TEACHER INFORMATION

Under Pressure: Inverse Relationships

1. There are currently 2 different combinations of equipment that will work for collecting pressure data. The most common method, which works for both the TI-83 Plus and TI-84 Plus families of calculators, is to use a Gas Pressure Sensor attached to a CBL 2 or LabPro.

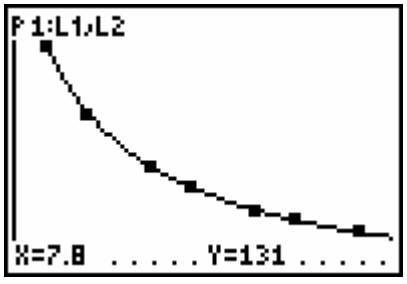
   The TI-84 Plus calculator has a USB port located at the top right corner. Using the USB port, an EasyLink with a Gas Pressure Sensor can be connected to collect pressure data. For more information on EasyLink refer to Page *ix* located in the front section of this book.

2. When connecting an EasyLink to a TI-84 Plus calculator using USB, the EasyData application automatically launches when the calculator is turned on and at the home screen.

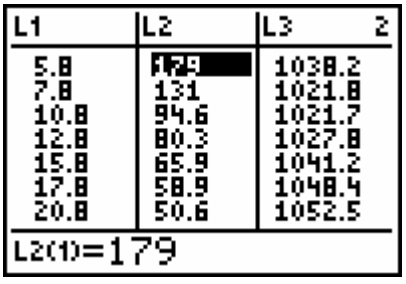
3. Don't use any extra tubing in attaching the syringe to the sensor. Attach the syringe directly to the Gas Pressure Sensor. Attach the syringe directly to the valve on the Pressure Sensor. Using any extra plastic tubing will degrade the results because of additional volume not counted in the syringe volume.

4. The product of the pressure and volume values, determined in Step 5 of the Analysis, can also be done directly using list calculations. You may choose to have students do the analysis that way.

SAMPLE RESULTS



Pressure *vs*. volume graph



Raw Data

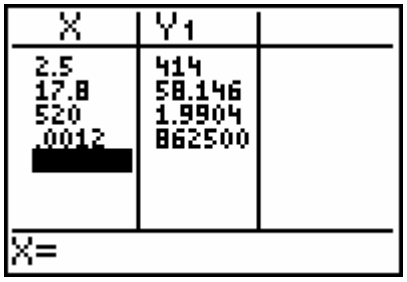
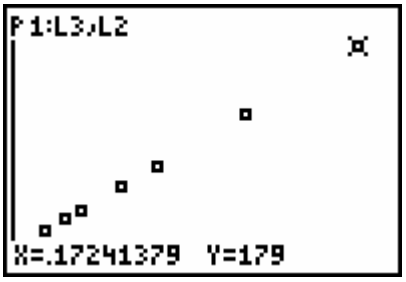


Table calculation



Pressure *vs*. inverse volume

DATA TABLE

Sample Data; actual data may vary.

Volume (*x* values)	Pressure (*y* values)	Product (*x***y*)
5.8	179	1039
7.8	131	1018
10.8	94.6	1022
12.8	80.3	1028
15.8	65.9	1041
17.8	58.9	1048
20.8	50.6	1053

Volume (mL) (*x* values)	Pressure (kPa) (*y* values)
2.5	414
17.8	58
520	2.0
0.0012	863 000

ANSWERS TO QUESTIONS

1. The model equation $y = 1035/x$ gave an excellent fit to the experimental data.

2. The products are all near 1035. This is as expected, since the model equation $y = 1035/x$ can be rearranged to $xy = 1035$.

3. From the model, the volume can't ever be zero because that would imply an infinite pressure.

4. As the volume of a gas sample decreases, its pressure increases.

5. Based on the graph of pressure *vs*. inverse volume, the data are indeed inversely proportional. The graph of pressure *vs*. inverse volume is very nearly a straight line.