Boyle's Law

PA State Standards:

3.4.10.A   Describe concepts about the structure and properties of matter.

2.5.11.B   Use symbols, mathematical terminology, standard notation, mathematical rules, graphing and other types of mathematical representations to communicate observations, predictions, concepts, procedures, generalizations, ideas and results.

1.2.11.A   Read and understand the central content of informational texts and documents in all academic areas.

Introduction:

There are four important variables to be measured when dealing with a gas. They include pressure, volume, mass, and temperature. The relationships between these variables can be determined by holding one or two of the variables constant. Boyle's Law deals with the relationship between pressure and volume. In this experiment, the relationship between pressure and volume will be determined. The volume of a gas will be measured while changing its pressure. Mass and temperature will remain constant.

Guiding Question:

Please answer the following question before beginning the lab.

What will a graph of pressure vs. volume look like? Draw a graph below.

Materials:

Thin-stemmed pipets filled with colored water and sealed

Four textbooks

Safety:

- Always wear safety goggles in the laboratory.

Procedure:
1. Lay the pipet flat on the tabletop and measure the volume of air trapped in the stem of the pipet in cm. Record the data in the data section.

2. Place one book on the bulb of the pipet and again measure the volume of air trapped in the stem of the pipet.

3. Place a second book on top of the first book on the bulb of the pipet and measure the volume of air trapped in the stem of the pipet.

4. Repeat until a total of four books are on top of the bulb of the pipet.

Data:

Pressure (number of books)	Volume (cm)
0	
1	
2	
3	
4	

Calculation:
Graph volume vs. pressure.

Questions:
1. What is the relationship between pressure and volume?

2. Explain the relationship between pressure and volume in terms of molecular theory.

3. Why can the distance between the end of the liquid in the pipet and the end of the pipet be used as volume?

4. What would the volume be in the stem of the pipet if 2.5 books were placed on the bulb of the pipet?