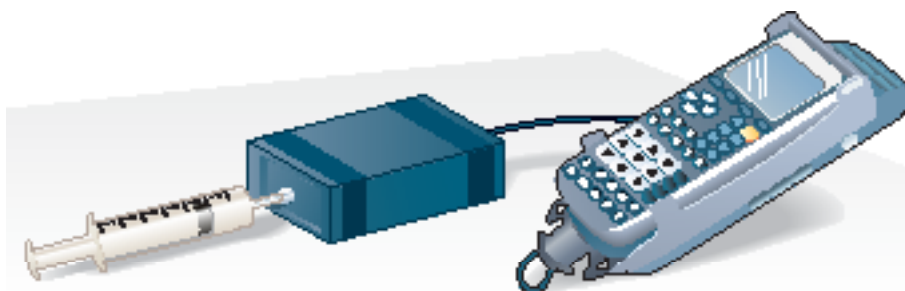


Investigating Inverse Variation

You can use a data collection device to investigate the relationship between volume and pressure.

▶ SET UP the Lab

- Connect a syringe to the gas pressure sensor. Then connect the data collection device to both the sensor and the calculator as shown.
- Start the data collection program and select the sensor.



ACTIVITY

- Step 1** Open the valve between the atmosphere and the syringe. Set the inside ring of the syringe to 20 mL and close the valve. This ensures that the amount of air inside the syringe will be constant throughout the experiment.
- Step 2** Press the plunger of the syringe down to the 5 mL mark. Wait for the pressure gauge to stop changing, then take the data reading. Enter 5 as the volume on the calculator. The pressure will be measured in atmospheres (atm).
- Step 3** Repeat step 2, pressing the plunger down to 7.5 mL, 10.0 mL, 12.5 mL, 15.0 mL, 17.5 mL, and 20.0 mL. Record the volume as you take each data reading.
- Step 4** After taking the last data reading, use STAT PLOT to create a line graph of the data.

ANALYZE THE RESULTS

1. Does the pressure vary directly as the volume? Explain.
2. As the volume changes from 10 to 20 mL, what happens to the pressure?
3. Predict what the pressure of the gas in the syringe would be if the volume was increased to 40 mL.
4. Add a column to the data table to find the product of the volume and the pressure for each data reading. What pattern do you observe?
5. **MAKE A CONJECTURE** The relationship between the pressure and volume of a gas is called Boyle's Law. Write an equation relating the volume v in milliliters and pressure p in atmospheres in your experiment.