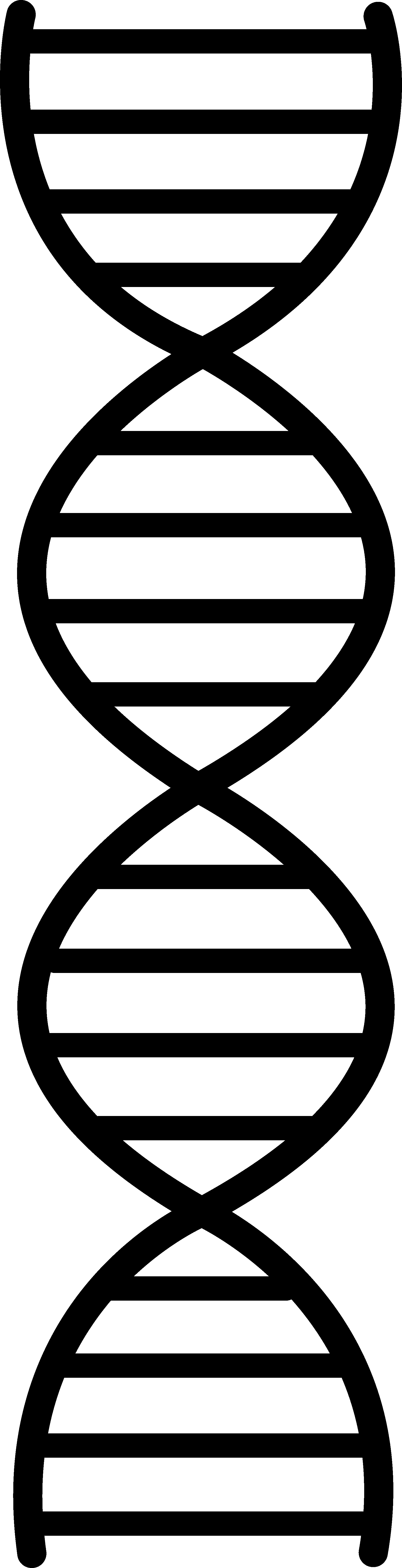


***Part 2 Questions***:

1. Can you change the shape of the molecules by twisting them around? **Y** or **N**
2. What happens to the molecules you dragged and twisted?
3. Are the bond angles in part 1 the same as the bond angles in part 2? Why do you think that they are the same/different?

***Going Further***:

1. Why do you think you cannot get more than 6 things around the central atom?
2. Organic molecules (like CH4) have carbon as the central atom. How many bonds can a carbon central atom support?
3. Is CH4 planar (2D)?
4. DNA is a large organic molecule that has a shape described as a “double helix” shown in a cartoon, right. Given what you know about the carbon molecule’s geometry (Q6) does this shape make sense? Why or why not?



http://www.clipartbest.com/clipart-nTXoXjoEc

Image credit:

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