**Name:\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Gas Laws Lab**

**Guiding Question:** What is the relationship, if any, between pressure, volume, and temperature when studying gasses particles?

**Pre-Lab Questions:**

1. When the temperature of a gas is increased, explain what happens to the energy of the gas particles.
2. What does a vacuum chamber do to the amount of air particles inside the chamber?

**Procedure:** Observe the demonstrations from your teacher. Record your observations in the table below.

**Data**

|  | **OBSERVATIONS** |
| --- | --- |
| **Balloon in Flask** |  |
| **Ping Pong Ball in Boiling water** |  |
| **Egg in Flask** |  |
| **Balloon/Shaving Cream/Marshmallow in Vacuum Chamber** |  |
| **Can demo** |  |

**Questions**: For questions 1-5, explain the observations for each demonstration with a narrative explanation in the first box below the descriptions. Describe the changes in **Pressure (internal and external), Volume, and Temperature.** Then create a before and after model to demonstrate what happened. Keep in mind these modeling rules:

* Use circles to represent gas particles both inside and outside of the system.
* Use arrows to show the particle movement and stars for collisions.
* The higher the temperature, the longer the arrow due to more movement.
* The more collisions, the more pressure the gas exerts on the container.
* Be aware of how close or spread out your particles are to account for their volume.

|  | **Describe** | **Model Before Change** | **Model After Change** |
| --- | --- | --- | --- |
| 1. | **Explain** the gas law that is being represented in the “balloon in flask” demo. Specifically explain what happened to the balloon when the flask was placed in hot versus cold water.  | COLD | HOT |
| 2. | **Explain** the gas law that is being represented by the “ping pong ball”. Specifically explain what happened to the ping pong ball when it was placed in boiling water. | ROOM TEMP dented | HOT |
| 3. | **Explain** what happened in the “egg in flask” demo when flames weren’t present and then when they were. | BEFORE | AFTER |
| 4. | **Explain** the gas law that is being represented by the “balloon/shaving cream/marshmallow in vacuum chamber”. Specifically explain what happened to the balloon when the air was removed from the chamber. | ROOM PRESSURE | AFTER PUMPING |
| 5. | In the “can demo” **explain** what occurred at the particle level to the gas particles (steam) when we heated the can in the “can demo”? Also, **explain** what happened at the particle level to the gas particles (steam) when the can was placed in the cold water in the “can demo”?  | HOT | COLD |

6. Claim: Fill in the blanks with the correct mathematical relationship between each of the variables.

* 1. External pressure and volume have a(n) \_\_\_\_\_\_\_\_\_\_\_\_ relationship.
	2. Internal pressure and temperature have a(n) \_\_\_\_\_\_\_\_\_\_\_\_ relationship.

* 1. Temperature and volume have a(n) \_\_\_\_\_\_\_\_\_\_\_\_ relationship. 

7. Evidence: Provide details of the examples from the lab to defend your relationships above.Write those notes under each question above.