**Gas Simulator**

1. Go to <http://phet.colorado.edu/en/simulation/gas-properties> (you can google “phet gas law” and it’s the first result). Once on the website click the green button that says “Run Now!”

2. Notice the features of the simulator – there is a thermometer at the top, a heat control at the bottom, a pump for adding gas, a pressure gauge (the dial on the right) , and some options to change in the boxes on the far right.

* *With no gas in the box, the pressure reading is zero. Why? – What does pressure measure?*

3. Click on the handle and pump it up and down, putting some gas into the box. The blue spheres represent molecules of gas.

* *Describe the motion of the molecules, including (a) the collisions that occur, (b) whether they move in patterns or random motion, (c) movement in straight lines or curves, and (d) all at the same speed or different speeds.*
* *What is the temperature and what does temperature say about the molecules?*

4. Pump the handle again, adding more gas molecules. Note how the pressure changes.

* *What happened to the pressure with more gas molecule? Use the definition of pressure to explain the difference.*

5. Click the reset button. In the box for “Heavy Species” type 50 and press enter. Wait ten seconds and note the pressure. At the bottom, add heat until the temperature is about 500 K. Pay attention to how the motion of the molecules changes. Wait about ten seconds and note the pressure.

* *At the higher temperature, how is the motion of the molecules different?*
* *How did the pressure value at the higher temperature compare to the lower temperature? How does the motion of the molecules explain this?*

6. At the bottom, remove heat until the temperature is about 100 K. Pay attention to how the motion of the molecules changes. Wait about ten seconds and note the pressure.

* *At the low temperature, how is the motion of the molecules different?*
* *How did the pressure value at the higher temperature compare to the lower temperature? How does the motion of the molecules explain this?*

7. Click the reset button. In the heavy species box, type 100 and press enter. Wait about ten seconds. Note the motion of the particles and the pressure. Click the reset button. In the light species box, type 100 and press enter. Wait about ten seconds. Note the motion of the particles and the pressure.

* *How does the motion of the two different gases compare?*
* *How do the pressures of 100 molecules of the two different gases compare?*

8. Click the reset button. In the heavy species box, enter 100 and press enter. Wait ten seconds, then note the pressure. Click the reset button. Drag the little man to the right so that the volume of the box is about half its original volume. In the heavy species box, enter 100 and press enter. Wait ten seconds, then note the pressure.

* *How does the pressure of the smaller volume compare to the original? Use the definition of pressure to explain this difference.*

9. Click the reset button. In the heavy species box, enter 100 and press enter. In the “Constant Parameter” box at the top right, select “pressure” (now the size of the box can change while pressure remains constant). Use the heat control to add and remove heat to see what effect this has on the volume of the gas.

* *Write a sentence that summarizes the relationship of temperature and gas volume.*