TI-Nspire™ CX Navigator™ Applications Tip Sheet

To obtain the latest version of the documentation, go to *education.ti.com/guides*.

Important Information

Except as otherwise expressly stated in the License that accompanies a program, Texas Instruments makes no warranty, either express or implied, including but not limited to any implied warranties of merchantability and fitness for a particular purpose, regarding any programs or book materials and makes such materials available solely on an "as-is" basis. In no event shall Texas Instruments be liable to anyone for special, collateral, incidental, or consequential damages in connection with or arising out of the purchase or use of these materials, and the sole and exclusive liability of Texas Instruments, regardless of the form of action, shall not exceed the amount set forth in the license for the program. Moreover, Texas Instruments shall not be liable for any claim of any kind whatsoever against the use of these materials by any other party.

Contents

Important Information ... ii

TI-Nspire™ Applications ... **1**

Using Question in the Teacher Software ... **2**

Calculator Application ... **3**

Entering and Evaluating Math Expressions ... 4
Working with Variables ... 11

Graphs Application ... **12**

What You Must Know ... 13
Graphing Functions ... 15
Finding Points of Interest on a Function Graph ... 16
Viewing Tables from the Graphs Application ... 18
Tracing Graphs or Plots ... 19

Geometry Application ... **22**

What You Must Know ... 22
Introduction to Geometric Objects ... 25
Creating Points and Lines ... 27
Creating Geometric Shapes ... 31
Creating Shapes Using Gestures (MathDraw) ... 37
Basics of Working with Objects ... 40

Lists & Spreadsheet Application ... **44**

Creating and Sharing Spreadsheet Data as Lists ... 45
Creating Spreadsheet Data ... 47

Data & Statistics Application ... **50**

Basic Operations in Data & Statistics ... 51

Notes Application ... **56**

Formatting Text in Notes ... 57
Entering Math Expressions in Notes Text ... 58

Data Collection ... **59**

What You Must Know ... 60
About Collection Devices ... 61
Connecting Sensors ... 65
Modifying Sensor Settings ... 66

Collecting Data 68
Analyzing Collected Data 72

TI-Nspire™ Applications

The applications are Question, Calculator, Graphs, Geometry, Lists & Spreadsheet, Data & Statistics, Notes, and the Vernier DataQuest™ (Data Collection) application.

Application Description

Question
Exclusive to TI-Nspire™ Teacher Software, the Question Application allows educators to write gradable or self-check questions to guide students through an activity.

Calculator
Perform computations and enter expressions, equations and formulas in proper math notation.

Graphs
Plot and explore functions, equations and inequalities, animate points on objects and graphs, use sliders to explain their behavior and more.

Geometry
Construct and explore geometric figures and create animations.

Lists & Spreadsheet
Perform mathematical operations on data and visualize the connections between the data and their plots.

Data & Statistics
Summarize and analyze data using different graphical methods such as histograms, box plots, bar and pie charts and more.

Notes
Enter notes, steps, instructions and other comments on the screen alongside the math.

Vernier DataQuest™ Application
Create a hypothesis graphically and replay data collection experiments all in a single application.

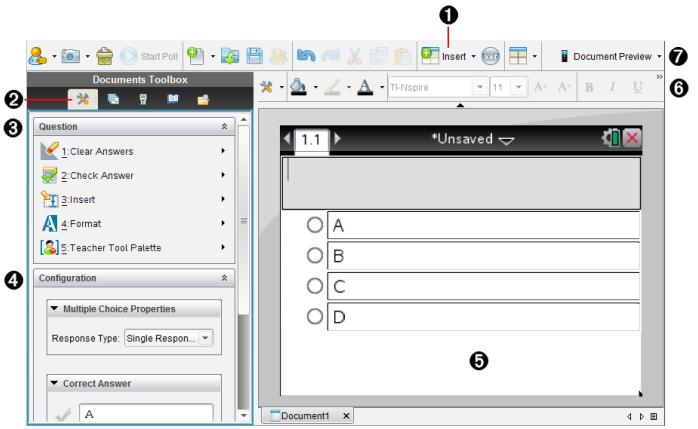
The DataQuest™ Application supports more than 60 Vernier Software & Technology™ data collection sensors.

Using Question in the Teacher Software

The Question application in the Teacher Software allows you to author multiple choice, open response, equation, expression, coordinate points, lists, image, and chemistry questions.

Although students cannot author questions, they can open documents containing questions, answer these questions, and, in Self-Check mode, check their work.

The Question application is located on the Insert menu in the Documents Workspace.



❶ **Insert menu.** Click **Insert** and select **Question** to add a question, or select **Image** to add an image to a question.

❷ **Document Tools.** Click this icon to open the toolbox pane.

❸ **Question tool.** Provides a menu of tools available for working with the Question application.

❹ **Configuration tool.** Allows you to set certain properties for each question you insert.

❺ **Question area.** This is where you type questions and view student responses.

❻ **Formatting toolbar**. Allows you to apply formatting to text.

❼ **Document Preview.** View the document in Handheld or Computer mode. The preview changes, but the page size does not. For more information on Document Preview, see *Working with TI-Nspire™ Documents*.

Calculator Application

The Calculator application lets you:

- Enter and evaluate math expressions
- Define variables, functions, and programs that become available to any TI-Nspire™ application—such as the Graphs application—residing in the same problem.
- Define library objects, such as variables, functions, and programs, which are accessible from any problem of any document. For information on creating library objects, see *Libraries*.

Adding a Calculator Page

▶ To start a new document with a blank Calculator page:

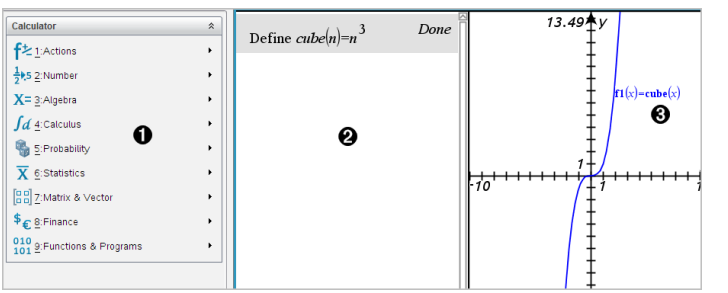
From the main **File** menu, click **New Document**, and then click **Add Calculator**.

Handheld: Press on, and select **Calculator**.

▶ To add a Calculator page in the current problem of an existing document:

From the toolbar, click **Insert > Calculator**.

Handheld: Press doc and select **Insert > Calculator**.



❶ **Calculator menu.** This menu is available anytime you are in the Calculator work area using the Normal view mode. The menu in this screen snapshot may not exactly match the menu on your screen.

❷ **Calculator work area**

- Enter a math expression on the entry line, and then press **Enter** to evaluate the expression.
- Expressions are displayed in standard mathematical notation as you enter them.
- Entered expressions and results show in the Calculator history.

❸ Example of Calculator variables used in another application.

Entering and Evaluating Math Expressions

Entering Simple Math Expressions

Note: To enter a negative number on the handheld, press (−). To enter a negative number on a computer keyboard, press the hyphen key (-).

Suppose you want to evaluate $\frac{2^8 \cdot 43}{12}$

1. Select the entry line in the Calculator work area.
2. Type **2^8** to begin the expression.

3. Press ▶ to return the cursor to the baseline.
4. Complete the expression:

   Type ***43/12**.

   Handheld: Type (×) **43** (÷) **12**.

5. Press **Enter** to evaluate the expression.

   The expression is displayed in standard mathematical notation, and the result is displayed on the right side of the Calculator.

Note: If a result does not fit on the same line with the expression, it is displayed on the next line.

Controlling the Form of a Result

You might expect to see a decimal result instead of 2752/3 in the preceding example. A close decimal equivalent is 917.33333..., but that's only an approximation.

By default, Calculator retains the more precise form: 2752/3. Any result that is not a whole number is shown in a fractional or (CAS) symbolic form. This reduces rounding errors that could be introduced by intermediate results in chained calculations.

You can force a decimal approximation in a result:

- By pressing shortcut keys.

  Windows®: Press **Ctrl** +**Enter** to evaluate the expression.

  Mac®: Press ⌘+**Enter** to evaluate the expression.

  Handheld: Press ctrl enter instead of enter to evaluate the expression.

Pressing ctrl enter forces the approximate result.

- By including a decimal in the expression (for example, **43.** instead of **43**).

$$\frac{2^8 \cdot 43.}{12} \qquad 917.333$$

- By wrapping the expression in the **approx()** function.

$$\text{approx}\left(\frac{2^8 \cdot 43}{12}\right) \qquad 917.333$$

- By changing the document's **Auto or Approximate** mode setting to Approximate.

  From the **File** menu, click **Settings** > **Document Settings**.

  Handheld: Press doc▾ to display the **File** menu.

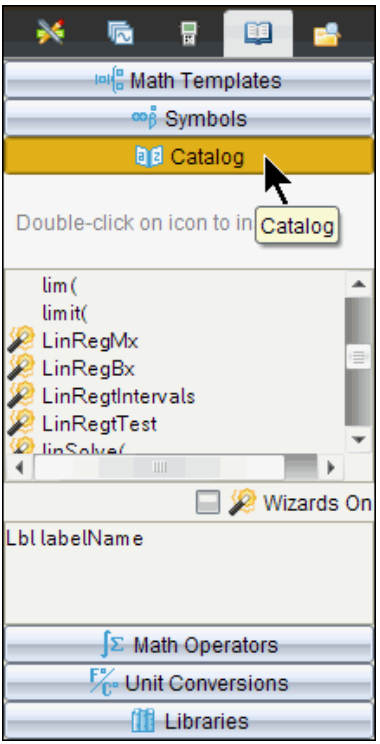
  Note that this method forces all results in all of the document's problems to approximate.

Inserting Items from the Catalog

You can use the Catalog to insert system functions and commands, symbols, and expression templates into the Calculator entry line.

1. Click the **Utilities** tab, and then click to open the Catalog.

   Handheld: Press 📖**1**.



Note: Some functions have a wizard that prompts you for each argument. Those functions are shown with an indicator. To receive the prompts, select Wizards On.

2. If the item you are inserting is visible in the list, select it and press **Enter** to insert it.
3. If the item is not visible:
   a) Click inside the list of functions, and then press a letter key to jump to the entries that begin with that letter.
   b) Press ▲ or ▼ as necessary to highlight the item you are inserting.

      Help, such as syntax information or a short description of the selected item, appears at the bottom of the Catalog.

   c) Press **Enter** to insert the item into the entry line.

Using an Expression Template

The Calculator has templates for entering matrices, piecewise functions, systems of equations, integrals, derivatives, products, and other math expressions.

$$\sum_{n=3}^{7}(n)$$

For example, suppose you want to evaluate $\sum_{n=3}^{7}(n)$

1. On the **Utilities** tab, click to open the templates.

   Handheld: Press .

2. Click to insert the algebraic sum template.

   The template appears on the entry line with small blocks representing elements that you can enter. A cursor appears next to one of the elements to show that you can type a value for that element.

3. Use the arrow keys to move the cursor to each element's position, and type a value or expression for each element.

4. Press **Enter** to evaluate the expression.

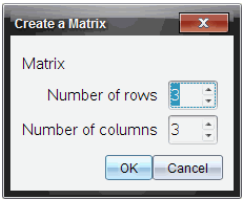
Creating Matrices

1. On the **Utilities** tab, click to open the templates.

   Handheld: Press .

2. Click .

   The Create a Matrix dialog box opens.



3. Type the **Number of rows**.
4. Type the **Number of columns**, and then click **OK**.

   Calculator opens a template with spaces for the rows and columns.

   Note: If you create a matrix with a large number of rows and columns, it may take a few moments to appear.

5. Type the matrix values into the template, and then press **Enter** to define the matrix.

Inserting a Row or Column into a Matrix

- To insert a new row, hold down **Alt** and press **Enter**.
- To insert a new column, hold down **Shift** and press **Enter**.

Handheld:

- To insert a new row, press .
- To insert a new column, press **Shift**+**Enter**.

Inserting Expressions Using a Wizard

You can use a wizard to simplify entering some expressions. The wizard contains labeled boxes to help you enter the arguments in the expression.

For example, suppose you want to fit a $y = mx + b$ linear regression model to the following two lists:

{1,2,3,4,5}
{5,8,11,14,17}

1. On the **Utilities** tab, click 📖 to open the Catalog.

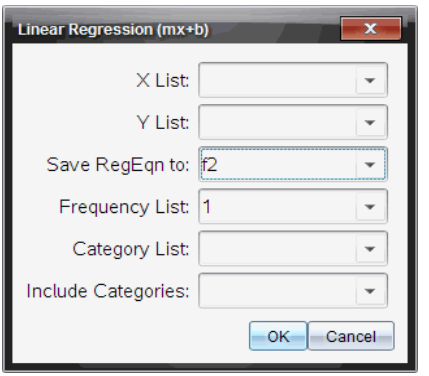
   Handheld: Press 📖 **1**.

2. Click an entry in the Catalog, and then press **L** to jump to the entries that begin with "L."
3. Press ▼ as necessary to highlight **LinRegMx**.
4. Select the **Wizards On** option, if it is not already selected:

   Handheld: Press **Tab Tab** to highlight **Wizards On**, press **Enter** to change the setting, and then press **Tab Tab** to highlight **LinRegMx** again.

5. Press **Enter**.

   A wizard opens, giving you a labeled box to type each argument.



6. Type {**1**,**2**,**3**,**4**,**5**} as **X List**.
7. Press **Tab** to move to the **Y List** box.
8. Type **{5,8,11,14,17}** as **Y List**.
9. If you want to store the regression equation in a specific variable, press **Tab**, and then replace **Save RegEqn To** with the name of the variable.
10. Click **OK** to close the wizard and insert the expression into the entry line.

Calculator inserts the expression and adds statements to copy the regression equation and show the variable *stat.results*, which will contain the results.

LinRegMx {1,2,3,4,5},{5,8,11,14,17},1: CopyVar stat.RegEqn,f2: stat.results

Calculator then shows the *stat.results* variables.

$$\text{LinRegMx } \{1,2,3,4,5\},\{5,8,11,14,17\},1:\ stat.results$$

"Title"	"Linear Regression (mx+b)"
"RegEqn"	"m*x+b"
"m"	3.
"b"	2.
"r²"	1.
"r"	1.
"Resid"	"{...}"

Note: You can copy values from the *stat.results* variables and paste them into the entry line.

Creating a Piecewise Function

1. Begin the function definition. For example, type the following expression:

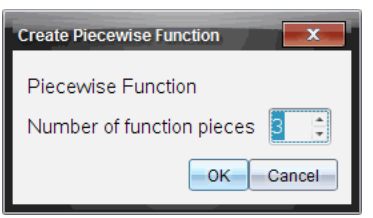
   `Define f(x,y)=`

2. On the **Utilities** tab, click to open the templates.

   Handheld: Press .

3. Click .

   The Create Piecewise Function dialog box opens.



4. Type the **Number of Function Pieces**, and click **OK**.

   Calculator opens a template with spaces for the pieces.

5. Type the expressions into the template, and press **Enter** to define the function.

6. Enter an expression to evaluate or graph the function. For example, type the expression `f(1,2)` on the Calculator entry line.

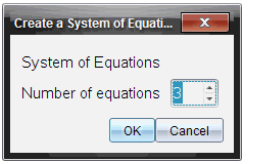
Creating a System of Equations

1. On the **Utilities** tab, click to open the templates.

   Handheld: Press .

2. Click .

   The Create a System of Equations dialog box opens.



3. Type the **Number of Equations**, and click **OK**.

   Calculator opens a template with spaces for the equations.

4. Type the equations into the template, and press **Enter** to define the system of equations.

Working with Variables

When you first store a value in a variable, you give the variable a name.

- If the variable does not already exist, Calculator creates it.
- If the variable already exists, Calculator updates it.

Variables within a problem are shared by TI-Nspire™ applications. For example, you can create a variable in Calculator and then use or modify it in Graphs & Geometry or Lists & Spreadsheet within the same problem.

Graphs Application

The Graphs application lets you:

- Graph and explore functions and other relations, such as inequalities, parametrics, polars, sequences, differential equation solutions, and conics.
- Animate points on objects or graphs and explore their behavior.
- Link to data created by other applications.

Adding a Graphs Page

▶ To start a new document with a blank Graphs page:

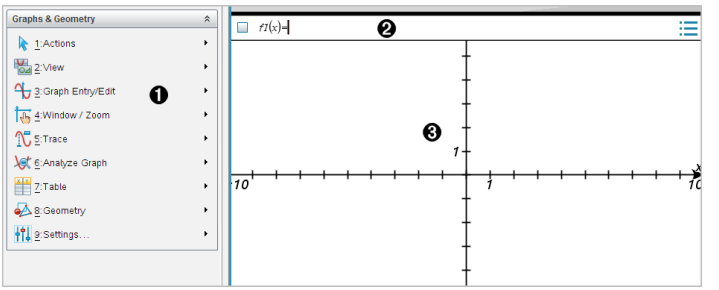
From the main **File** menu, click **New Document**, and then click **Add Graphs**.

Handheld: Press [on], and select **Graphs**.

▶ To add a Graphs page in the current problem of an existing document:

From the toolbar, click **Insert > Graphs**.

Handheld: Press [doc] and select **Insert > Graphs**.



❶ **Graphs & Geometry menu.** Contains tools for defining, viewing, and investigating relations.

❷ **Entry line**. Lets you define the relations that you want to graph. The default graph type is Function, so the form $f1(x)=$ is displayed initially. You can define multiple relations for each of several graph types.

❸ **Graphs Work Area**

- Shows graphs of relations that you define on the entry line.
- Shows points, lines, and shapes that you create with geometry tools.
- Drag the area to pan (affects only those objects created in the Graphs application).

What You Must Know

Changing the Graphs and Geometry Settings

1. From the **Settings** menu in the Documents Toolbox, select **Settings**.
2. Select the settings that you want to use.
   - **Display Digits.** Sets the display format for numbers as Floating or Fixed decimal.
   - **Graphing Angle.** Sets the angle unit for all Graphs and 3D Graphing applications in the current docuument. The default setting is Radian. Set this to Auto if you want graphing angles to follow the Angle setting in the main **File > Settings** menu. An angle mode indicator shows the resulting mode in Graphs and 3D Graphing applications.
   - **Geometry Angle.** Sets the angle unit for all Geometry applications in the current document. The default setting is Degree. Set this to Auto if you want geometry angles to follow the Angle setting in the main **File > Settings** menu. An angle mode indicator shows the resulting mode in Geometry applications.
   - **Automatically hide plot labels.** In the Graphs application, hides the label that normally appears next to a graphed relation.
   - **Show axis end values.** Applies only in the Graphs application.
   - **Show tool tips for function manipulation.** Applies only in the Graphs application.
   - **Automatically find points of interest.** In the Graphs application, shows zeros, minima, and maxima while tracing function graphs.
   - **Force Geometric Triangle Angles to Integers.** Restricts the angles of a triangle to integer values as you create or edit the triangle. This setting applies only in the Geometry View with the Geometry Angle unit set to Degree or Gradian. It does not apply to analytic triangles in Graphing View or to analytic triangles in the Analytic Window of the Geometry View. This setting does not affect existing angles, and it does not apply when constructing a triangle based on previously inserted points. By default, this setting is deselected.
   - **Automatically Label Points.** Applies labels (A, B, ..., Z, A_1, B_1, and so on) to points, lines, and vertices of geometric shapes as you draw them. The labeling sequence starts at A for each page in a document. By default, this setting is deselected.

     Note: If you create a new object that uses existing unlabeled points, those point are not automatically labeled in the completed object.

   - Click **Restore** to restore all settings to their factory defaults.

- Click **Make Default** to apply the current settings to the open document and save them as the default for new Graphs and Geometry documents.

Using Context Menus

Context menus provide quick access to commonly used commands and tools that apply to a specific object. For example, you can use a context menu to change an object's line color or to group a set of selected objects.

▶ Display the context menu for an object in one of the following ways.

- Windows®: Right-click the object.
- Mac®: Hold ⌘ and click the object.
- Handheld: Move the pointer to the object, and then press ctrl menu.

Finding Hidden Objects in the Graphs or Geometry Application

You can hide and show individual graphs, geometric objects, text, labels, measurements, and axis end-values.

To temporarily view hidden graphs or objects or to restore them as shown objects:

1. From the **Actions** menu, select **Hide/Show**.

   The Hide/Show tool  appears in the work area, and all hidden objects become visible in dimmed colors.

2. Click a graph or object to toggle its Hide/Show state.
3. To apply the changes and close the Hide/Show tool, press **ESC**.

Inserting a Background Image

You can insert an image as a background for a Graphs or Geometry page. The file format of the image can be .bmp, .jpg, or .png.

1. From the **Insert** menu, click **Image**.
2. Navigate to the image you want to insert, select it, and then click **Open**.

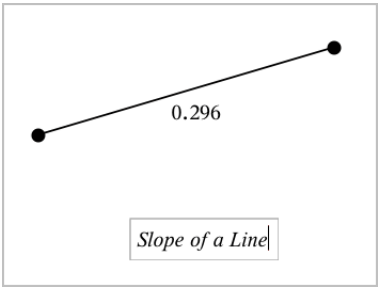
Adding Text to the Graphs or Geometry Work Area

1. From the **Actions** menu, select **Text**.

   The Text tool  appears in the work area.

2. Click the location for the text.

3. Type the text in the box that appears, and then press **Enter**.



4. To close the Text tool, press **ESC**.
5. To edit the text, double-click it.

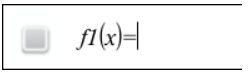
Deleting a Relation and its Graph

1. Select the relation by clicking its graph.
2. Press **Backspace** or **DEL**.

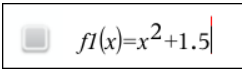
   The graph is removed from both the work area and the graph history.

Graphing Functions

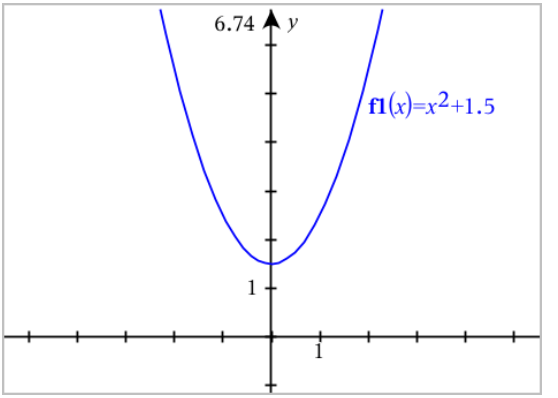
1. From the **Graph Entry/Edit** menu, select **Function**.



2. Type an expression for the function.



3. Press **Enter** to graph the function.



Finding Points of Interest on a Function Graph

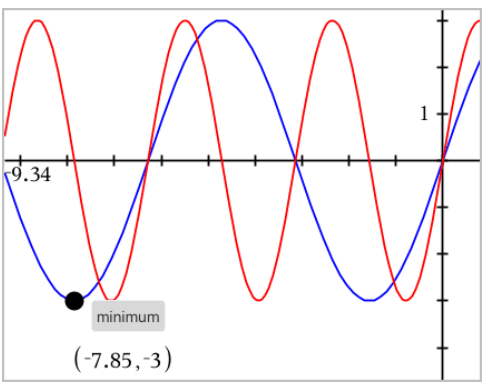
The Graphs application helps you find zeros, minimums, maximums, intersections, derivatives (dy/dx), or integrals. For Graphs defined as conic sections, you can also find foci, directrix, and other points.

(CAS): You can also find the point of inflection.

Identifying Points of Interest by Dragging a Point

- To quickly identify maximums, minimums, and zeros, create a point on the graph and then drag the point.

  Temporary signposts appear as you drag through points of interest.

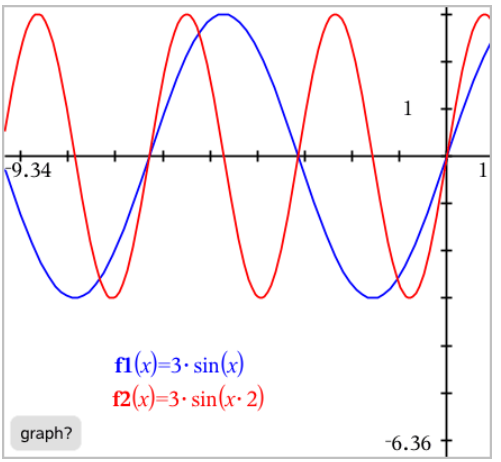


Identifying Points of Interest with Analysis Tools

This example illustrates using the Minimum tool. Other analysis tools operate similarly.

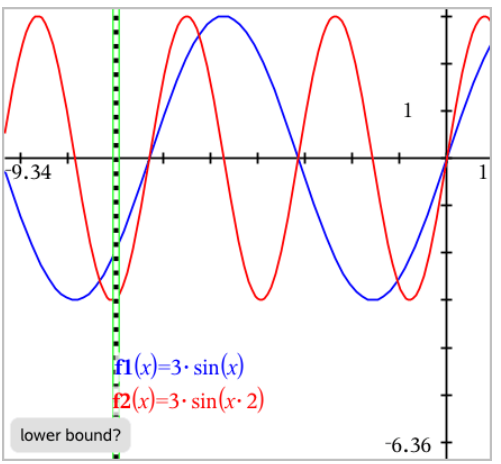
1. From the **Analyze Graph** menu, select **Minimum**.

The Minimum icon is displayed at the top left on the work area, and a **graph?** prompt appears in the work area.

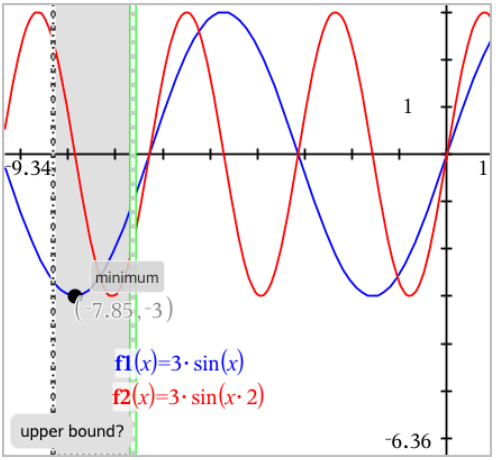


2. Click the graph on which you want to find the minimum.

   A dotted line appears, representing the lower bound of the range to search.

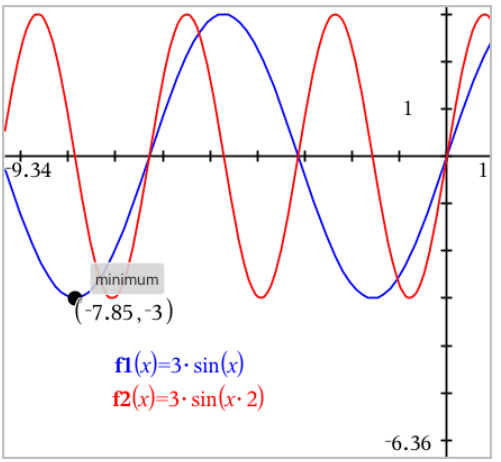


3. Drag the line or click a location to set the lower bound and display a proposed upper bound.



4. Drag the line representing the upper bound, or click a location to set it.

   The minimum is displayed, along with a text object showing its coordinates.



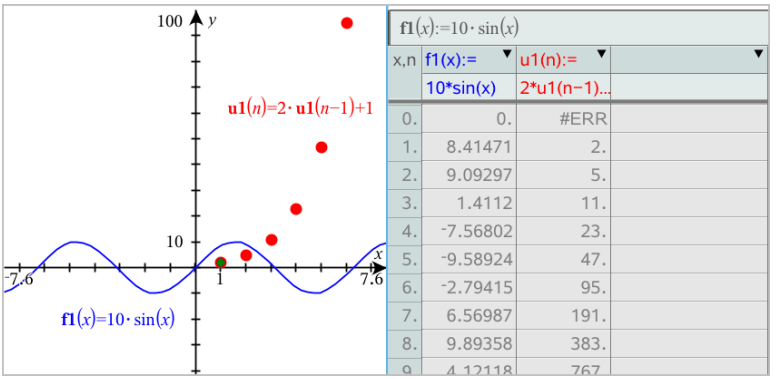
Viewing Tables from the Graphs Application

You can show a table of values for any relation defined in the current problem.

Showing a Table

- From the **Table** menu, select **Split-screen Table**.

  The table is displayed with columns of values for the currently defined relations.



To change which relation is displayed in a column, click the arrow in the top cell of the column, and then select the relation name.

Hiding the Table

- From the **Table** menu, select **Remove Table**.

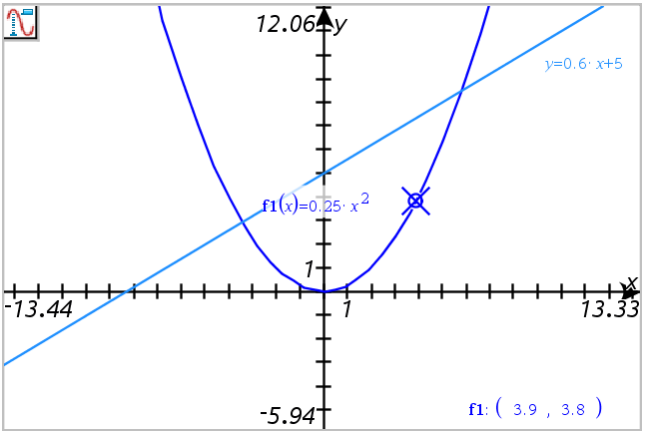
Tracing Graphs or Plots

Graph Trace lets you move a trace cursor over the points of a graph or plot and displays value information.

Tracing Specific Graphs

1. From the **Trace** menu, select **Graph Trace**.

   The Graph Trace tool appears at the top of the work area, the trace cursor appears, and the cursor coordinates are displayed in the lower right corner.



2. Explore a graph or plot:
   - Point to a position on a graph or plot to move the trace cursor to that point.
   - Press ◀ or ▶ to step the cursor along the current graph or plot. The screen pans automatically to keep the cursor in view.
   - Press ▲ or ▼ to cycle among the displayed graphs.
   - Click the trace cursor to create a persistent point. Optionally, enter a specific independent value to move the trace cursor to that value.
3. To stop tracing, press **Esc**.

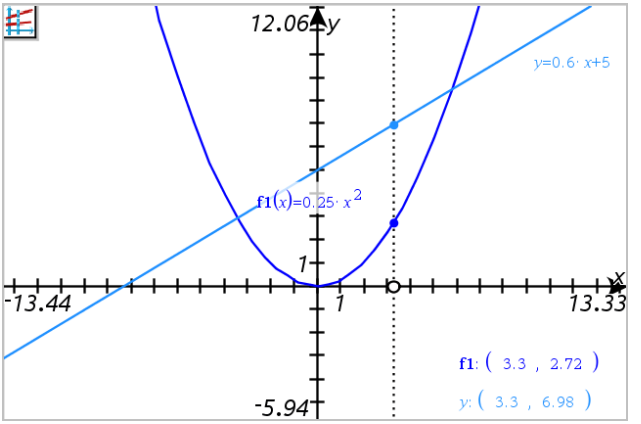
Tracing All Graphs

The Trace All tool allows tracing multiple functions simultaneously. With several functions graphed on the work area, perform the following steps:

Note: The Trace All tool traces only function graphs, not plots of other relations (polar, parametric, scatter, sequence).

1. From the **Trace** menu, select **Trace All**.

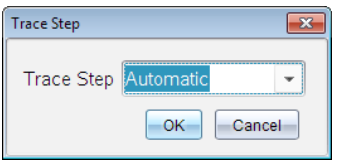
   The Trace All tool appears in the work area, a vertical line indicates the x value of the trace, and the coordinates for each traced point are displayed in the lower right corner.



2. Explore the graphs:
   - Click a point on the x axis to move all the trace points to that x value.
   - Press ◄ or ► to step the trace points along all the graphs.
3. To stop tracing, press **Esc**.

Changing the Trace Step

1. From the **Trace** menu, select **Trace Step**.



2. Choose Automatic or enter a specific step size for tracing.

Geometry Application

The Geometry application lets you:

- Create and explore geometric objects and constructions.
- Manipulate and measure geometric objects.
- Animate points on objects and explore their behavior.
- Explore object transformations.

Adding a Geometry Page

▶ To start a new document with a blank Geometry page:

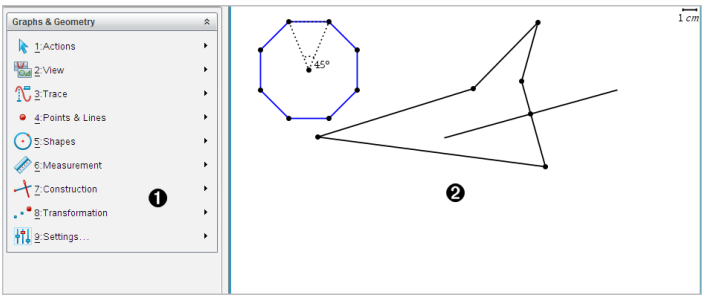
From the main **File** menu, click **New Document**, and then click **Add Geometry**.

Handheld: Press [on], and select **Geometry**.

▶ To add a Geometry page in the current problem of an existing document:

From the toolbar, click **Insert > Geometry**.

Handheld: Press [doc] and select **Insert > Geometry**.



❶ Geometry menu – Available anytime you are viewing a Geometry page.

❷ Geometry work area -- The drawing area where you create and explore geometric objects.

What You Must Know

Changing the Graphs and Geometry Settings

1. From the **Settings** menu in the Documents Toolbox, select **Settings**.
2. Select the settings that you want to use.

- **Display Digits.** Sets the display format for numbers as Floating or Fixed decimal.
- **Graphing Angle.** Sets the angle unit for all Graphs and 3D Graphing applications in the current docuument. The default setting is Radian. Set this to Auto if you want graphing angles to follow the Angle setting in the main **File > Settings** menu. An angle mode indicator shows the resulting mode in Graphs and 3D Graphing applications.
- **Geometry Angle.** Sets the angle unit for all Geometry applications in the current document. The default setting is Degree. Set this to Auto if you want geometry angles to follow the Angle setting in the main **File > Settings** menu. An angle mode indicator shows the resulting mode in Geometry applications.
- **Automatically hide plot labels.** In the Graphs application, hides the label that normally appears next to a graphed relation.
- **Show axis end values.** Applies only in the Graphs application.
- **Show tool tips for function manipulation.** Applies only in the Graphs application.
- **Automatically find points of interest.** In the Graphs application, shows zeros, minima, and maxima while tracing function graphs.
- **Force Geometric Triangle Angles to Integers.** Restricts the angles of a triangle to integer values as you create or edit the triangle. This setting applies only in the Geometry View with the Geometry Angle unit set to Degree or Gradian. It does not apply to analytic triangles in Graphing View or to analytic triangles in the Analytic Window of the Geometry View. This setting does not affect existing angles, and it does not apply when constructing a triangle based on previously inserted points. By default, this setting is deselected.
- **Automatically Label Points.** Applies labels (A, B, ..., Z, A_1, B_1, and so on) to points, lines, and vertices of geometric shapes as you draw them. The labeling sequence starts at A for each page in a document. By default, this setting is deselected.

  Note: If you create a new object that uses existing unlabeled points, those point are not automatically labeled in the completed object.
- Click **Restore** to restore all settings to their factory defaults.
- Click **Make Default** to apply the current settings to the open document and save them as the default for new Graphs and Geometry documents.

Using Context Menus

Context menus provide quick access to commonly used commands and tools that apply to a specific object. For example, you can use a context menu to change an object's line color or to group a set of selected objects.

- Display the context menu for an object in one of the following ways.
  - Windows®: Right-click the object.
  - Mac®: Hold ⌘ and click the object.
  - Handheld: Move the pointer to the object, and then press ctrl menu.

Finding Hidden Objects in the Graphs or Geometry Application

You can hide and show individual graphs, geometric objects, text, labels, measurements, and axis end-values.

To temporarily view hidden graphs or objects or to restore them as shown objects:

1. From the **Actions** menu, select **Hide/Show**.

   The Hide/Show tool appears in the work area, and all hidden objects become visible in dimmed colors.

2. Click a graph or object to toggle its Hide/Show state.
3. To apply the changes and close the Hide/Show tool, press **ESC**.

Inserting a Background Image

You can insert an image as a background for a Graphs or Geometry page. The file format of the image can be .bmp, .jpg, or .png.

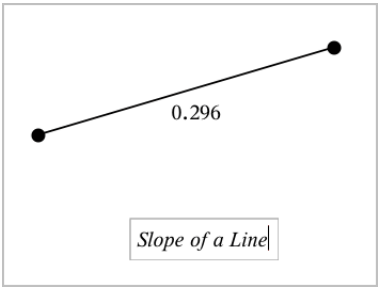
1. From the **Insert** menu, click **Image**.
2. Navigate to the image you want to insert, select it, and then click **Open**.

Adding Text to the Graphs or Geometry Work Area

1. From the **Actions** menu, select **Text**.

   The Text tool appears in the work area.

2. Click the location for the text.
3. Type the text in the box that appears, and then press **Enter**.



4. To close the Text tool, press **ESC**.
5. To edit the text, double-click it.

Deleting a Relation and its Graph

1. Select the relation by clicking its graph.
2. Press **Backspace** or **DEL**.

   The graph is removed from both the work area and the graph history.

Introduction to Geometric Objects

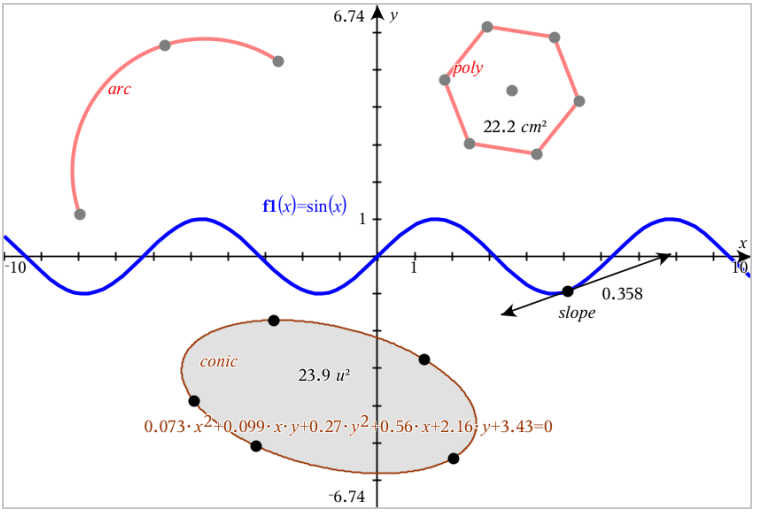
Geometry tools are accessible in both the Graphs and Geometry applications. You can use these tools to draw and investigate objects such as points, lines, and shapes.

- The Graphing view shows the Graphs work area superimposed on the Geometry work area. You can select, measure, and alter objects in both work areas.
- The Plane Geometry view shows only the objects created in the Geometry application.

Objects Created in the Graphs Application

Points, lines, and shapes created in the Graphs application are analytic objects.

- All points that define these objects reside on the x,y graph plane. Objects created here are visible only in the Graphs application. Changing the axes scale affects the appearance of the objects.
- You can display and edit the coordinates of any point on an object.
- You can display the equation of a line, tangent line, circle shape, or geometric conic created in the Graphs application.

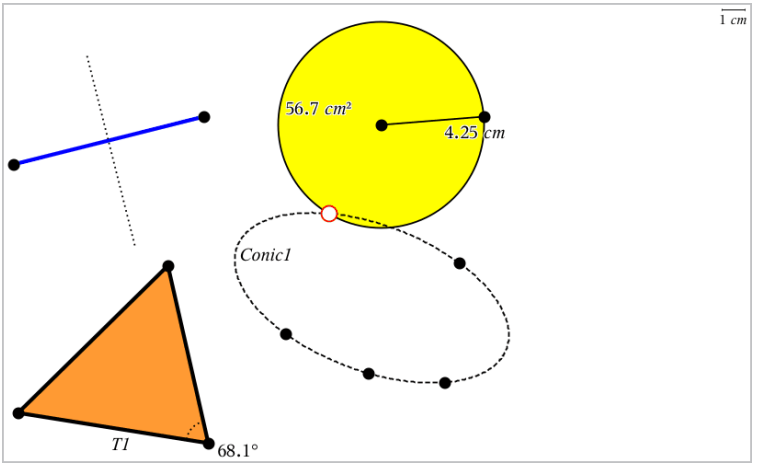


The circle arc and polygon were created in the Geometry application. The sine wave and conic were created in the Graphs application.

Objects Created in the Geometry Application

Points, lines, and shapes created in the Geometry application are not analytic objects.

- Points that define these objects do not reside on the graph plane. Objects created here are visible in both the Graphs and Geometry applications, but they are unaffected by changes to the Graphs x,y axes.
- You cannot obtain the coordinates of an object's points.
- You cannot display the equation of a geometric object created in the Geometry application



Creating Points and Lines

As you create an object, a tool appears in the work area (for example, **Segment**). To cancel, press **ESC**. To enable automatic labeling of certain objects, see *What You Must Know* in this chapter.

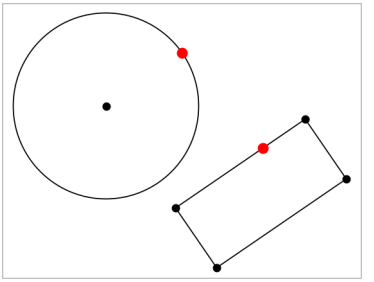
Creating a Point on the Work Area

1. From the **Points and Lines** menu, select **Point**. (In the Graphs application, click **Geometry > Points and Lines > Point.)**
2. Click a location to create the point.
3. (Optional) Label the point.
4. To move a point, drag it.

Creating a Point on a Graph or Object

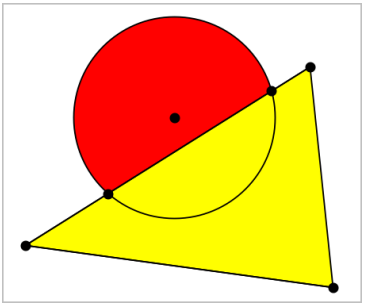
You can create a point on a line, segment, ray, axis, vector, circle, graph, or axis.

1. From the **Points and Lines** menu, select **Point On**. (In the Graphs application, click **Geometry > Points and Lines > Point On.)**
2. Click the graph or object on which you want to create the point.
3. Click a location on the object to place the point.



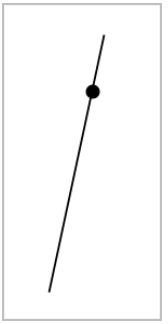
Identifying Points of Intersection

1. From the **Points and Lines** menu, select **Intersection Points**. (In the Graphs application, click **Geometry > Points and Lines > Intersection Points.)**
2. Click two intersecting objects to add points at their intersections.



Creating a Line

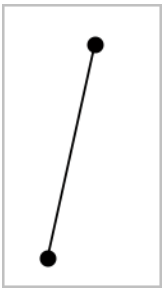
1. From the **Points and Lines** menu, select **Line**. (In the Graphs application, click **Geometry > Points and Lines > Line.)**
2. Click a location to define one point on the line.
3. Click a second location to define the direction of the line and the length of its visible portion.



4. To move a line, drag its identifying point. To rotate it, drag any point except the identifying point or ends. To extend its visible portion, drag from either end.

Creating a Segment

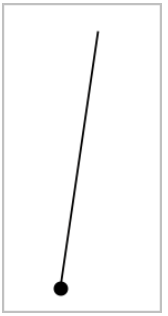
1. From the **Points and Lines** menu, select **Segment**. (In the Graphs application, click **Geometry > Points and Lines > Segment.)**
2. Click two locations to define the endpoints of the segment.



3. To move a segment, drag any point other than an endpoint. To manipulate the direction or length, drag either endpoint.

Creating a Ray

1. From the **Points and Lines** menu, select **Ray**. (In the Graphs application, click **Geometry > Points and Lines > Ray.)**
2. Click a location to define the endpoint of the ray.
3. Click a second location to define the direction.

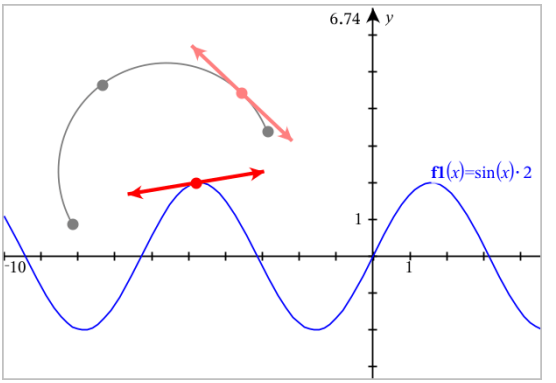


To move a ray, drag its identifying point. To rotate it, drag any point except the identifying point or end. To extend its visible portion, drag from the end.

Creating a Tangent

You can create a tangent line at a specific point on a geometric object or function graph.

1. From the **Points and Lines** menu, select **Tangent**. (In the Graphs application, click **Geometry > Points and Lines > Tangent.)**
2. Click the object to select it.
3. Click a location on the object to create the tangent.

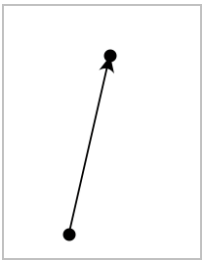


4. To move a tangent, drag it. It remains attached to the object or graph.

Creating a Vector

1. From the **Points and Lines** menu, select **Vector**. (In the Graphs application, click **Geometry > Points and Lines > Vector.)**

2. Click a location to establish the vector's initial point.
3. Click a second location to specify direction and magnitude and complete the vector.

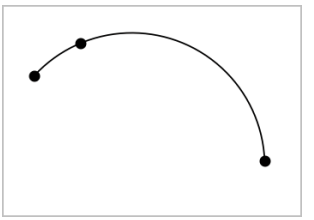


4. To move a vector, drag any point other than the endpoints. To manipulate the magnitude and/or direction, drag either end point.

   Note: If you create an endpoint on an axis or another object, you can move the endpoint only along that object.

Creating a Circle Arc

1. From the **Points and Lines** menu, select **Circle Arc**. (In the Graphs application, click **Geometry > Points and Lines > Circle Arc.)**
2. Click a location or point to establish the starting point of the arc.
3. Click a second point to establish an intermediate point through which the arc will pass.
4. Click a third point to set the ending point and complete the arc.



5. To move an arc, drag its perimeter. To manipulate it, drag any of its three defining points.

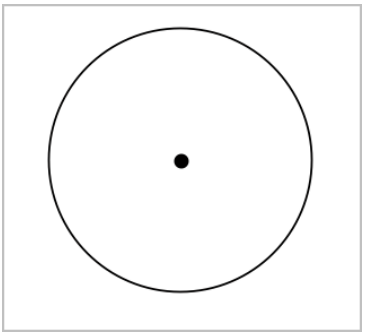
Creating Geometric Shapes

The Shape tools let you explore circles, polygons, conics, and other geometric objects.

As you create a shape, a tool appears in the work area (for example, **Circle** ⊙). To cancel the shape, press **ESC**. To enable automatic labeling of certain objects, see *What You Must Know*, in this chapter.

Creating a Circle

1. From the **Shapes** menu, select **Circle**. (In the Graphs application, click **Geometry > Shapes > Circle**.)
2. Click a location or point to position the circle's center point.
3. Click a location or point to establish the radius and complete the circle.

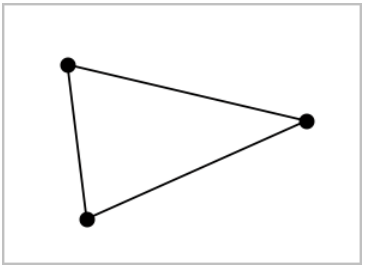


4. To resize a circle, drag its perimeter. To move it, drag its center point.

Creating a Triangle

Note: To ensure that the sum of the angles of a triangle equals 180° or 200 gradians, you can force integer angles in the Geometry view. Refer to *What You Must Know*, in this chapter.

1. From the **Shapes** menu, select **Triangle**. (In the Graphs application, click **Geometry > Shapes > Triangle**.)
2. Click three locations to establish the vertices of the triangle.

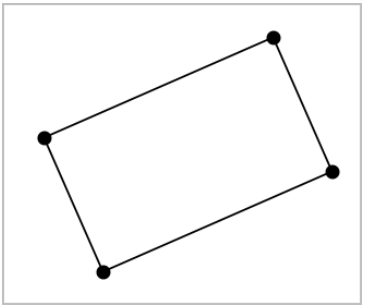


3. To manipulate a triangle, drag any point. To move it, drag any side.

Creating a Rectangle

1. From the **Shapes** menu, select **Rectangle**. (In the Graphs application, click **Geometry > Shapes > Rectangle**.)
2. Click a location or point to establish the first corner of the rectangle.
3. Click a location for the second corner.

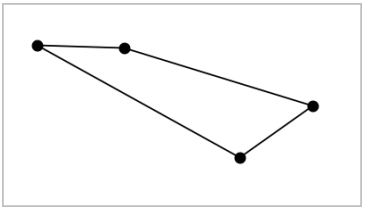
   One side of the rectangle is displayed.
4. Click to establish the distance to the opposite side and complete the rectangle.



5. To rotate a rectangle, drag one of its first two points. To extend it, drag one of the last two points. To move it, drag any side.

Creating a Polygon

1. From the **Shapes** menu, select **Polygon**. (In the Graphs application, click **Geometry > Shapes > Polygon**.)
2. Click a location or point to establish the first vertex of the polygon.
3. Click to establish each additional vertex.
4. To complete the polygon, click the first vertex.

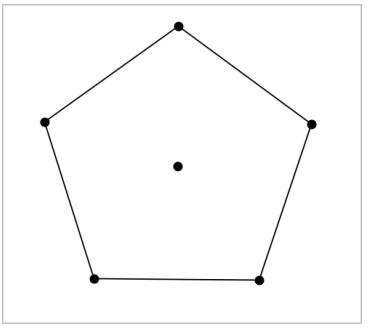


5. To manipulate a polygon, drag any vertex. To move it, drag any side.

Creating a Regular Polygon

1. From the **Shapes** menu, select **Regular Polygon**. (In the Graphs application, click **Geometry > Shapes > Regular Polygon**.)
2. Click once on the work area to establish the center point.
3. Click a second location to establish the first vertex and radius.

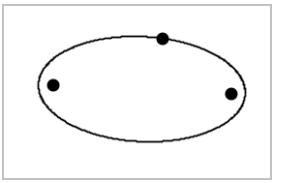
   A 16-sided regular polygon is formed. The number of sides is displayed in brackets; for example, {16}.
4. Drag any vertex in a circular motion to set the number of sides.
   - Drag clockwise to reduce the number of sides.
   - Drag counterclockwise to add diagonals.



5. To resize or rotate a regular polygon, drag any of its points. To move it, drag any side.

Creating an Ellipse

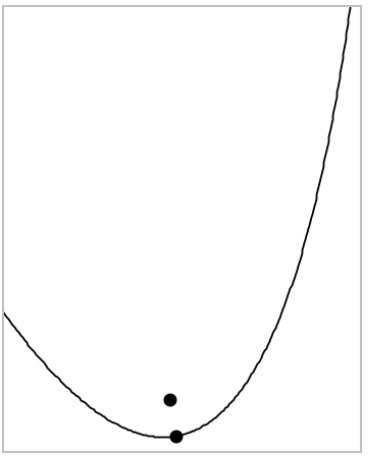
1. From the **Shapes** menu, select **Ellipse**. (In the Graphs application, click **Geometry > Shapes > Ellipse**.)
2. Click two locations or points to establish the foci.
3. Click to establish a point on the ellipse and complete the shape.



4. To manipulate an ellipse, drag any of its three defining points. To move it, drag its perimeter.

Creating a Parabola (from focus and vertex)

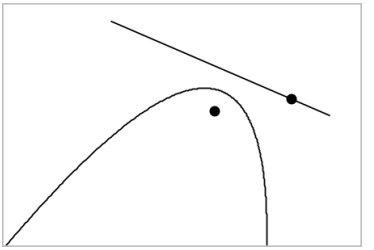
1. From the **Shapes** menu, select **Parabola**. (In the Graphs application, click **Geometry > Shapes > Parabola**.)
2. Click a location to establish the focus.
3. Click a location to establish the vertex and complete the parabola.



4. To manipulate a parabola, drag its focus or its vertex. To move it, drag it from any other point.

Creating a Parabola (from focus and directrix)

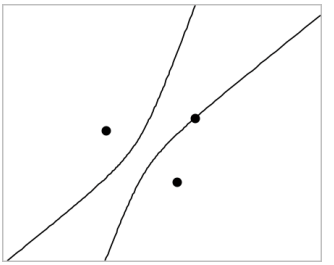
1. Create a line to serve as the directrix.
2. From the **Shapes** menu, select **Parabola**. (In the Graphs application, click **Geometry > Shapes > Parabola**.)
3. Click a location to establish the focus.
4. Click the line to establish it as the directrix.



5. To manipulate a parabola, rotate or move its directrix or drag its focus. To move it, select both the directrix and the focus, and then drag either object.

Creating a Hyperbola

1. From the **Shapes** menu, select **Hyperbola**. (In the Graphs application, click **Geometry > Shapes > Hyperbola**.)
2. Click two locations to establish the foci.
3. Click a third location to complete the hyperbola.

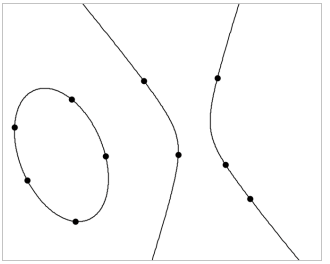


4. To manipulate a hyperbola, drag any of its three defining points. To move it, drag it from any other place on the shape.

Creating a Conic by Five Points

1. From the **Shapes** menu, select **Conic by Five Points**. (In the Graphs application, click **Geometry > Shapes > Conic by Five Points**.)
2. Click five locations to establish the five points on the shape.

   Depending on the pattern of the points, the conic can be a hyperbola or an ellipse.



3. To manipulate a conic, drag any of its five defining points. To move it, drag it from any other place on the shape.

Creating Shapes Using Gestures (MathDraw)

The MathDraw tool lets you use touchscreen or mouse gestures to create points, lines, circles, and other shapes.

MathDraw is available in:

- Geometry view without the analytic window displayed.
- Graphing view when the x scale and y scale are identical. This avoids non-circular ellipses and non-square rectangles appearing as circles and squares.

MathDraw is not available in the 3D Graphing view or in the Geometry view with the analytic window displayed.

Activating MathDraw

1. If using the Geometry view with the analytic window visible, use the **View** menu to hide the window.
2. On the **Actions** menu, select **MathDraw**.

   The MathDraw icon appears. You can begin using the tool.

Canceling MathDraw

- When you have finished using the MathDraw tool, press **Esc**.

  The tool also closes if you select a different tool or change views.

Creating Points

To create a labeled point, tap or click in an open area.

- If the point is close to an existing line, segment, ray, geometric conic (including circles), or polygon, the point snaps to that object. You can also place a point on the intersection of any two of those types of objects.

- If the point is close to a visible grid location in a Graphs view or the analytic window of a Geometry view, it snaps to the grid.

Drawing Lines and Segments

To create a line or segment, touch or click the initial position, and then drag to the end position.

- If the drawn line passes near an existing point, the line snaps to the point.
- If the drawn line starts close to an existing point and ends next to another existing point , it becomes a segment defined by those points.
- If the drawn line is nearly parallel or perpendicular to an existing line, segment, or side of a polygon, it aligns to that object.

  Note: The default tolerance for detecting parallel/perpendicular lines is 12.5 degrees. This tolerance can be redefined using a variable named **ti_gg_fd.angle_tol**. You can change the tolerance in the current problem by setting this variable in the calculator app to a value in the range 0 through 45 (0=no parallel/perpendicular detection).

Drawing Circles and Ellipses

To create a circle or ellipse, use the touchscreen or mouse to draw the approximate shape.

- If the drawn shape is sufficiently circular, a circle is created.
- If the shape is elongated, an ellipse is created.
- If the virtual center of the drawn shape is near an existing point, the circle or ellipse is centered on that point.

Drawing Triangles

To create a triangle, draw a triangle-like shape.

- If a drawn vertex is close to an existing point, the vertex snaps to the point.

Drawing Rectangles and Squares

To create a rectangle or square, use the touchscreen or mouse to draw the perimeter.

- If the drawn shape is nearly square, a square is created.
- If the drawn shape is elongated, a rectangle is created.

- If the center of a square is close to an existing point, the square snaps to that point.

Drawing Polygons

To create a polygon, tap or click a succession of existing points, ending on the first point you tapped.

Using MathDraw to Create Equations

In the Graphs view, MathDraw attempts to recognize certain gestures as functions for analytic parabolas.

Note: The default step value for quantization of the parabola coefficients is 1/32. The denominator of this fraction can be redefined using a variable named **ti_gg_fd.par_quant**. You can change the step value in the current problem by setting this variable to a value greater or equal to 2. A value of 2, for example, produces a step value of 0.5.

Using MathDraw to Measure an Angle

To measure the angle between two existing lines, use the touchscreen or mouse to draw a circle arc from one of the lines to the other.

- If the intersection point between the two lines does not exist, it is created and labeled.
- The angle is not a directed angle.

Using MathDraw to Find a Mid-point

To create a point midway between two points, tap or click point 1, point 2, and then point 1 again.

Using MathDraw to Erase

To erase objects, use the touchscreen or mouse to drag left and right, similar to the motion of erasing a whiteboard.

- The erasure area is the bounding rectangle of the erasure gesture.
- All point objects and their dependents inside the erasure area are removed.

Basics of Working with Objects

Selecting and Deselecting Objects

You can select an individual object or multiple objects. Select multiple objects when you want to quickly move, color, or delete them together.

1. Click an object or graph to select it.

   The object flashes to indicate selection.

2. Click any additional objects to add them to the selection.
3. Perform the operation (such as moving or setting color).
4. To deselect all objects, click an empty space in the work area.

Grouping and Ungrouping Geometric Objects

Grouping objects gives you a way to reselect them as a set, even after you have deselected them to work with other objects.

1. Click each object to add it to the current selection.

   The selected objects flash.

2. Display a context menu of the selected object or objects.
3. Click **Group**. You can now select all the items in the group by clicking any of its members.
4. To split a group into individual objects, display a context menu of any of its member objects, and click **Ungroup**.

Deleting Objects

1. Display the context menu of the object or objects.
2. Click **Delete**.

   You cannot delete the origin, the axes, or points representing locked variables, even if those items are included in the selection.

Moving Objects

You can move an object, group, or combination of selected objects and groups.

Note: If an immovable object (such as the graph axes or a point with locked coordinates) is included in a selection or group, you cannot move any of the objects. You must cancel the selection and then select only movable items.

To move this...	Drag this
A multiple-object selection or group	Any of its objects
A point	The point
A segment or vector	Any point other than an endpoint
A line or ray	The identifying point
A circle	The center point
Other geometric shapes	Any position on the object except one of its defining points. For example, move a polygon by dragging any of its sides.

Constraining Object Movement

Holding down the **SHIFT** key before dragging lets you constrain how certain objects are drawn, moved, or manipulated.

Use the constraint feature to:

- Rescale only a single axis in the Graphs application.
- Pan the work area horizontally or vertically, depending on which direction you drag initially.
- Limit object movement to horizontal or vertical.
- Limit point placement to 15° increments as you draw a triangle, rectangle, or polygon.
- Limit angle manipulations to 15° increments.
- Limit the radius of a resized circle to integer values.

Pinning Objects

Pinning objects prevents accidental changes as you move or manipulate other objects.

You can pin graphed functions, geometric objects, text objects, the graph axes, and the background.

1. Select the object or objects to pin, or click an empty area if you are pinning the background.
2. Display the context menu, and select **Pin**.

   A pinned object displays a pin icon  when you point to it.
3. To unpin an object, display its context menu, and select **Unpin**.

Notes:

- Although you cannot drag a pinned point, you can reposition it by editing its x and y coordinates.
- You cannot pan the work area while the background is pinned.

Changing the Line or Fill Color of an Object

Color changes made in the software are displayed in shades of gray when you work on documents using a TI-Nspire™ handheld that does not support color. Color is preserved when you move documents back to the software.

1. Select the object or objects.
2. Display the object's context menu, click **Color**, and then click **Line Color** or **Fill Color**.
3. Select the color to apply to the objects.

Changing the Appearance of an Object

1. From the **Actions** menu, select **Attributes**.
2. Click the object that you want to change. You can change shapes, lines, graphs, or graph axes.

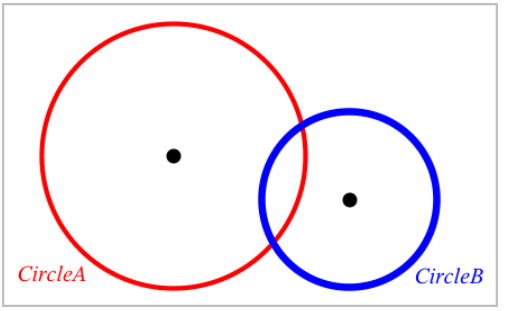
   The list of the attributes for the selected object are displayed.
3. Press ▲ and ▼ to move through the list of attributes.
4. At each attribute icon, press ◄ or ► to move through the options. For example, select Thick, Thin, or Medium for the Line Weight attribute.
5. Press **Enter** to apply the changes.

6. Press **ESC** to close the Attributes tool.

Labeling Points, Geometric Lines, and Shapes

1. Display the context menu of the object.
2. Click **Label**.
3. Type the text of the label, and then press **Enter**.

   The label attaches itself to the object and follows the object as you move it. The label's color matches the object's color.



Lists & Spreadsheet Application

The Lists & Spreadsheet application gives you a place to work with tabular data. It lets you:

- Store numeric data, text, or math expressions.
- Define a table cell in terms of the contents of other cells.
- Define an entire column based on the contents of another column.
- Share columns of data as list variables with other TI-Nspire™ applications. Also share individual cells as variables.
- Work with variables created in the Graphs & Geometry and Calculator applications.
- Collect tables of real-world data from sensors.
- Generate columns of data-based sequences that you define.
- Plot table data using the Data & Statistics application.
- Generate a table of values for a function.
- Copy and paste table data from the Lists & Spreadsheet application to other computer applications, such as TI Connect™ software and Excel® spreadsheet software.
- Perform statistical analysis on lists of data.

Adding a Lists & Spreadsheet Page

▶ To start a new document with a blank Lists & Spreadsheet page:

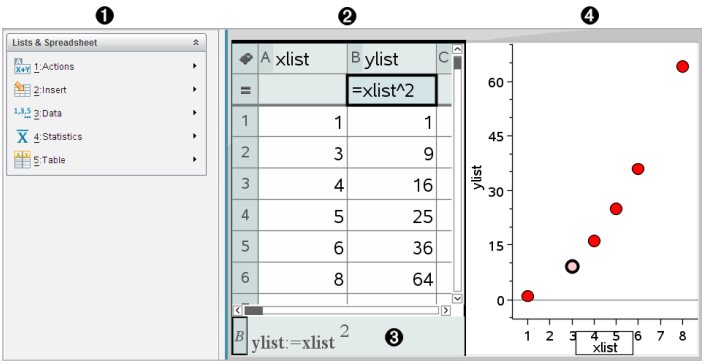
From the main **File** menu, click **New Document**, and then click **Lists & Spreadsheet**.

Handheld: Press [on], and select **Lists & Spreadsheet**.

▶ To add a Lists & Spreadsheet page in the current problem of an existing document:

From the toolbar, click **Insert > Lists & Spreadsheet**.

Handheld: Press [doc] and select **Insert >Lists & Spreadsheet**.



❶ Lists & Spreadsheet tools (available when a Lists & Spreadsheet work area is active)

❷ Sample Lists & Spreadsheet work area

❸ Lists & Spreadsheet entry line

❹ Lists & Spreadsheet data plotted in the Data & Statistics application

Creating and Sharing Spreadsheet Data as Lists

You can define a column as a named list of elements of the same type of data. After defining a list, you can link to it from the Graphs & Geometry, Calculator, or Data & Statistics applications, and from other instances of the Lists & Spreadsheet application within the current problem.

Note: Lists & Spreadsheet can display a maximum of 2500 elements in a list.

Sharing a Spreadsheet Column as a List Variable

You share a column of data by naming it as a list variable.

Note: Avoid defining variables that use the same names as those used for statistical analysis. In some cases, an error condition could occur.

Variable names used for statistical analysis are listed in the *TI-Nspire™ Reference Guide*, under the **stat.results** entry.

1. Click the cell to move to the column's name cell (the top cell of the column).

   —or—

   Press ▲ as necessary.

2. Type a name for the list variable, and press **Enter**.

   The column is now available as a list variable to other TI-Nspire™ applications.

3. Create elements in the list the same as you would create data in spreadsheet cells. For example, you can type the data into each cell or use a formula to generate a column of data.

Notes:

- If a variable with the name you specified already exists in the current problem, Lists & Spreadsheet displays an error message.
- When you select the column formula cell of a list, it displays the list name in an expression similar to **`width:=`**.

- Lists can contain empty elements (denoted by "_") .
- You can refer to a specific element in a named list from the Calculator application. Use the list name and the element's position within the list. In a list named Heights, for example, refer to the first element as Heights[1]. The expression Heights[2] refers to the second element, and so on.

Linking to an Existing List Variable

Linking a column to an existing list variable lets you easily view and edit the values in the list. The list can be any shared list in the current problem and can be defined in Graphs & Geometry, Calculator, or any instance of Lists & Spreadsheet.

After you link a column to a list, Lists & Spreadsheet automatically shows any changes that you make to the list with other TI-Nspire™ applications.

1. Click the column formula cell (the second cell from the top) of the column that you want to link to the variable.
2. Type the name of the list variable you want to link to.

   —or—

   Click var on the toolbar (press var on the handheld), click **Link To**, and click the variable you want to link to.
3. Press **Enter**.

   The column shows the list elements.

Notes:

- You cannot link to the same variable multiple times on the same page.
- Use caution if you link to a system variable. Doing so could prevent the variable from being updated by the system. System variables include *ans* and statistics results (such as *stat.results*, *stat.RegEqn*, and *stat.Resid*).

Inserting an Element in a List

When you insert an element in a list, the remaining elements shift downward to create space. No other columns are affected.

▶ Click **Insert > Insert Cell**.

Deleting an Element from a List

When you delete an element, the remaining list elements shift upward to close the gap. The upward shift affects only the selected column.

1. Click the cell of the element to delete.
2. Open the context menu for the cell, and click **Delete Cell**.

   Note: If you press **Del** or **Backspace** to clear the contents of the cell instead of deleting the list element, the element is assigned a value of 0 (zero). The remaining list elements do not shift.

Creating Spreadsheet Data

You can type numeric values, text, or formulas into body cells. Column formula cells can contain formulas only. (For more information, see Generating Columns of Data.)

Data Examples

Entry	Remarks
1.234	Simple numeric entry
"Green"	Text - Enclose categorical data (such as the names of colors used in a study) within quotes to distinguish them from variable names. Handheld: Press ctrl × to enter quoted data.
=a3*length	Formula - Consists of an "=" symbol followed by an expression. You can type the expression or use the Catalog and expression templates to build it. For more information, see the *Calculator* section. To ensure a decimal result instead of a fraction, type one of the integers in the expression as a decimal. For example, type **1.0** instead of **1**.

Typing a Math Expression, Text, or Spreadsheet Formula

1. Double-click the cell to select it and put it in edit mode.

   Note: If the cell is already selected, you can press **Enter** or click the entry line.

2. Type the expression, text, or formula. Be sure to enclose text entries in quotes and start formula entries with an "=" symbol.

   As you type the data, it appears in the cell and on the entry line simultaneously.

3. Press **Enter** to complete the entry and move down to the next cell.

—or—

Press **Tab** to complete the entry and move right to the next cell.

The Lists & Spreadsheet application automatically recalculates any cells that are dependent on the cell you entered. If you have shared the cell, and other TI-Nspire™ applications are linked to the cell, the other applications are also updated.

Note: Empty cells in a spreadsheet display as a void represented by an underscore (_). The underscore is automatically added to empty cells when a list is named or when an empty cell is referenced in a formula. When you plan to perform calculations on a range of cells, be sure to notice the location of void cells. Cells without a value can affect calculations. For example, if you include a void cell in the range for a sum such as "=b2+c2," the result of the calculation is void (_).

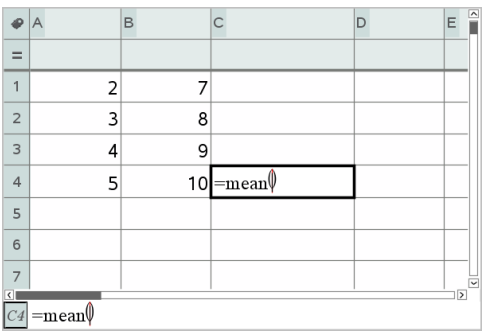
Inserting a Cell Range into a Formula

The Select Range feature lets you insert a cell range (such as a1:b3) into a formula by selecting the range instead of typing cell addresses into an argument.

Suppose you want to calculate the mean of a range of cells.

1. Select the cell that will contain the result.
2. From the **Data** menu, click **List Math > Mean**.

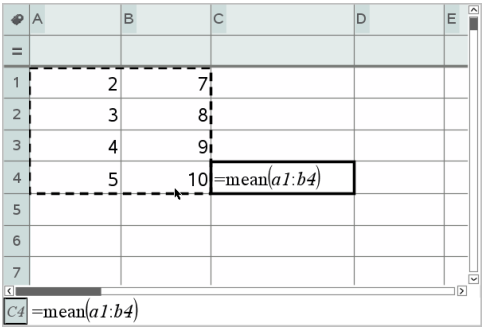
   An editable formula appears in the cell.



3. Click **Actions > Select > Select Formula Range**.
4. Drag a selection rectangle around the range of values for which you want to calculate the mean.

Handheld: Move to the first cell in the range, hold ⇧shift, and press the arrow keys.

The formula is updated as you select the cells.



5. Press **Enter** to complete the formula and display the result.

Data & Statistics Application

The Data & Statistics application provides tools to:

- Visualize sets of data in different types of plots.
- Directly manipulate variables to explore and visualize data relationships. Data changes in one application are dynamically applied to all linked applications.
- Explore central tendency and other statistical summary techniques.
- Fit functions to data.
- Create regression lines for scatter plots.
- Graph hypothesis tests and results (z- and t-tests) based on summary statistics definitions or data.

Adding a Data & Statistics Page

▶ To start a new document with a blank Data & Statistics page:

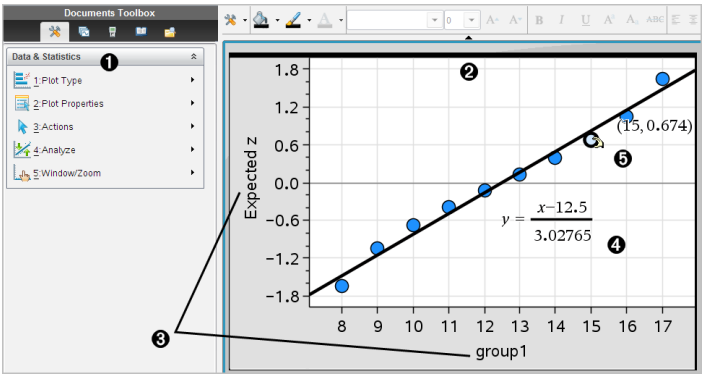
From the main **File** menu, click **New Document**, and then click **Add Data & Statistics**.

Handheld: Press [on], and select **Data & Statistics** .

▶ To add a Data & Statistics page in the current problem of an existing document:

From the toolbar, click **Insert > Data & Statistics**.

Handheld: Press [doc] and select **Insert > Data & Statistics**.



❶ Data & Statistics menu

❷ Work area

❸ **Add Variable** regions on x-axis and y-axis

❹ Normal Probability Plot with expression

❺ Data point with coordinates

Basic Operations in Data & Statistics

The Data & Statistics application lets you explore and visualize data and graph inferential statistics. The Lists & Spreadsheet application can work in conjunction with the Data & Statistics application. The Lists & Spreadsheet Summary Plot and Quick Graph tools automatically add a Data & Statistics application to show plots. A list that you create in a problem (using the Lists & Spreadsheet or Calculator applications) can be accessed as a variable in any TI-Nspire™ application in that problem.

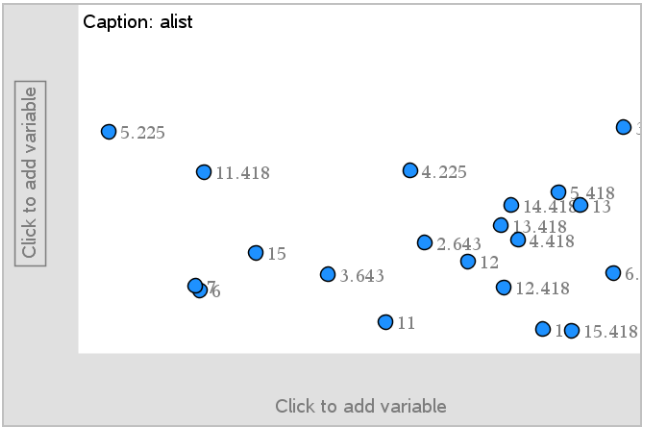
Changing Data & Statistics Settings

1. From the **Settings** menu, select **Settings**.
2. Select the settings that you want to use.
   - **Display Digits.** Lets you select the display format for numeric labels in the current document. Select **Auto** to automatically follow the setting in the Document Settings dialog box.
   - **Diagnostics.** Displays the value of the r^2 or R^2 statistic (when available) under certain regression equations.
     - r^2 is displayed for Linear (mx+b), Linear (a+bx), Power, Exponential, and Logarithmic regressions.
     - R^2 is displayed for Quadratic, Cubic, and Quartic regressions.

Using the Default Caseplot

The Data & Statistics application plots numeric and string (categorical) data from variables. When you add a Data & Statistics application to a problem that includes lists, a default caseplot displays on the work area.

The caseplot is like having a stack of cards with information on them and scattering the cards randomly on a table. You can click a dot to see the information on that “card.” You can drag a dot to “group” the “cards” by the caption variable.



- Click the variable name displayed after **Caption** to use the caseplot.
  - Choose <None> to remove the default caseplot.
  - Choose the name of a variable to have it replace the current caseplot variable.
  - Hover over any data point to see the summary information.
  - Drag any data point toward an axis to see how the points group.
  - Activate the Graph Trace tool and press ◀ or ▶ to move across points.

When you add a variable to either axis, the plot for that variable replaces the default caseplot. The default caseplot redisplays if you remove the plotted variable from each axis.

Using the Context Menu

The context menu provides access to the tools most commonly used with the selected object. The context menu displays different options depending on the active object and the task you are performing.

- To open the context menu for an object.

  Windows®: Right-click the object.

  Mac®: Hold ⌘ and click the object.

  Handheld: Point to the object and press ctrl menu.

The context menu includes the **Color** option. You can use the Color option to change the data to the color of your choice.

Other options that are appropriate for various plots also appear on the context menu.

Selecting Data and Displaying Summary Information

When you hover over part of a plot, the Data & Statistics application displays summary information for the data it represents.

1. Hover at an area of interest in a plot to display data values or summary information. For example, you can hover over the center of a box plot to display the median summary data.
2. Click once to select a representation of data in a plot.

   Data points are shown with a bold outline to indicate selection. You can click a point a second time to deselect it, or click additional points to add to the selection.

Plotting Variables

To plot variables, start with a problem that includes a Data & Statistics application and lists created in the Lists & Spreadsheet application or the Calculator application.

1. Click the Add Variable region near the center of an axis.

   If no variable is plotted on the axis, the tooltip **Click or Enter to add variable** displays.

2. Click the tooltip **Click or Enter to add variable**.

   A list displays the names of available variables.

3. Click the name of the variable to plot.

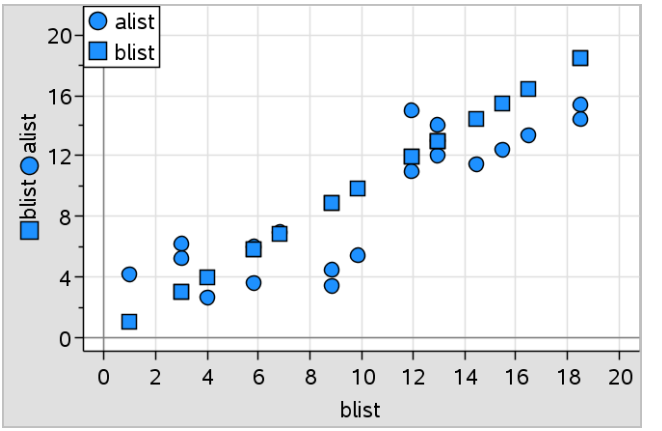
   Note: By convention, the independent variable is shown on the x-axis.

   The default plot for one variable is a dot chart. The data points in the default caseplot reposition to represent the elements of the selected variable in a dot chart.

4. (Optional) Click the Add Variable region near the center of the remaining axis to plot a second variable.

The default plot for two variables is a scatter plot. The data points shift to represent the elements of both variables as a scatter plot.

5. (Optional) Repeat Steps 1-3 to choose additional variables to plot on the vertical axis.



The name of each variable that you add is appended to the label on the axis. The default data point shape changes to help you distinguish data, and a legend is displayed to identify the shapes.

6. Change, analyze, or explore the plotted data.
   - Remove or change the variable on an axis by clicking the Add Variable region again.
   - View the plotted data in another supported plot type by selecting a tool from the **Plot Types** menu.
   - Choose the Graph Trace tool on the **Analyze** menu and press ◀ or ▶ to move across the data points in the plot.
   - The lists that you plot as variables can include incomplete or missing cases. (A case is the data contained in a row of cells in the Lists & Spreadsheet application.) The Lists & Spreadsheet application displays a void as an underscore ("_"), and Data & Statistics plots no data point for a void cell.

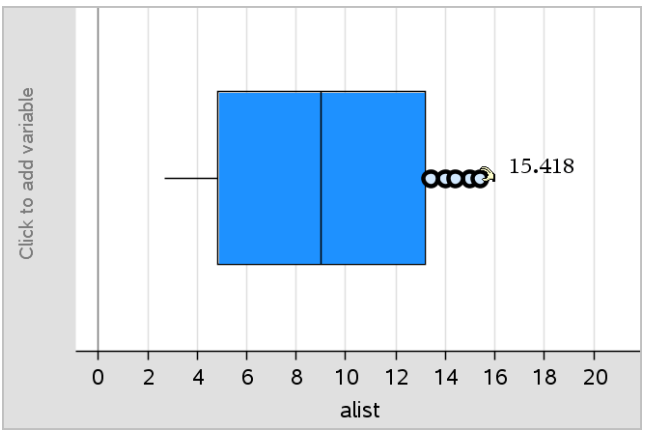
Manipulating Plotted Data

You can manipulate data points on the Data & Statistics work area to explore their effects. For example, you could explore how a specific group of values affects the median.

You can move a data point only in directions allowed by its definition. If a list is defined with a formula in Lists & Spreadsheet, the points in Data & Statistics may not move because of the formula's restrictions. For example, you can manipulate a plot that represents the result of y=x, but you can only move along a line.

You cannot move points that represent data in a locked variable or data that represents a categorical value.

1. On the Data & Statistics work area, click a representation of data—such as a histogram bin or a whisker of a box plot—that is not locked or restricted by a formula.



   The pointer changes to an open hand to show that the data can be moved.

2. Drag the selection to explore how different values of the point affect the plot.

   Handheld: Press ctrl to grab, and then swipe or use the arrow keys to drag.

   As you drag, the changing value displays on the work area.

Notes Application

The Notes application lets you create and share text documents using the TI-Nspire™ handheld and computer software. Use **Notes** to:

- Create study notes to reinforce learning, demonstrate your understanding of classroom concepts, and to review for exams.
- Edit collaboratively by assigning different roles to individuals using your document so that any edits appear in a different text format.
- Create and evaluate math expressions.
- Create correctly formatted chemical formulas and equations.

Adding a Notes Page

▶ To start a new document with a blank Notes page:

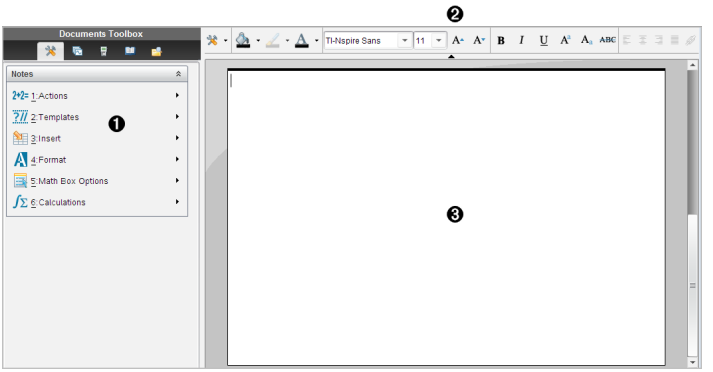
From the main **File** menu, click **New Document**, and then click **Add Notes**.

Handheld: Press [on], and select **Notes**.

▶ To add a Notes page in the current problem of an existing document:

From the toolbar, click **Insert > Notes**.

Handheld: Press [doc] and select **Insert > Notes**.



❶ Notes tools – Available anytime you are in the Notes work area.

❷ Text formatting toolbar -- Lets you change size, color, bold, and other text properties.

❸ Notes work area -- The area where you type and format text.

Formatting Text in Notes

Text formatting lets you apply visual properties, such as bold and italic, to your text.

- **Ordinary text**. Apply most combinations of bold, italic, underline, superscript, subscript, and strikethrough formatting. Select font and font size for any character.
- **Text in a math expression box**. Apply formatting and enter math exponents and math subscripts for variable names. Select font and font size. Font size affects all text in the box.
- **Text in a chemical equation box**. Apply formatting. Select font and font size. Font size affects all text in the box. Superscript and subscript are handled automatically.

Selecting Text

▶ Drag from the starting point to the ending point to select the text.

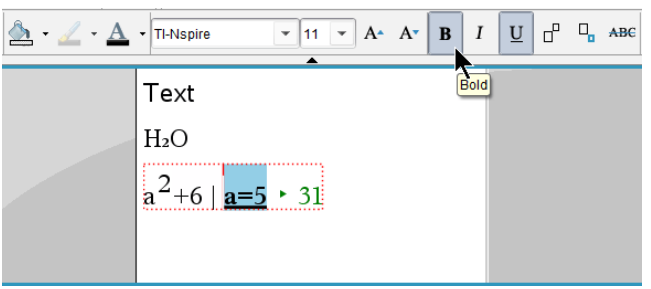
Handheld: If you are using the Q&A or Proof template, press tab to place the cursor in the area containing the text. Use the Touchpad to place the cursor at the start or end of the text to be selected. Hold down ⇧shift, and use the Touchpad to select the text.

Applying a Text Format

1. Select the text that you want to format.
2. On the formatting toolbar, click the formatting icons (such as **B** for bold) to toggle them, or click to select a font and font size.

   Handheld: Click menu, and then select **Format** > **Format Text**.

   The changes are applied to the text as you make selections.



Note: The toolbar shows only the icons that are applicable to the type of text selected. For example, superscript (A) and subscript (A) are shown only for ordinary text.

Entering Math Expressions in Notes Text

You can include math expressions in Notes text, using the same tools as in other TI-Nspire™ applications.

Math expression boxes have attributes that allow you to control how the expression is displayed.

Menu Name	Menu Option	Function
 **5: Math Box Options**		
	 1: Math Box Attributes	When a math box is selected, this option opens a dialog box allowing you to customize the math box. You can hide or show input or output, turn off calculation for the box, insert symbols, change display and angle settings, and allow or disallow the wrapping of expressions and the display of warning indicator after they have been dismissed. You can change the attributes of multiple selected math boxes at the same time.
	 2: Show Warning Info	Displays a warning indicator after the warning has been dismissed.
	 3: Show Error	Displays an error after the error has been dismissed.

Entering an Expression

1. In the Notes work area, place the cursor where you want the expression. Then do the following:
   - Windows®: From the **Insert** menu, click **Math Expression Box** or **Ctrl + M.**
   - Mac®: Press ⌘+ **M**.
   - Handheld: Press menu to open the Notes menu. Select **Insert,** and then click **Math Expression Box**.
2. Type the expression. You can use the Catalog, if necessary, to insert a function, command, symbol, or expression template.

Data Collection

The Vernier DataQuest™ application is built into the TI-Nspire™ software and the operating system (OS) for handhelds. The application lets you:

- Capture, view, and analyze real-world data using a TI-Nspire™ handheld, a Windows® computer, or a Mac® computer.
- Collect data from up to five connected sensors (three analog and two digital) using the TI-Nspire™ Lab Cradle.

  Important: The TI-Nspire™ CM-C Handheld is not compatible with the Lab Cradle and only supports the use of a single sensor at a time.
- Collect data either in the classroom or at remote locations using collection modes such as time-based or event-based.
- Collect several data runs for comparison.
- Create a graphical hypothesis using the Draw Prediction feature.
- Play back the data set to compare the outcome to the hypothesis.
- Analyze data using functions such as interpolation, tangential rate, or modeling.
- Send collected data to other TI-Nspire™ applications.

Adding a Vernier DataQuest™ Page

Note: The application is launched automatically when you connect a sensor.

Starting a new document or problem for each new experiment ensures that the Vernier DataQuest™ application is set to its default values.

▶ To start a new document containing a data collection page:

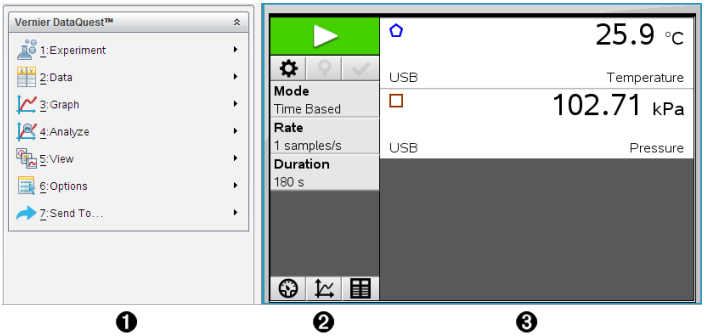
From the main **File** menu, click **New Document**, and then click **Add Vernier DataQuest™**.

Handheld: Press [on], and select **Vernier DataQuest™**.

▶ To insert a new problem with a data collection page into an existing document:

From the toolbar, click **Insert > Problem>Vernier DataQuest™**.

Handheld: Press [doc] and select **Insert > Problem > Vernier DataQuest™**.



❶ **Vernier DataQuest™ Menu.** Contains menu items for setup, collection, and analysis of sensor data.

❷ **Details view.** Contains buttons for starting data collection, changing collection settings, marking collected data, storing data sets, and tabs for managing multiple data runs.

View selection buttons let you choose from Meter view, Graph view, or Table view.

❸ **Data work area.** The information displayed here depends on the view.

Meter. Displays a list of sensors that are currently connected or set up in advance.

Graph. Displays collected data in a graphical representation, or displays the prediction before a data collection run.

Table. Displays collected data in columns and rows.

What You Must Know

Basic Steps in Performing an Experiment

These basic steps are the same no matter which type of experiment you perform.

1. Start the Vernier DataQuest™ Application.
2. Connect sensors.
3. Modify sensor settings.
4. Select the collection mode and collection parameters.
5. Collect data.
6. Stop collecting data.
7. Store the data set.
8. Save the document to save all data sets in the experiment.
9. Analyze the data.

Sending Collected Data to Other TI-Nspire™ Applications

You can send collected data to the Graphs, Lists & Spreadsheet, and Data & Statistics applications.

- From the **Send To** menu, click the name of the application.

  A new page showing the data is added to the current problem.

About Collection Devices

You can select from a variety of sensors and interfaces to collect data while running the Vernier DataQuest™ application with TI-Nspire™ software.

Multi-Channel Sensor Interfaces

Multi-channel sensor interfaces let you connect more than one sensor at a time.

Sensor Interface	Description
 Texas Instruments TI-Nspire™ Lab Cradle	This sensor can be used with a handheld, a computer, or as a stand-alone sensor. The sensor interface allows you to connect and use one to five sensors at the same time. It can be used in the lab or at a remote collection location. The Lab Cradle supports two digital sensors and three analog sensors. The Lab Cradle also supports high-sample data collection sensors, such as a hand-grip heart rate or a blood pressure monitor. After using the Lab Cradle as a remote sensor, you can download data to either a handheld or computer.

Single-Channel Sensor Interfaces

Single-channel sensor interfaces can only connect to one sensor at a time. These sensors have either a mini-USB connector for a handheld or a standard USB connector for a computer. For a complete list of compatible sensors, see *Compatible Sensors*.

Sensor Interface	Description
 **Vernier EasyLink®**	This sensor interface is used with handhelds. It has a mini-USB connector so it can be plugged directly into the handheld. Connect sensors to Vernier EasyLink® to: • Measure barometric pressure. • Measure the salinity of a solution. • Investigate the relationship between pressure and volume (Boyles' Law).
 Vernier Go!Link®	This sensor interface is used with computers. It has a standard connector so it can be plugged into a Windows® or Mac® computer. Connect sensors to Vernier GoLink® to: • Measure the acidity or alkalinity of a solution. • Monitor greenhouse gases. • Measure sound level in decibels.

Types of Sensors

- **Analog sensors.** Temperature, light, pH, and voltage sensors are analog sensors and require a sensor interface.
- **Digital sensors.** Photogates, radiation monitors, and drop counters are digital sensors. These sensors can only be used with the TI-Nspire™ Lab Cradle.
- **Direct-connect USB sensors.** These sensors connect directly to a handheld or computer and do not require a sensor interface.

Sensors for Handhelds

The following lists some sensors you can use with a handheld.

Sensor	Description
 **Texas Instruments**	This analog sensor connects directly to TI-Nspire™ handhelds through the mini-USB port. It is used to explore and graph motion. This sensor automatically launches the Vernier DataQuest™ application when you connect it to a handheld. Data collection begins when you select the Motion Match function. This sensor collects up to 200 samples per second. Use this sensor to: • Measure position and speed of a person or object.

Sensor	Description
CBR 2™	• Measure the acceleration of an object.
 **Vernier EasyTemp® temperature sensor**	This analog sensor connects directly to TI-Nspire™ handhelds through the mini-USB port and is used to collect temperature ranges. You can design experiments to: • Collect weather data. • Record temperature changes due to chemical reactions. • Perform heat fusion studies.

Sensors for Computers

The following table lists some sensors you can use with a computer.

Sensor	Description
 **Vernier Go!Temp® temperature sensor**	This analog sensor connects to the computer's USB port and is used to collect temperature ranges. You can use this sensor to: • Collect weather data. • Record temperature changes due to chemical reactions. • Perform heat fusion studies.
 **Vernier Go!Motion® motion detector**	This analog sensor connects to the computer's USB port and is used to measure acceleration, speed, and velocity. Use this sensor to: • Measure position and speed of a person or object. • Measure the acceleration of an object.

Compatible Sensors

The following sensors can be used with the Vernier DataQuest™ application.

- 25-g Accelerometer
- 30-Volt Voltage Probe

- 3-Axis Accelerometer
- Low-g Accelerometer
- CBR 2™ - Connects directly to handheld USB port
- Go!Motion® - Connects directly to computer USB port
- Extra Long Temperature Probe
- Stainless Steel Temperature Probe
- Surface Temperature Sensor
- Ammonium Ion-Selective Electrode
- Anemometer
- Barometer
- Blood Pressure Sensor
- C02 Gas Sensor
- Calcium Ion-Selective Electrode
- Charge Sensor
- Chloride Ion-Selective Electrode
- Colorimeter
- Conductivity Probe
- High Current Sensor
- Current Probe
- Differential Voltage Probe
- Digital Radiation Monitor
- Dissolved Oxygen Sensor
- Dual-Range Force Sensor
- EasyTemp® - Connects directly to handheld USB port
- EKG Sensor
- Electrode Amplifier
- Flow Rate Sensor
- Force Plate
- Gas Pressure Sensor
- Go!Temp® - Connects directly to computer USB port
- Hand Dynamometer
- Hand-Grip Heart Rate Monitor
- Instrumentation Amplifier
- Light Sensor
- Magnetic Field Sensor

- Melt Station
- Microphone
- Nitrate Ion-Selective Electrode
- O2 Gas Sensor
- ORP Sensor
- pH Sensor
- Relative Humidity Sensor
- Respiration Monitor Belt (Requires Gas Pressure Sensor)
- Rotary Motion Sensor
- Salinity Sensor
- Soil Moisture Sensor
- Sound Level Meter
- Spirometer
- Thermocouple
- TI-Light - Sold only with the CBL 2™
- TI-Temp - Sold only with the CBL 2™
- TI-Voltage - Sold only with the CBL 2™
- Tris-Compatible Flat pH Sensor
- Turbidity Sensor
- UVA Sensor
- UVB Sensor
- Vernier Constant Current System
- Vernier Drop Counter
- Vernier Infrared Thermometer
- Vernier Motion Detector
- Vernier Photogate
- Voltage Probe
- Wide-Range Temperature Probe

Connecting Sensors

Direct-connect USB sensors, such as the Vernier Go!Temp® temperature sensor (for computers) or the Vernier EasyLink® temperature sensor (for handhelds), connect directly to the computer or handheld and do not need a sensor interface.

Other sensors require a sensor interface such as the TI-Nspire™ Lab Cradle.

Connecting Directly

- Attach the cable on the sensor directly to the computer's USB port or to an appropriate port on the handheld.

Connecting through a Sensor Interface

1. Attach the sensor to the sensor interface using either the mini-USB, USB, or BT connector and the appropriate cable.
2. Attach the interface to a computer or handheld using the appropriate connector and cable.

   Note: To attach a handheld to a TI-Nspire™ Lab Cradle, slide the handheld into the connector at the bottom of the Lab Cradle.

Modifying Sensor Settings

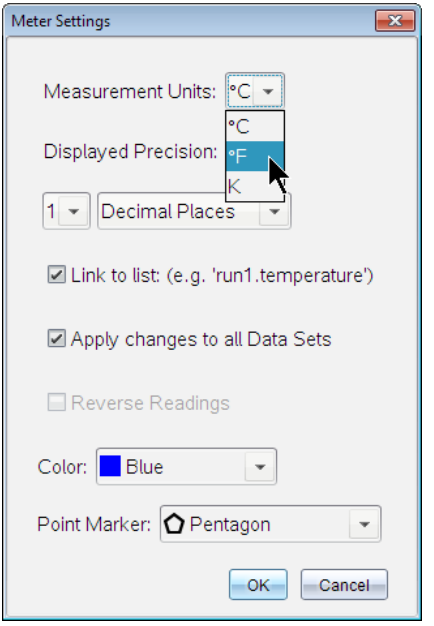
You can modify how the sensor values are displayed and stored. For example, when using a temperature sensor, you can change the unit of measure from Centigrade to Fahrenheit.

Changing Sensor Measurement Units

Measurement units depend on the selected sensor. For example, units for the Vernier Go!Temp® Temperature sensor are Fahrenheit, Celsius, and Kelvin. Units for the Vernier Hand Dynamometer (a specialized force sensor) are Newton, Pound, and Kilogram.

You can change the units before or after you collect data. The collected data reflects the new measurement unit.

1. Click Meter view  to display the connected and offline sensors.
2. Click the sensor whose units you want to change.
3. In the Meter Settings dialog box, select the unit type from the **Measurement Units** menu.



Calibrating a Sensor

When the software or handheld detects a sensor, the calibration for that sensor automatically loads. You can calibrate some sensors manually. Other sensors, such as the Colorimeter and the Dissolved Oxygen Sensor, must be calibrated to provide useful data.

There are three options for calibrating a sensor:

- Manual Entry
- Two Point
- Single Point

Refer to the sensor's documentation for specific calibration values and procedures.

Setting a Sensor to Zero

You can set the standing value of some sensors to zero. You cannot set sensors in which relative measurements such as force, motion, and pressure are common to zero. Sensors designed to measure specific environmental conditions, such as Temperature, pH, and CO_2 also cannot be set to zero.

1. Click Meter view to display the connected and offline sensors.
2. Click the sensor that you want to set to zero.
3. In the Meter Settings dialog box, click **Zero**.

Reversing a Sensor's Readings

By default, pulling with a force sensor produces a positive force and pushing produces a negative force. Reversing the sensor allows you to display pushing as a positive force.

1. Click Meter view to display the connected and offline sensors.
2. Click the sensor that you want to reverse.
3. In the Meter Settings dialog box, click **Reverse Readings**.

   The sensor display is now reversed. In Meter View, the reverse indicator appears after the sensor name.

Collecting Data

Collecting Time-Based Data

The Time Based collection mode captures sensor data automatically at regular time intervals.

1. Connect the sensor or sensors.

   Sensor names are added to the sensor list automatically.
2. From the **Experiment** menu, select **New Experiment**.

   This removes all data and restores all meter settings to their defaults.
3. From the **Experiment** menu, select **Collection Mode > Time Based**.
   a) Select **Rate** or **Interval** from the drop-down list, and then type the **Rate** (samples/second) or **Interval** (seconds/sample).

b) Type the **Duration** of the collection.

The Number of points is calculated and displayed, based on rate and duration. Note that collecting too many data points can slow system performance.

c) Select **Strip Chart** if you want to collect samples continuously, retaining only the last n samples. (where "n" is the number shown in the Number of points field.)

4. Modify sensor settings as necessary.
5. Click **Start Collection**  .
6. After the data has been collected, click **Stop Collection**  .

The data set run is complete.

Collecting Selected Events

Use the Selected Events collection mode to capture samples manually. In this mode, each sample is automatically assigned an event number.

1. Connect the sensor or sensors.

Sensor names are added to the sensor list automatically.

2. From the **Experiment** menu, select **New Experiment**.

This removes all data and restores all meter settings to their defaults.

3. From the **Experiment** menu, select **Collection Mode > Selected Events**.

The Selected Events Setup dialog box opens.

- **Name**. This text is visible in the Meter View. Its first letter is displayed as the independent variable in the Graph view.
- **Units**. This text is displayed in Graph view alongside the Name.
- **Average over 10 s.** This option averages ten seconds of data for each point.

4. Modify sensor settings as necessary.
5. Click **Start Collection**  .

The Keep Current Reading icon  becomes active. The current sensor value appears in the center of the graph.

6. Click **Keep Current Reading**  to capture each sample.

The data point is plotted, and the current sensor value appears in the center of the graph.

Note: If you selected the Averaging option, a countdown timer appears. When the counter reaches zero, the system plots the average.

7. Continue capturing until you collect all of the desired data points.
8. Click **Stop Collection**  .

   The data set run is complete.

Collecting Events with Entry

Use the Events with Entry collection mode to capture samples manually. In this mode, you define the independent value for each point you collect.

1. Connect the sensor or sensors.

   Sensor names are added to the sensor list automatically.

2. From the **Experiment** menu, select **New Experiment**.

   This removes all data and restores all meter settings to their defaults.

3. From the **Experiment** menu, select **Collection Mode > Events with Entry**.

   The Events with Entry Setup dialog box opens.

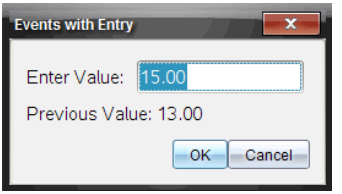
   - **Name.** This text is visible in the Meter View. Its first letter is displayed as the independent variable in the Graph view.
   - **Units.** This text is displayed in Graph view alongside the Name.
   - **Average over 10 s.** This option averages ten seconds of data for each point.

4. Modify sensor settings as necessary.
5. Click **Start Collection**  .

   The Keep Current Reading icon  becomes active. The current sensor value appears in the center of the graph.

6. Click **Keep Current Reading**  to capture a sample.

   The Events with Entry dialog box opens.



7. Type a value for the independent variable.
8. Click **OK**.

   The data point is plotted, and the current sensor value appears in the center of the graph.

   Note: If you selected the Averaging option, a countdown timer appears. When the counter reaches zero, the system plots the average.
9. Repeat steps 6 through 8 until you collect all of the desired data points.
10. Click **Stop Collection** .

    The data set run is complete.

Collecting Photogate Timing Data

The Photogate Timing collection mode is available only when using the Vernier Photogate sensor. This sensor can time objects that pass through the gates or objects that pass outside of the gates.

1. Connect the Photogate sensor or sensors.

   Sensor names are added to the sensor list automatically.
2. From the **Experiment** menu, select **New Experiment**.

   This removes all data and restores all meter settings to their defaults.
3. From the **Experiment** menu, select **Collection Mode > Photogate Timing**.
4. Set the collection options.
5. Modify sensor settings as necessary.
6. Click **Start Collection** .
7. After the data has been collected, click **Stop Collection** .

   The data set run is complete.

Collecting Drop Counter Data

The Drop Counting collection mode is available only when using the Vernier Drop Counter optical sensor. This sensor can count the number of drops or record the amount of liquid added during an experiment.

1. Connect the Drop Counter sensor or sensors.

   Sensor names are added to the sensor list automatically.

2. From the **Experiment** menu, select **New Experiment**.

   This removes all data and restores all meter settings to their defaults.

3. From the **Experiment** menu, select **Collection Mode > Drop Counting**.
4. Set the collection options.
5. Modify sensor settings as necessary.
6. Click **Start Collection**  .
7. After the data has been collected, click **Stop Collection**  .

   The data set run is complete.

Analyzing Collected Data

In the Vernier DataQuest™ application, use Graph View to analyze data. Start by setting up graphs, and then use analysis tools such as integral, statistics, and curve fit to investigate the mathematical nature of the data.

Important: The Graph menu and Analyze menu items are only available when working in Graph View.

Finding the Area Under a Data Plot

Use Integral to determine the area under a data plot. You can find the area under all of the data or a selected region of the data.

To find the area under a data plot:

1. Leave the graph unselected to examine all the data, or select a range to examine a specific area.
2. Click **Analyze > Integral**.
3. Select the plotted column name if you have more than a single column.

   The data plot area is displayed in the View Details area.

Finding the Slope

Tangent displays a measure of the rate at which the data is changing at the point you are examining. The value is labeled “Slope.”

To find the slope:

1. Click **Analyze > Tangent**.

   A check mark appears in the menu next to the option.

2. Click the graph.

   The examine indicator is drawn to the nearest data point.

   The values of the plotted data are shown in the View details area and the All Details for Graph dialog box.

   You can move the examine line by dragging, clicking another point, or using the arrow keys.

Interpolating the Value Between Two Data Points

Use Interpolate to estimate the value between two data points and to determine the value of a Curve Fit between and beyond these data points.

The examine line moves from data point to data point. When Interpolate is on, the examine line moves between and beyond data points.

To use Interpolate:

1. Click **Analyze > Interpolate**.

   A check mark appears in the menu next to the option.

2. Click the graph.

   The examine indicator is drawn to the nearest data point.

   The values of the plotted data are shown in the View Details area.

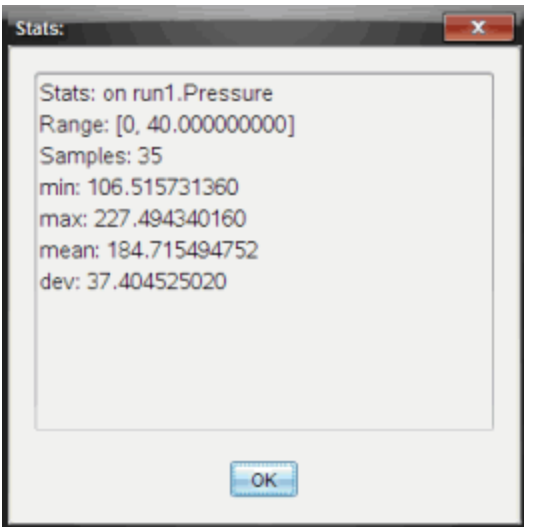
   You can shift the examine line by moving the cursor with the arrow keys or by clicking on another data point.

Generating Statistics

You can generate statistics (minimum, maximum, mean, standard deviation, and number of samples) for all the collected data or for a selected region. You can also generate a curve fit based on one of several standard models or on a model that you define.

1. Leave the graph unselected to examine all the data, or select a range to examine a specific area.
2. Click **Analyze > Statistics**.
3. Select the plotted column name if you have more than a single column. For example, run1.Pressure.

   The Stats dialog box opens.



4. Review the data.
5. Click **OK**.

For information on clearing the Statistics analysis, see *Removing Analysis Options*.

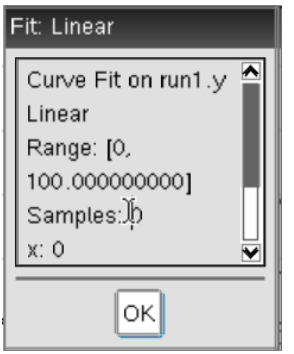
Generating a Curve Fit

Use Curve Fit to find the best curve fit to match the data. Select all of the data or a selected region of data. The curve is drawn on the graph.

1. Leave the graph unselected to examine all the data, or select a range to examine a specific area.
2. Click **Analyze > Curve Fit**.
3. Select a curve fit option.

Curve Fit option	Calculated in the form:
Linear	y = m*x + b
Quadratic	y = a*x^2 + b*x + c
Cubic	y = a*x^3 + b*x^2 + c*x + d
Quartic	y = a*x^4 + b*x^3 + c*x^2 + d*x + e
Power (ax^b)	y = a*x^b
Exponential (ab^x)	y = a*b^x
Logarithmic	y = a + b*ln(x)
Sinusoidal	y = a*sin(b*x + c) + d
Logistic (d $\neq$ 0)	y = c/(1 + a*e^(-bx)) + d
Natural Exponential	y = a*e^(-c*x)
Proportional	y = a*x

The Fit Linear dialog box opens.



4. Click **OK**.

5. Review the data.

For information on clearing the Curve Fit analysis, see *Removing Analysis Options*.

Plotting a Standard or User-Defined Model

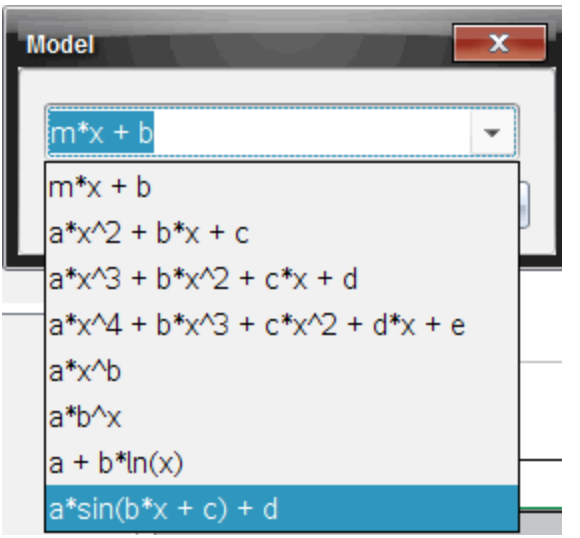
This option provides a manual method for plotting a function to fit data. Use one of the predefined models or enter your own.

You can also set the spin increment to use in the View Details dialog box. Spin increment is the value by which the coefficient changes when you click the spin buttons in the View Details dialog box.

For example, if you set m1=1 as the spin increment, when you click the up spin button the value changes to 1.1, 1.2, 1.3 and so on. If you click the down spin button, the value changes to 0.9, 0.8, 0.7, and so on.

1. Click **Analyze > Model**.

   The Model dialog box opens.



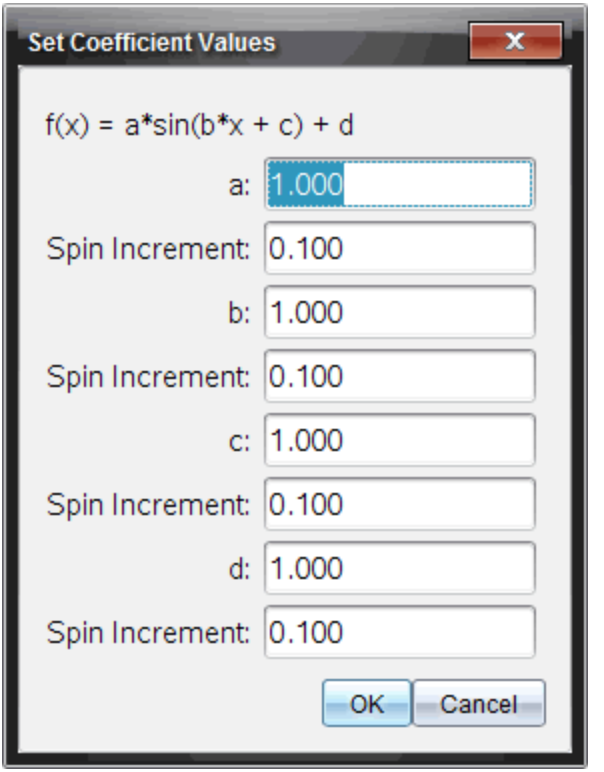
2. Type your own function.

   —or—

   Click to select a value from the drop-down list.

3. Click **OK**.

   The Set Coefficient Values dialog box opens.



4. Type the value for the variables.
5. Type the change in value in the Spin Increment fields.
6. Click **OK**.

   Note: These values are the initial values. You can also adjust these values in the View Details area.

   The model is shown on the graph with adjustment options in the View Details area and in the All Details for Graph dialog box.

7. (Optional) Adjust the window setting for minimum and maximum axis values. For more information, see *Setting the Axis for One Graph*.

For information on clearing the Model analysis, see *Removing Analysis Options*.

8. Click ▲▼ to make any desired adjustments to the coefficients.

   —or—

   Click the value in the View Details area.

This graphic is an example of a model with adjusted values.

Removing Analysis Options

1. Click **Analyze > Remove**.
2. Select the data display you want to remove.

   The display you selected is removed from the graph and the View Details area.