***Quick - PhET Gas Intro (Google “PhET Gas Intro > Choose” Gases Intro” > click on the arrow button)* Play around with the interactive for a few minutes….then hit the orange reset button. Change temperature to Celsius, click width and wall collisions, and click on the green + sign for Particles.**

**Temperature and Pressure *-*** *How does increasing temperature affect pressure?*

**Manipulated Variable (Independent) =**

**Responding Variable (Dependent) =**

**Controlled Variables (constants) (2) =**

**☺ FYI – a picosecond is 1 trillionth of a second!!**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test # | Mass  # of aps | Length of box nm (volume) | Temperature (C) | Pressure (Atm)  atm is a unit used to measure pressure | # Wall Collisions  per 10 picoseconds |
| 1 | 500 | 10nm |  |  |  |
| 2 | 500 | 10nm |  |  |  |
| 3 | 500 | 10nm |  |  |  |

*You may only use the words* ***increase*** *and/or* ***decrease*** *to fill in the blanks for each sentence.*

When temperature \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.

**Volume and Pressure -** *How does increasing volume affect pressure?*

MV =

FYI a nanometer (nm) is 1 billionth of a meter

RV =

CV (2) =

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test # | Mass  # of aps | Temperature  (C) | Length of box (nm)  (Volume) | Pressure (atm)  atm is a unit used to measure pressure | # Wall Collisions  per 10 picoseconds |
| 1 | 700 | 75 C | 5 nm |  |  |
| 2 | 700 | 75 C | 10 nm |  |  |
| 3 | 700 | 75 C | 15 nm |  |  |

*When volume \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

**Mass (# Particles) and Pressure -** *How does increasing mass (# of particles) affect pressure?*

MV =

RV =

CV (2) =

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Test # | Length (volume) | Temperature (C) | Mass  (# of Particles) | Pressure | # Wall Collisions  per 10 picoseconds |
| 1 | 10 nm | 100 C |  |  |  |
| 2 | 10 nm | 100 C |  |  |  |
| 3 | 10 nm | 100 C |  |  |  |

*When mass (# of aps) \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_, pressure \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_.*

***Turn the paper over and graph your data!***

When graphing variables, remember the acronyms...

**MIX = Manipulated, Independent variable on the X axis**

**DRY = Dependent, Responding variable on the Y axis**

|  |  |
| --- | --- |
| ***Temperature vs Pressure*** graph  xy | Explain your reasoning for the graph’s appearance |
| ***Volume vs Pressure*** graph  xy | Explain your reasoning for the graph’s appearance |
| ***# Particles vs Pressure*** graph  xy | Explain your reasoning for the graph’s appearance |

**Thinking Questions:**

1. Explain how the pressure in the box and number of wall collisions are related.
2. An inverse relationship means as one variable increases, the other variable decreases. Which two variables are inversely related?