TEACHER INFORMATION

Funnel Volumes: Volume and Weight

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

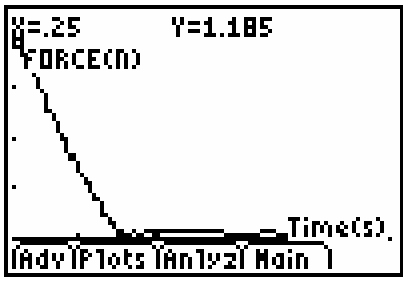
   The TI-84 Plus calculator has a USB port located at the top right corner. Using the USB port, an EasyLink with a Force Sensor can be connected to collect force data. For more information on EasyLink refer to Page *ix* located in the front section of this book.

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.

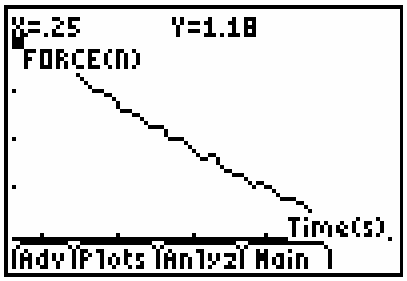
3. The Force Sensor reads in units of Newtons, the SI unit of force. Weight is measured in Newtons. The weight of the water remaining in the funnel is thus measured in Newtons. If you want to convert to cm^3 of water, multiply the force readings by 102 cm^3/N.

4. Hold the probe and funnel so that both are level while data is being collected. Be careful not to touch the funnel during data collection.

SAMPLE RESULTS



Raw data in EasyData



After selection of linear region

DATA TABLE

x_1	0.25 s	x_2	1.00 s
y_1	1.18 N	y_2	0.60 N
slope	–0.61 N/s		
***x*-intercept**	2.05 s	***y*-intercept**	1.33 N

ANSWERS TO QUESTIONS

1. The slope is negative because the weight of the water-filled funnel is decreasing with time.

2. Answers may vary.

3. Yes, the line is a good fit. The fitted line passes directly through the point used in the point-slope formula.

4. The x intercept is the time the funnel was first empty.

5. $y = -0.68x + 1.33$.

6. The new line is nearly the same as the one found using two points, but could be closer to the data as a whole since the whole line is used to determine the slope and intercept.

7. Making the opening smaller would slow the release of the water, so that the rate of change of the volume of water would be smaller. The slope of the fitted line would then be smaller in magnitude.