Name: **ANSWERS** **{OPTIONAL PARTNER} Name:**

Molecular Shapes
Answers & Feedback

Next steps:

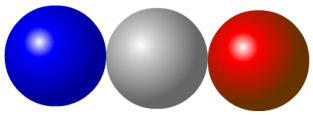
- Include a reflection in the comment section of this assignment and copy to your Learning Portfolio.
- Give yourself a mark out of 10 after you review the answers & feedback below.
- Describe at least one aspect you understand well (WHAT you understand, do not just say "I understand molecular shapes" as this doesn't show any knowledge)
- Describe one area you can improve on or something that started confusing but you understand now.

Instructions:

- Click **http://www.simbucket.com/simulation/chemthink-molecular-shapes/**
- Scroll down to the simulation and press the play button.
- Enter a random name in the guest section to access the Chemthink.
- Follow along and answer the questions below
- Prefer to Print this? -> Submit a document picture using Drive app - See Tech Q&A for how BEST to submit photos of work

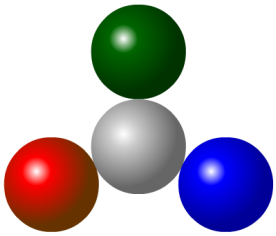
1. Where in a covalent bond are shared electrons the most likely to be found?
   They are most likely to be found somewhere between the 2 bonded atoms.

2. When you move the red (right) atom, what happens to the blue (left) one?
   When I try to move the red atom closer to the blue atom, this brings the covalent bonds closer together. They repel one another which is why this results in the blue atom moving farther away.



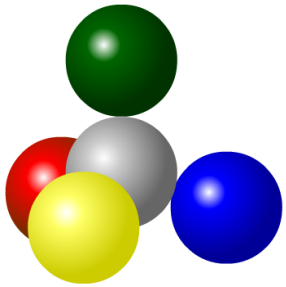
3. What bond angle forms between the red and blue atom?
   a. **180°**
   b. 120°
   c. 109.5°
   d. 90°

4. If there are **three** atoms bonded to the central atom, what angle forms between them?
   a. 180°
   b. **120°**

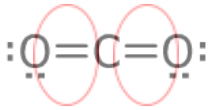


c. 109.5°
d. 90°

5. If there are **four** atoms bonded to the central atom, what angle forms between them?
   a. 180°
   b. 120°
   c. 109.5°
   d. 90°



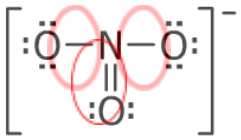
6. Circle the areas of electron concentration around the central atom in this molecule of carbon dioxide.



   a. Carbon dioxide takes a _____**linear**_____ molecular shape.

   b. The bond angle for carbon dioxide is: ___**180°**_____.

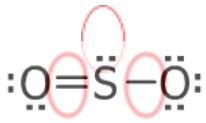
7. Circle the areas of electron concentration around the central atom in this nitrate molecule.
   FEEDBACK:
   - Make sure you circle lone pairs on central atom as areas of electron concentration that affect the shape of the molecule. (this applies to all this type of question).
   - The lone pair on any outer atoms are NOT areas of electron concentration as we are focusing on the central atom only for this concept as it is the electron concentration around the central atom that determines the 3D shape.



   a. Nitrate takes a ____**trigonal planar**_____ molecular shape.

   b. The bond angle for nitrate is: _____**120°**_____.

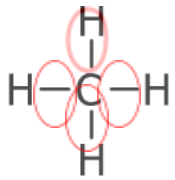
8. Circle the areas of electron concentration around the central atom in this sulfur dioxide molecule.



a. Sulfur dioxide takes a _____**bent**_____ molecular shape.

b. The bond angle for sulfur dioxide is: _____**~120°**_____.

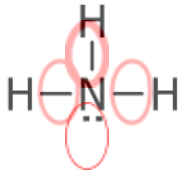
9. Circle the areas of electron concentration around the central atom in this methane molecule.



a. Methane takes a ____**tetrahedral**_____ molecular shape.

b. The bond angle for methane is: _____**109.5°**_____.

10. Circle the areas of electron concentration around the central atom in this ammonia molecule.



Ammonia takes a ___**trigonal pyramid**_____ molecular shape.

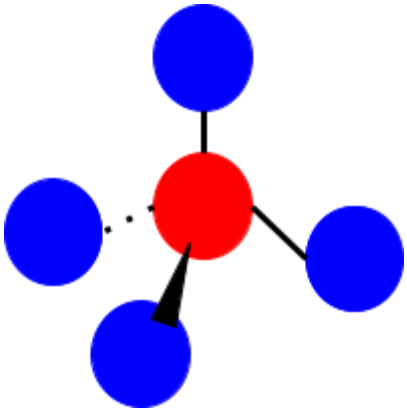
a. The bond angle for ammonia is: ___**109.5°**_____.

11. Circle the areas of electron concentration around the central atom in this water molecule.
FEEDBACK:
- You need to have completed the circling on electron concentrations and the questions as per feedback with Q #7 for all of #7-11.
- Review the shapes and matching angles of each, be sure to understand that lone pairs still repel bonded electron pairs and contribute to the shape of the molecule.

Water takes a _____**bent**_____ molecular shape.

a. The bond angle for water is: ___**109.5°**_____.

12. Draw the diagram for methane.
FEEDBACK: Make sure the electrons are represented by LINES ONLY between the atoms. Some students incorrectly draw Lewis structures with electron dots and a line between the dots. The line IS the two electrons in a bond. Ensure you have two different wedges, one dashed and one solid to show the 3D shape, with two simple lines for what is on the same plane as the page.



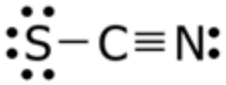
Red: Carbon
Blue: Hydrogen

a. What does the dashed line represent?
It means the atom is behind the central atom

b. What does the solid black wedge represent?
The atom is in front of the central atom

13. Click the "PROBLEMS" Button AFTER exiting the simulation and attempt the questions. Record anything you learned completing the problems below. (eg if you got one wrong, what did you learn?)
FEEDBACK: you MUST include something here, indicating you have completed the Problems section and solidified or improved your understanding. If you got all questions correct, include your reflective summary of your learning (how DO you get the questions right… I know to determine the correct shape by…). This can be your assignment reflection for the Learning Portfolio.

Ex: Thiocyanate only has 2 areas of electron concentration, the molecular structure would not be bent, it would be linear.



However, phosphorus trifluoride has 4 areas of concentration because the central atom (P) does have a lone pair. The molecular shape would be trigonal pyramidal.