Name: \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ **This Lab does not SUCK**

Guiding Question: How do suction cups work?

Materials: suction cups, vacuum chamber

Procedure and Obesrevations:

1. Push the suction cup onto the table top and pull it off. Experiment with the amount of force used to push the suction cup down with. How does the force you use to push the suction cup down affect how difficult it is to pull the suction cup off?
2. Push the suction cup onto the top of the lab bench and pull it off. Push the suction cup on the side of the lab bench and pull it off. Push the suction cup on a surface so it is upside down. Is it more, less, or the same difficulty to pull the suction cup off if it is pushed with the same force?

Team Discussion Questions:

1. What symbol(s) can we use to show the force on an object when we create models?
2. What is another word for force on an object? For example, if your friend tried to force you to join a club in school, you would feel “peer \_\_\_\_\_\_\_.” Explain your choice.
3. Gasses exert a force on everything they surround. You are just used to our atmospheric gasses held at 101.3kPa. Wave your hand near your face as if to cool off. That wind you made up of air particles. Why do you feel that force/wind? What are the particles doing to you?
4. When the suction cup is sitting loosely on the desk, how does the behavior of gas particles outside of the suction cup compare to those inside the suction cup?
5. Is there more pressure above the cup, below the cup, or equal when the cup is not “suctioned?”
6. When you pressed the suction cup to the desk with force to “suction it on” what happened to the gas particles inside and outside of the suction cup? Did they move?
7. When the suction cup is stuck to the desk, how does the behavior of gas particles outside of the suction cup compare to those inside the suction cup?
8. Is there more pressure above the cup, below the cup, or equal when the cup is “suctioned” to a surface?
9. Does the force of gravity play a role in how the suction cup works?
10. **Claim:**On your white boards, draw the suction cup sitting on the table before the push, during the push, and after it is pushed onto the table. Compare your models with other teams. Draw your final model below. Consider the following:
    * There is air both above and below the cup
    * Air always has a pressure, shown by colliding arrows with surfaces
    * More arrows or thicker arrows can show a stronger force or pressure
    * Consider which surface of the cup has more pressure, or are they equal
    * Be sure to EXPLAIN BY DRAWING how the suction cup stays on a surface

| Before push | During push | After push |
| --- | --- | --- |
|  |  |  |

1. **Reasoning:** Explain in words how a suction cup works.

Class Demo: What happens when the suction cup is placed in the vacuum chamber?

1. Describe what a vacuum chamber does when it is powered on.
2. Describe what happened to the suction cup when the vacuum pump was powered on.
3. Explain why the name suction cup is not an accurate name by describing what was actually happening to keep a cup stuck on a surface.

BONUS: Come up with a new name for suction cups that is more descriptive of what is happening on the particulate level. If I love it, you might get an extra point :)