

Introduction to Data Collection on a TI-Nspire Handheld

Data collection is a very important part of science. Meteorologists collect weather data over time to keep a historical record and to help make forecasts. Oceanographers collect data on the salinity (saltiness) of seawater to study changing trends in our Earth's oceans. While data have been collected by hand for thousands of years, the technology to collect data electronically has been around for fewer than 80 years. Only in the last 20 years has this technology been available to schools.

This experiment was designed to introduce you to two of the most common modes of data collection that will be used in this book. Part I will guide you through collecting and analyzing data over time. A Temperature Probe will be used to record the temperature of water for 60 seconds at a rate of one sample every two seconds. In Part II, you will collect data using a mode called Events with Entry. This style of data collection allows you to collect one point of data, then will ask you to enter a corresponding value. In this experiment, the data collected will be the temperature of your hand and the value you enter will be your name.

OBJECTIVES

In this experiment, you will

- Become familiar with TI-Nspire handheld and the DataQuest application.
- Use a Temperature Probe to make measurements.
- Analyze a graph of the data.
- Use this graph to make conclusions about the experiment.
- Determine the response time of a Temperature Probe.

MATERIALS

TI-Nspire handheld
EasyTemp **or** Go!Temp with adapter **or**
Temperature Probe and data-collection interface
two 250 mL beakers

cold tap water
hot tap water
ice

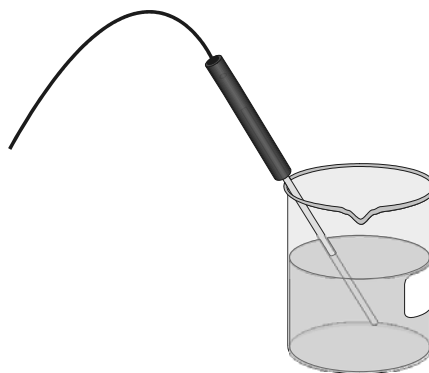



Figure 1



PROCEDURE


Part I Time Graph

- Place about 100 mL of cold tap water into a 250 mL beaker. Add two or three ice cubes.
- Set up the handheld for data collection.
 - Start from a new document.

*To open a new document, press **on** and select **New Document**. You may be prompted to save the current document.*
 - Connect the Temperature Probe to the data-collection interface. If you are using an EasyTemp or Go!Temp with an adapter, you do not need a data-collection interface.
 - Connect the interface to the TI-Nspire handheld.

Connecting an interface or direct-connect USB sensor will automatically launch the DataQuest application in your new document.
- Set up the data -collection parameters.
 - Choose New Experiment from the  Experiment menu.

*Press **menu** to access the DataQuest menus. Select  **Experiment** then **New Experiment**.*
 - Choose Collection Setup from the  Experiment menu.

*Press **menu**, select  **Experiment** then **Collection Setup**.*
 - Enter **0.5** as the rate (samples/second).



*The default collection rate for a temperature probe is 2 samples per second. To modify this value, press **tab** to highlight the **Rate (samples/second)** edit box and type **0.5**. The interval value will automatically update to show 2 seconds between samples.*
 - Enter **60** as the experiment duration in seconds.

*The default duration for a temperature probe is 180 seconds. To modify this value, press **tab** to highlight the **Duration (seconds)** edit box and type **60**. The number of data points collected should show 31.*
 - Select OK.

*Press **tab** until the **OK** option is highlighted and press **enter**.*
- Place the Temperature Probe into the cold water and stir briefly. Then position the probe in the cold-water beaker as shown in Figure 1. **Note:** Make sure the beaker will not tip over from the weight of the Temperature Probe.
- Place about 150 mL of hot water into a second 250 mL beaker.

Note: In Step 7, you will switch the Temperature Probe from the cold water to the hot water at exactly 10 seconds after you have started data collection.
- When everything is ready, start data collection. Do not stir or move the water.


Here are three ways you can start data collection.

 - Click the Start Collection button – Use the touchpad or arrow keys to move the cursor over the Start Collection button () and press **↵**.*
 - Use the menus – Press **menu**, select  **Experiment** then **Start Collection**.*
 - Tab to the Start Collection button – Press **tab** until the Start Collection button is in focus (highlighted by a black border) and press **enter**.*


Note: When data collection begins, the DataQuest Application view will change from Meter View () to Graph View () and the Data Collection button will show the stop icon (.



7. When exactly 10 seconds have gone by, quickly move the Temperature Probe to the beaker containing hot water and allow data collection to continue. Do not stir the water or move the Temperature Probe during the remainder of the data-collection period.

8. Data collection will stop automatically after 60 seconds.

Note: When data collection ends, the data-collection button will again show the start icon () and the graph will autoscale to show all of the data.

9. Remove the Temperature Probe from the beaker and dry it with a paper towel.
10. Determine the elapsed time when the highest temperature was reached.

- a. Examine the data pairs on the displayed graph to find the highest temperature.
Use the touchpad or arrow keys to move the cursor near a desired point. Press  to select the point. Use the arrow keys to examine other points on the graph.
- b. Record this temperature and the time when it was first reached in the data table.
The coordinates of the point you are examining will be displayed in the Graph View details box to the left of the graph.
- c. Verify that you found the maximum temperature using statistical analysis. The maximum temperature should match what you found in Step 10b. Did you get the same time both ways?

To perform a statistics calculation on your data, press , select  Analyze then Statistics.






11. Sketch or print copies of the graph as directed by your instructor.

Note: To print the graph, you must first import the file to a computer running the TI-Nspire computer software. You cannot print the file directly from a TI-Nspire handheld.

12. You can also confirm the time when the highest temperature was reached by viewing the data table directly.







- a. Change to the Table View to view the data lists.

Here are two ways you change views:

- *Clicking the Table View tab – Use the touchpad or arrow keys to move the cursor over the Table View tab () and press .*
- *Using the menus – Press , select  View then  Table.*

- b. Find the time when the highest temperature was first reached.

Here are three ways to scroll through the data table.

- *Using the table's vertical scroll buttons – Use the touchpad or arrow keys to move the cursor over the table scroll buttons and press .*
- *Using the table's slider bar – move the cursor over the black portion of the slider, press and hold  or press  followed by , and then use the touchpad or arrow keys to scroll the table. (Press  to release the slider.)*
- *Arrow through the table – Use the touchpad or arrow keys to move the cursor over any cell in the table and press  to highlight the table cell. Use the arrow keys to move through the table cells.*

Part II Events with Entry

13. Insert a new problem into your TI-Nspire document and insert a DataQuest Application.

*Inserting a new problem will allow you to retain the data from Part I as you do Part II. To add a new problem, press **doc v** (**ctrl** **home**) for a clickpad handheld), select **Insert** then **Problem**. You will notice that a new tab labeled **2.1** will be added to your document. To add the DataQuest app to this page, select **Add Vernier DataQuest**.*

14. Set up the data-collection parameters.

- a. Choose Collection Mode ► Events with Entry from the **Experiment** menu.
*Press **menu**, select **Experiment**, **Collection Mode**, and then **Events with Entry**.*
- b. Enter **Name** as the Name and leave the Units field blank.
*To add upper case letters, press **↑shift** followed by the desired letter. If you want all upper case letters, press **ctrl** followed by **↑shift** before typing any letters.*
- c. Select OK.
*Note the Keep button (**keep**) located to the right of the Start Data Collection button. You will use this button to control when a sensor reading is recorded.*

15. Start data collection (**start**).

*In Events with Entry mode, starting data collection does not cause a temperature vs. time graph to be created. In this mode, no temperatures will be collected until you click the Keep button (**keep**). After you have started data collection, notice that the Keep button is active.*

16. Measure the hand temperature of the first test subject.

- a. The first test subject should pick up the Temperature Probe and hold its tip in the palm of his or her hand, as shown in Figure 2. Watch the live temperature readout.
The current sensor reading will be displayed in the details box to the left of the graph.
- b. When the temperature stops rising, click the Keep button (**keep**).
Like in Step 6, there are three ways to activate the Keep option. As you collect data, try the different options to see which you prefer.
- c. You will be prompted to enter the test subject's name. Enter the test subject's name, then select OK. The temperature and name have been saved.

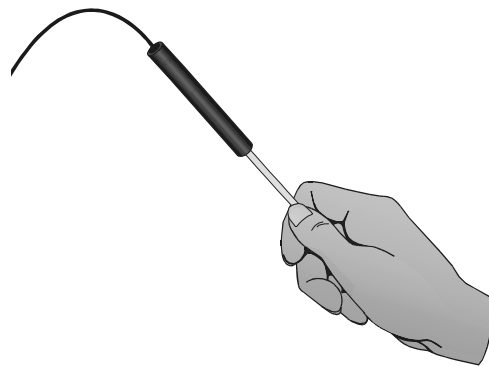


Figure 2

A data point representing the temperature for this test subject will be added to the graph. Since there is no numerical value associated with the name you typed, the row number associated with this data point is used to locate the point on the independent axis.

17. Cool the Temperature Probe down by placing it in the cold water from Part I. Monitor the temperature on the screen and remove it from the water when the temperature reaches 25°C.
18. Pass the Temperature Probe to the second test subject and repeat Steps 16–17.

*After collecting the second data point, it is recommend that you autoscale the graph. To do this, press **menu**, select **Graph** then **Autoscale Now**.*

19. Repeat Steps 16–18 until you have tested everyone in your group.


*Note: If you accidentally select Stop Data Collection instead of Keep, restart data collection and choose the option to **Append** the data to the latest data set.*



20. Stop data collection.

In order to perform any analysis on the data points, you must stop data collection.

21. Record your data in the data table. It may be necessary to add additional rows to your table.

You can find the data value by examining the data on the graph (see Step 10a) or by viewing the data table (see Step 12).

22. Find the average hand temperature for the subjects you tested by selecting Statistics from the  Analyze menu.

To perform a statistics calculation on your data, press , select  Analyze then Statistics.

23. Sketch or print copies of the graph as directed by your teacher.

DATA

Part I Time Graph

Maximum temperature (°C)	Elapsed time (s)

Part II Events with Entry

Group member number	Group member name	Maximum temperature (°C)
1		
2		
3		
4		
5		
6		
Group average		

QUESTIONS

Part I Time Graph

Note: To get back to your data from Part I, you can do the following:

- Use the arrow keys – Press **ctrl** followed by **←** (**←**) to move to the previous page in your TI-Nspire document.
- Click on the Page number – Use the touchpad or arrow keys to move the cursor over the **1.1** page tab and press **↵**.

1. Describe the appearance of your graph in Part I.
2. Why is time plotted on the horizontal axis in this experiment?
3. Why is temperature plotted on the vertical axis?
4. Determine the Temperature Probe's response time. To do this, use your data to find how long it took for the Temperature Probe to reach the maximum temperature after moving it from the cold water to the hot water.
5. Explain how you determined your answer to Question 4.

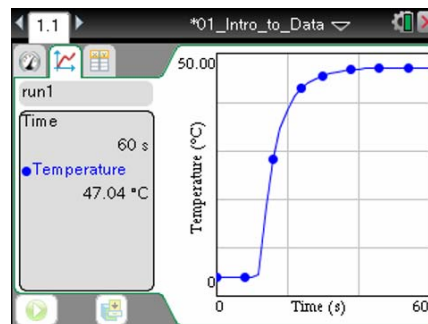
Part II Events with Entry

6. Who had the hottest hand in your group?
7. Who had the coldest hand in your group?

Using DataQuest on a Handheld

This appendix gives an overview of using the Vernier DataQuest application on a TI-Nspire handheld. It includes information on accessing the common tools in the DataQuest Application.

DataQuest is included in TI-Nspire handheld software versions 3.0 and newer. If you have an older version of TI-Nspire software, you can get updates at education.ti.com.



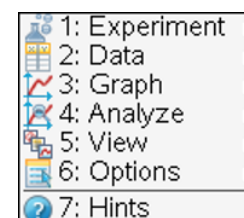
The TI-Nspire Software

Access Menus

DataQuest can be used to collect, display, and analyze data. Most features can be accessed using the application menus. To access the menus, press **menu**.

Access Context Menus

To access context menus, move the cursor over the object using the touchpad or arrow keys, and press **ctrl** **menu**. Meters, View details boxes, graphs, and the table all have contextual menus.



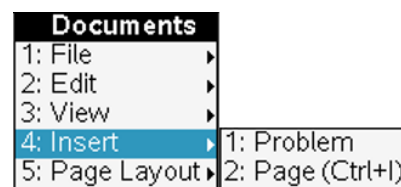
Open a New Document

To open a new document, press **on** then select New Document. Having only one TI-Nspire document opened when using DataQuest is recommended.



Add a Page or Problem

To add a new page or problem to your TI-Nspire document, press **doc** (**ctrl** **on** for clickpad handhelds) and choose Problem or Page from the Insert menu. For touchpad handhelds, you can also add a page by pressing **ctrl** **doc**.



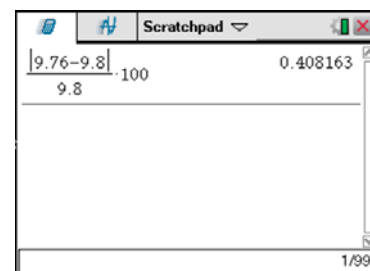
Save a document

To save your TI-Nspire document, press **doc** (**ctrl** **on** for clickpad handhelds) and choose Save from the File menu or press **ctrl** **S**.



Scratch Pad Calculator

The Scratch Pad Calculator is a built-in calculator that can be used to perform calculations while you are conducting an experiment. To use the Scratch Pad Calculator, press **calc**. (On a click pad handheld, press **on** then select the Scratchpad Calculate option.)



Start DataQuest

DataQuest should automatically start when you connect a TI-Nspire Lab Cradle, EasyLink interface, EasyTemp temperature probe, or Texas Instruments CBR 2™ motion detector to your handheld.



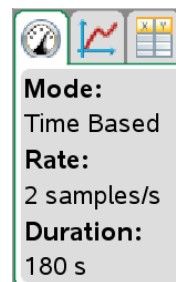
Manually Launch DataQuest

To start DataQuest manually, press **[on]** then select **[A]**. You can also press **[doc]** (**[ctrl]** **[on]** for clickpad handhelds) and choose Vernier DataQuest from the Insert menu.

Views in DataQuest

There are three views in the DataQuest application: Meter, Graph, and Table. Click a tab to change views or press **[menu]** then choose the desired view from the **[View]** menu.

On the left side of the screen in each view, you will see the View details box. The Meter View details box shows the data-collection settings. The Graph View details box shows graph trace and analysis information. The Table View details box shows data set variable information.

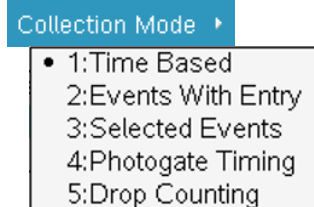


Data Collection Settings

Change the Data-Collection Mode

1. Press **[menu]** then choose Collection Mode from the **[Experiment]** menu.
2. Select the data-collection mode you want to use.

Note: Changing modes will require you to discard any collected data. To avoid losing data, save the current document and open a new document, or insert a new problem in the current document.

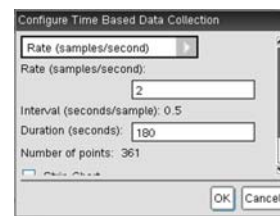


3. A dialog showing the data-collection settings for the mode you have selected will be displayed. Adjust the settings as desired for your experiment. Use **[tab]** to move between entry lines.
4. When you are done setting up the data collection, select OK.

Change Data-Collection Settings


When you have already set up the data-collection mode and want to make changes to the settings, you can change the values you have entered.

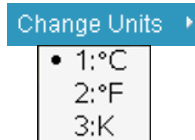
1. Press **[menu]** then choose Collection Setup from the **[Experiment]** menu.
2. Make the necessary changes and select OK.



Sensor Settings


Change Units

1. Press **[menu]** then choose Set Up Sensors ► Change Units from the  Experiment menu.
2. Select the unit you want to use. The readings from the sensor and any collected data will be displayed in the new unit.

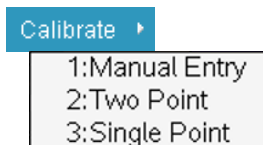


Calibrate a Sensor

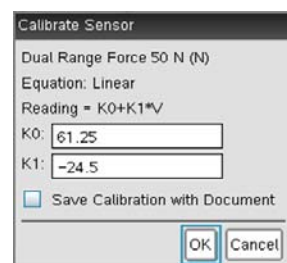
Not all sensors can be calibrated. Check the sensor booklet for specific information about your sensor. For most experiments, the sensor's stored calibration is recommended. In some instances, you may want to calibrate a sensor to get readings that are even more accurate.

1. Press **[menu]** then choose Set Up Sensors ► Calibrate from the  Experiment menu. Select the appropriate calibration option for your situation:

- Manual Entry – Use Manual Entry when you know the calibration equation and want to enter the coefficients directly.
- Two Point – Use Two Point for most calibrations.
- Single Point – Use Single Point when only one known calibration value is attainable (for example, calibrating a Barometer to match the current atmospheric pressure). Single Point calibration will only affect the intercept of the calibration equation.



2. Perform a live calibration (Two Point or Single Point).
 - a. Place the sensor in the desired calibration environment, enter the reference value, wait for the voltage readings to stabilize, and select Keep.
 - b. Two Point only – place the sensor in a second calibration environment, enter the reference value, wait for the voltage readings to stabilize, and select Keep.
3. Note the updated calibration equation, modify if necessary (Manual Entry), and select OK.



Zero a Sensor

Not all sensors can be zeroed. Check the sensor booklet for specific information about your sensor.


To zero a sensor, press **[menu]** then select Set Up Sensors ► Zero from the  Experiment menu.

Note: When you have more than one sensor you want to zero, select the All Sensors option.

ch1: Force 0N

Reverse a Sensor


Not all sensors can be reversed. Check the sensor booklet for specific information about your sensor.

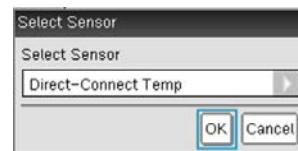
Press **[menu]** then choose Set Up Sensors ► Reverse from the  Experiment menu. The sign of the sensor reading is changed as noted in the example.

ch1: Force 1N

ch1: Force(↓) -1N

Sensors that do not Auto-ID

The DataQuest Application supports older sensors that do not auto-ID. To manually set up a sensor, connect the sensor to the interface and the interface to your handheld. Press **menu** then choose Advanced Set Up ► Configure Sensor from the  Experiment menu, and select the interface and channel your sensor is connected to. Select your sensor from the drop down list and click OK.



Sensors that do not auto-ID must be set up everytime they are used and will not be identified by the software when opening a saved file.

Data Collection

Start Data Collection

To start data collection, click the Start Collection button or press **menu** then choose Start Collection from the  Experiment menu.



Keep Data Points (Event Based Data Collection)

To store a data point during Events with Entry or Selected Events experiments, click the Keep button or press **menu** then choose Keep from the  Experiment menu.




Stop Data Collection

To stop data collection, click the Stop Collection button or press **menu** then select Stop Collection from the  Experiment menu.



Extend Data Collection (Time Graph Collection)

To extend a time graph experiment to one and one-half times the current duration, press **menu** then choose Extend Collection from the  Experiment menu before or during a collection. The time listed in the menu will be the new duration for the experiment.



Store Data Sets

To store a data set, click the Store Latest Data Set button or press **menu** then choose Store Data Set from the  Experiment menu.

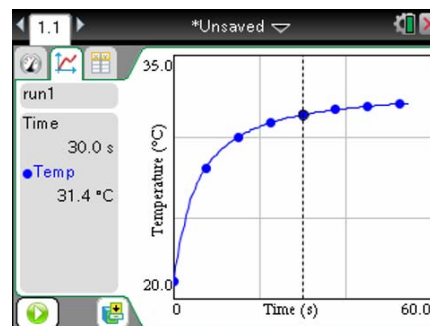


Graphical Display of the Data


By default, DataQuest will graph the most recent (latest) data set on the graph. When two or more of the same type of sensor are connected, data from those sensors will be plotted on the same graph.

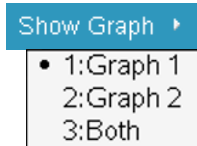
When you have two different types of sensors connected, data from the different sensors will be plotted on two separate graphs.

When a Motion Detector is connected, two graphs will be displayed – position and velocity.




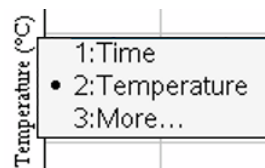
Show Graphs

To change the graph displayed, press **[menu]** then select Show Graph from the  Graph menu. You can select Graph 1, Graph 2, or Both. The two graphs can have different dependent (y-axis) data with different ranges; however, they must have the same independent data and range.




Change what is graphed on the axes

To change the data columns plotted on a graph, move the cursor to the axis label and press **[ctrl]** **[F2]**, or press **[menu]** then select X-Axis Column or Y-Axis Columns from the  Graph menu. Select from the available columns. Use the More option to plot multiple columns on the same axes.

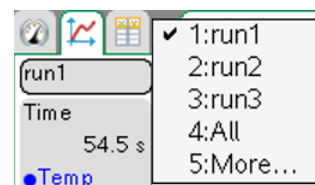


Change which data set is graphed


To plot a different data set or multiple data sets on the same graph, click the run indicator or press **[menu]** then choose Select Run from the  Graph menu.

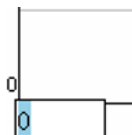
Select All to display all data sets.

Select More to display any combination of stored data sets.





Adjust the Graph Window Settings

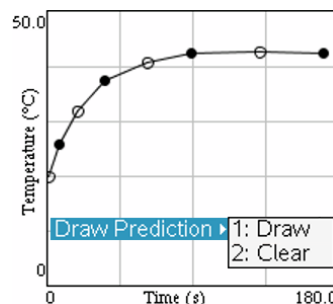
To manually adjust the window settings, click the axis labels or press **[menu]** then choose Window Settings from the  Graph menu.




Draw Prediction

Use the draw prediction feature before data collection to predict the outcome of the data collection. To add a prediction to a graph, press **[menu]**, choose Draw Prediction from the  Analyze menu, then select Draw. Click the graph in the desired locations. When finished press **[esc]**.

To remove a prediction, press **[menu]** then choose Draw Prediction from the  Analyze menu, and select Clear.

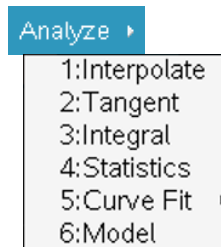


Analyze Data

You can perform multiple types of analysis on your data. For most analysis options, the results will apply to all data points unless a region of data is selected first. Press **[menu]** then choose your desired analysis option from the  Analyze menu.

Interpolate

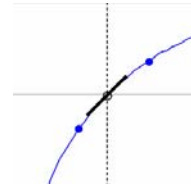
Use Interpolate to examine a graph trace between and beyond the graphed data points. The examine line will move from pixel to pixel instead of data point to data point. This is recommended when examining curve fits.



Appendix B

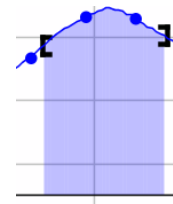
Tangent

Use Tangent to get a measure of the rate of change of the data at a specific point. A segment is drawn on the graph to help visualize the rate and the rate of change (labeled slope) is displayed in the Graph View details box.



Integral

Use Integral to get a measure of the area between your data and the x-axis. Find the area under all data points or under a selected region of the data. You can adjust the region used by clicking and dragging the brackets. The integral region is shaded on the graph and the area is displayed in the Graph View details box.



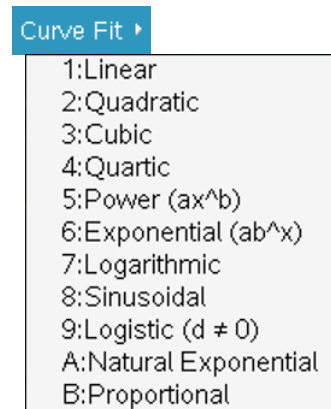
Statistics

Use Statistics to find minimum, maximum, mean, and standard deviation of your data. Find these values for all data points or a selected region of the data. You can adjust the region used by clicking and dragging the brackets. The statistical values are displayed in the Graph View details box.

Samples: 101
min: 0.163
max: 0.593
mean: 0.394
dev: 0.127

Curve Fits

Use Curve Fits to find the best-fit equation of a curve fit function. Curve fit all data points or a selected region of the data. You can adjust the region used by clicking and dragging the brackets. The curve fit equation is graphed on the axes and the equation values are displayed in the Graph View details box.

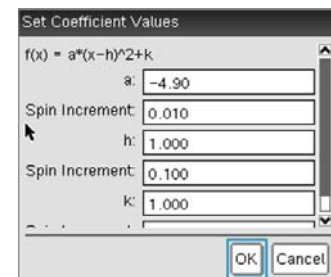


Model




Use Model to manually fit a mathematical equation to your data. A model differs from a Curve Fit in that there are no statistical or iterative processes used to determine the best fit. You can define your models using any function of the variable x .

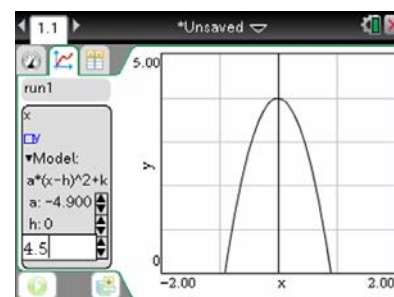
To enter a model:

1. Press **menu**, then choose Model from the **ANalyze** menu.
2. Select one of the predefined equations or enter your own. The model must be a function of the variable x .
3. Enter your estimates for the coefficient values.
4. Modify the spin increment value if desired.
5. Select OK.



You can adjust the coefficients in your model to obtain a good match of your data.

- Click  on the spin increment buttons .
- Click  on the coefficient and type a new value.
- Move the cursor to the Graph View Details, press **ctrl** **menu** then select the Modify Model option.



Remove an analysis feature from a graph

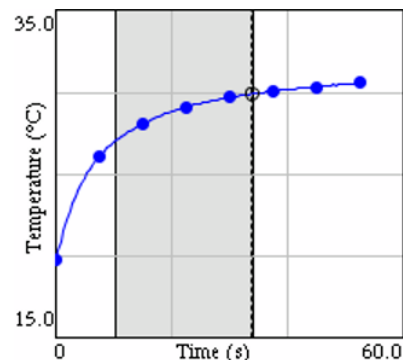
Use the remove option to remove an analysis (integral, statistics, curve fit, or model) from a graph. To do this, press **[menu]** then choose Remove from the **[AN]** Analyse Menu. If there are more than one, the analysis options will be listed in the order in which they were created.

Select a Region on a Graph

Select a region when you want to look more closely at a specific region of data or analyze only a portion of the data.

To select a region:

1. Move the cursor to the place you want to start the selected region.
2. Press **[ctrl]** **[⏏]** to start the selection.
3. Move the cursor to select the region.
4. Press **[⏏]** or **[esc]** to end the selection.



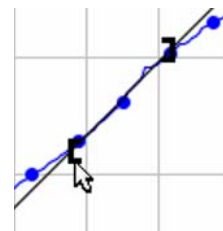
The selected region is indicated by shading. Once a region is selected, you can:

- Zoom in on the region (Press **[menu]** then choose Zoom In from the **[G]** Graph menu).
- Analyze the region (see above).
- Strike the data within or outside the selected region (see below).

Modify the range of an analysis

Once you have used one of the analysis tools, you can modify the range over which the analysis will apply. To do this directly on the graph, move the cursor over one of the brackets, when the cursor changes to a white arrow, press **[ctrl]** **[⏏]** to grab the bracket, then use the touch pad or arrow keys to move the bracket. Press **[esc]** to release the bracket.

To do this from a menu, move the cursor over the Graph View details box, press **[ctrl]** **[menu]**, then choose the Modify Range option. If you have more than one analysis, choose the one you want to adjust or choose the Modify All option to apply the change to all of the existing ranges.



Strike Data

When there are data points that you wish not to have considered in the graphing or analysis of your data, you can “strike” that data. Striking data does not delete the data; rather, data is displayed in the data table with a single line drawn through it and calculated column cells based on struck data will be blank. Struck data is not displayed on the graph.

To strike data, select a region, press **[menu]**, then choose Strike Data from the **[DT]** Data menu. Select whether to strike through data inside or outside the selected region.

	Time	Temp
3	1.0	20.9
4	1.5	21.6

Strike Data ▾

1:In Selected Region
2:Outside Selected Region

Restore Data

Use this option to restore struck data. Select a region (optional), press **[menu]** then choose Restore Data from the **[DT]** Data menu. Select whether to restore data In Selected Region, Outside Selected Region, or Restore All Data.

Restore Data ▾

Tabular Display of the Data

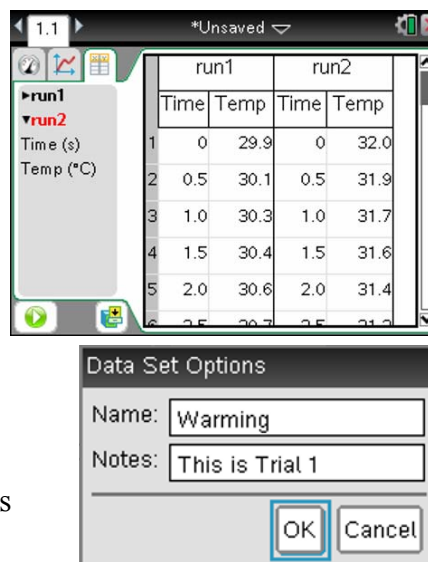
DataQuest also displays data in a data table. In addition to viewing collected sensor data, you can enter data manually and perform column calculations. Use the scroll bar and scroll buttons to view the data.

Data collected will populate the Latest Data Set in the table. This data set is identified with **red, bolded text** on CX handhelds (**bolded text** on other handhelds) in the Table View Details box. Storing a Data Set will change the data set

identified as the Latest.

Data Set Options

To change the name of a run or to add notes about the data set, double-click the run name or move the cursor to the table, press **ctrl** **menu** then select Data Set Options.



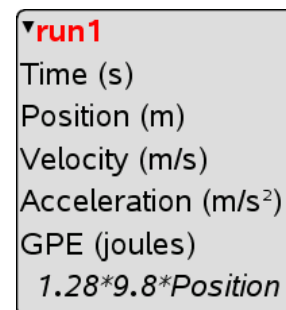
Column Options

Use the column options to change the name of the column and to modify the display precision of any column. Press **menu**, choose Column Options from the **Data** menu, then select the column you wish to modify.

Calculated Columns

Calculated columns are used to generate data based on existing columns in a data set. For example, you may want to calculate gravitational potential energy from height measurements or you may want to linearize pressure-volume data by plotting pressure vs. the reciprocal of the volume data.

To add a calculated column, press **menu** then choose New Calculated Column from the **Data** menu. The equation you enter must use one of the data columns in the data set.



Manually Entered Data

For experiments that require hand-entered data, launch DataQuest in a new document or problem without any sensors connected. Use the default x and y columns to manually enter data values. You can use the Column Options to rename your columns if desired (see above).

To add additional manual columns, press **menu** then choose New Manual Column from the **Data** menu.

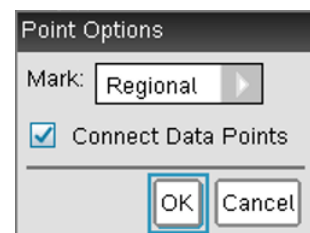
	run1	
	x	y
1	5.00	18.60
2	10.00	5.8
3	15.00	-22.50

DataQuest Options

Points Options

Use the point options to determine how the data are drawn on the graph. To access the Point options, press **[menu]** then choose Point Options from the **[Options]** menu.

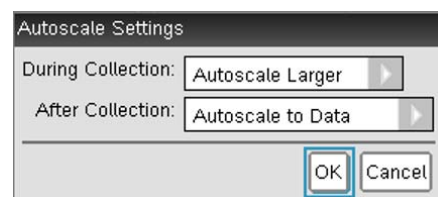
Mark refers to the symbol used to distinguish the different traces on a graph. The Mark options are None, Regional, or All. You can also choose whether to have the data points drawn connected.



Regional/Connected is the default for Time Graph data collection. All/Not Connected is the default for Event based data collection.

Autoscale Settings

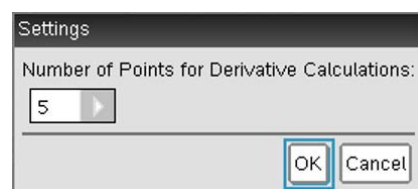
Use the Autoscale Settings to set the scaling behavior of the application during and after data collection. To access Autoscale Settings, press **[menu]** then choose Autoscale Settings from the **[Options]** menu.



- Autoscale Larger – expands the graph range when needed to ensure each data point appears on the graph. This is the default setting and only applies while collecting data.
- Autoscale From Zero – adjusts the graph range to ensure all data points and the origin (0,0) are displayed with little or no extra space. This only applies after collection is complete.
- Autoscale to Data – adjusts the graph range to show all data points with little or no extra space around the points. This is the default setting and only applies after data collection.
- Do Not Auto Scale – maintains the current window range regardless of the collected data. This can be applied either during or after collection.

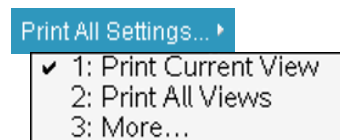
Derivative Settings

Use the derivative settings to set the number of points used in derivative calculation. The default value is five. To access this setting, press **[menu]** then choose Derivative Setting from the **[Options]** menu.



Print All Settings

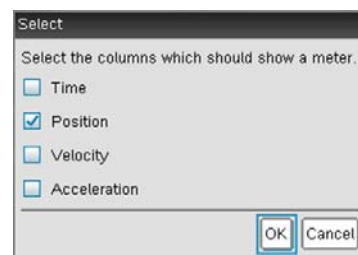
Use the Print All settings to determine which DataQuest views are printed when the Print All printing option is used. Choose from Print Current View (default), Print All Views, or select any one or combination of views to print. The Print All Settings are specific to each DataQuest App so multiple instances of the app must be set up separately.



To access Print All Settings, press **[menu]** then choose Print All Settings from the **[Options]** menu. **Note:** You cannot print a document directly from a handheld. You can only print from the TI-Nspire computer software.

Show/Hide Meters

You can display (or hide) a meter for any column of data. This is useful for calculated columns of data. To select which meters to display, press **[menu]** then choose Show/Hide Meters from the **[☰]** Options menu. **Note:** Meters for calculated columns will only show live values during data collection.

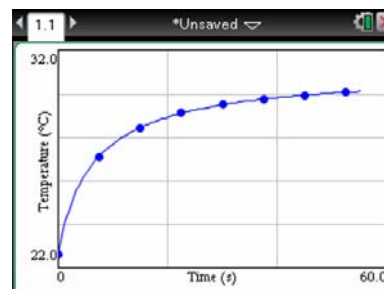


Hide View Details (Show View Details)

The View details boxes, tabs, and collection buttons can be hidden if desired. To hide the View details, press **[menu]** then choose Hide View Details from the **[☰]** Options menu. When the details are hidden, use the menus to change views and control data collection.

Note: View details will automatically be hidden in some split screen views and when the application window gets too small.

To show View details when they are hidden, press **[menu]** then choose Show View Details from the **[☰]** Options menu.



Print a Document

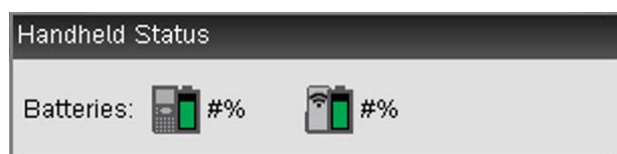
You cannot print a document directly from a handheld. You can only print from the TI-Nspire computer software. See *Appendix C* for more details regarding printing.

Battery Level

The battery icon located in the upper right portion of the screen will display the current battery level available to the handheld. Move your cursor over the battery icon to get an approximate percent of battery life remaining. The level is a combination of all battery types that apply – handheld AAA, handheld rechargeable, and Lab Cradle rechargeable.

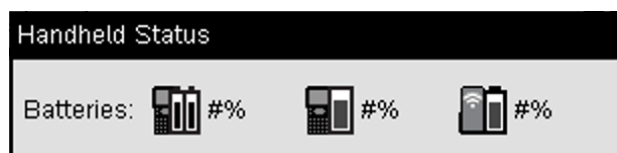


For more detailed information regarding the charge level of the different battery types, press **[on]**, choose Settings, then select Status.















We recommend not letting your battery level go below 25% as this can affect the identification of your sensors.





The TI-Nspire Lab Cradle can be used to collect data on a handheld while powered using the AC adaptor that comes with the Lab Cradle.



DataQuest Cursors

The DataQuest application uses several different cursors to help identify when there is some special feature available to you through mouse interaction (clicking, right-clicking, clicking and dragging, etc.). The table below will give you a brief explanation of the different cursors used.

Cursor	Description
	<p>Pointer – The standard cursor you see when using DataQuest.</p>
	<p>Horizontal Resize Cursor – This cursor is shown when you are over the location of an object that can be resized in a horizontal direction. The locations where the Horizontal Resize cursor appears are:</p> <ul style="list-style-type: none"> ▶ The right edge of and View Details box in Meter, Graph and Table View. This will allow you to resize the details box. ▶ The left one-third of the horizontal (x-) axis. This allows you to dynamically adjust the x-min window-setting value without changing the x-max value. ▶ The right one-third of the horizontal (x-) axis. This allows you to dynamically adjust the x-max window-setting value without changing the x-min value. ▶ The left edge of a table cell. This allows you to adjust the width of the column to the left of the cursor. <p>Press ctrl  to grab the object and resize it. After the object has been grabbed, the cursor changes to . Move the cursor left or right to resize the object. Press esc to release the object.</p>
	<p>Vertical Resize Cursor – This cursor is shown when you are over the location of an object that can be resized in a vertical direction. The locations where the Vertical Resize cursor appears are:</p> <ul style="list-style-type: none"> ▶ The space between two DataQuest graphs when both graphs are shown. This will allow you to resize the two graphs as desired. The default is to show both graphs the same height. ▶ The top one-third of the vertical (y-) axis. This allows you to dynamically adjust the y-max window-setting value without changing the y-min value. ▶ The bottom one-third of the vertical (y-) axis. This allows you to dynamically adjust the y-min window-setting value without changing the y-max value. <p>Press ctrl  to grab the object and resize it. After the object has been grabbed, the cursor changes to . Move the cursor left or right to resize the object. Press esc to release the object.</p>
	<p>Translation Cursor – This cursor is shown when you are over the location of an object that can be repositioned up-and-down or left-and-right. The locations where the Translation cursor appears are:</p> <ul style="list-style-type: none"> ▶ The middle one-third of the horizontal (x-) axis. This allows you to dynamically adjust the x-min and x-max window setting values by the same amount, simultaneously. The graph will appear to move left or right. ▶ The middle one-third of the vertical (y-) axis. This allows you to dynamically adjust the y-min and y-max window setting values by the same amount, simultaneously. The graph will appear to move up and down. <p>Press ctrl  to grab the object and resize it. Move the cursor to resize the object. When you move the object, the cursor changes to . Press esc to release the object.</p>
	<p>Text Edit Cursor – This cursor is shown when you are over the numeric graph-axis labels. Press  to edit the value. Press enter to save the change. Press esc to exit without making a change.</p>

Cursor	Description
	<p>Hollow Pointer – This cursor is shown when the object underneath is selectable in some way. The locations where the Hollow Pointer appears are:</p> <ul style="list-style-type: none">▶ The graph-axes text label. Press ctrl menu to change what is graphed on the axis.▶ The analysis selected-region brackets ([or]). Press ctrl  to grab a bracket. Move the cursor left or right to adjust the region used in the analysis calculation. Press esc to release the bracket.
	<p>Pencil Cursor – This cursor is shown when Draw Prediction is active. Move the cursor to the desired location and press  to add a point. Repeat as necessary. Press esc to end your prediction.</p>