Name_____ Period_____

IDEAL GAS LAW LAB

Objective

Determine the number of moles of air present in a syringe.

Theory

In this lab you will use a gas pressure sensor to record changes in pressure relative to change in volume. You will use this information along with the Ideal Gas Law to determine the number of moles of air in 20mL at room temperature.

$$PV = nRT$$
$$\frac{PV}{RT} = n$$

The temperature and gas constant will not change and the value of PV will be determined from a graph (hint!).

Materials

- Vernier LabQuest
- 20 mL plastic syringe
- Vernier Gas Pressure Sensor
- Vernier Stainless Steel Temperature Probe

Procedure

- 1. Plug in and turn on LabQuest.
- 2. Connect pressure sensor to channel 1.
- 3. Connect temperature probe to channel 2.
- 4. Retract syringe to 20 mL.
- 5. Connect syringe to pressure sensor.



- 6. Record the temperature of the room.
- 7. Record the pressure and volume in your table.
- 8. Decrease the volume by 2 mL and repeat step 7.
- 9. Continue until you reach 10 mL.

<u>Data</u>

Temperature (K) =

V (mL)	V (m ³)	P (Pa)
20		
18		
16		
14		
12		
10		

(Hint: $1 \text{ m}^3 = 1 \times 10^6 \text{ mL}$)

Analysis

Plot the data on the graph below, labeling the axes with appropriate numbers to indicate the scale.



The graph probably needs to be linearized. Make a table with the changes you made to the data and plot the data on the graph below. You can put your table beside the graph below.



• Determine the number of moles of air in the syringe. Show the information you took from the graph to help you. You can use Logger Pro to do the linear fit, but you must plot your graph above. Show all steps clearly for determining the number of moles of air in the syringe.