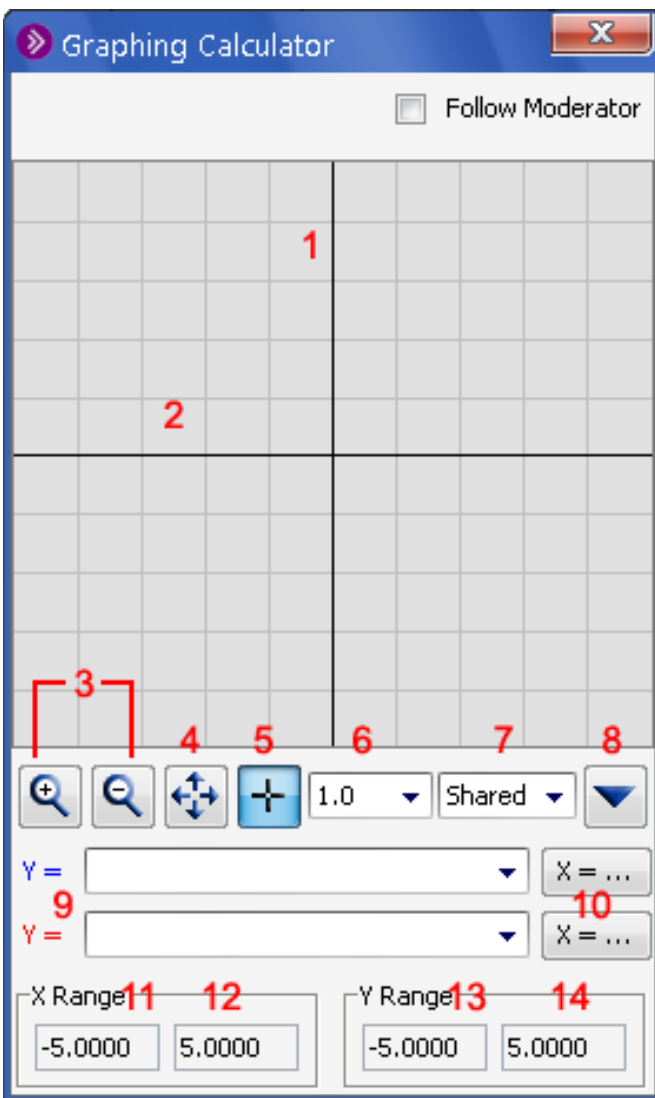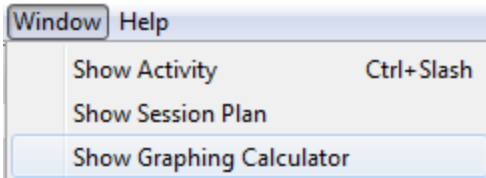# GRAPHING CALCULATOR

To display the calculator, select Graphing Calculator from the Window menu. The calculator is displayed in front of the other windows. Resize or re-position the Graphing Calculator window as desired.

1	Y-axis	8	Restore default button
2	X-axis	9	Function boxes
3	Zoom buttons	10	Evaluate buttons
4	Manually shift view area button	11	Minimum X range box
5	Point select button	12	Maximum X range box
6	Grid spacing selection	13	Minimum Y range box
7	Privacy settings	14	Maximum Y range box

Open and Close Graphing Calculator Window

To open the window, in the *Window* menu, select *Graphing Calculator*.
Closing the Graphing Calculator window will not affect any of the work you have already done – it just closes the window. To close the window, do one of the following:

> o Click on the window's **Close** button in the title bar of the window.
> o Enter Ctrl+W (Command-W on Mac)
> o Enter Alt+F4 (Windows and Linux only)

Private and Shared Calculators

The Graphing Calculator feature supplies everyone with two calculators: a *private* and a *shared* calculator.

Anyone can open and use their *private* calculator, which is visible only to them. Participants do not need any permissions to use the private calculator, however, they can access it only if the *Follow Moderator* option is turned off (which it is by default).

The *shared* calculator resides on the Moderator's application. Only Moderators can use the shared calculator. No permission is required to view the shared calculator.
Both Graphing Calculators function identically.

Switch between the Private and Shared Graphing Calculator

To switch between the two calculators, select Shared or Private from the drop down menu in the Graphing Calculator window.
The information on your private calculator does not change or get deleted when you switch between private and shared calculators.
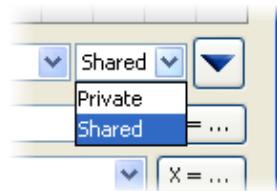
Use the Shared Graphing Calculator

The shared calculator can be used in one of two ways: with or without the *Follow Moderator* option selected.

The shared calculator <u>without</u> the *Follow Moderator* option selected (default)

- Participants can switch to their private calculator or close their Graphing Calculator window at any time.
- You can change the display region at any time.

The shared calculator __with__ the *Follow Moderator* option selected

Turn on the *Follow Moderator* option in one of the following ways:

- From the Tools menu, select Graphing Calculator > Follow Moderator.
- Select (check) the Follow Moderator option in the Graphing Calculator window.

When the Graphing Calculator window is open, the shared Graphing Calculator is displayed to everyone:

- The Participants are forced to view the shared Graphing Calculator window and see all the changes that are made on your calculator.
- Participants cannot dismiss the Graphing Calculator or use their private calculator. You, however, can always use your private calculator.
- If you dismiss the Graphing Calculator window, then the Participants' (private and shared) calculators are dismissed as well.

Graphing Functions Using the Calculator

You can enter only explicit functions in the Graphing Calculator. The calculator allows you to plot two functions on the same grid. If your function contains a variable, it must be represented by an x.

1. Type your function in the Function box and press Enter to graph it.
2. Optionally, you can enter a second function in the second function box. Your first function is graphed in blue, the second in red.

Entering Mathematical Operators and Functions

The following table lists the allowable mathematical operators.

Type	To perform this operation…
+	Add
-	Subtract
*	Multiply
/	Divide
^	Exponent
( )	Parenthesis (to indicate order of operation)
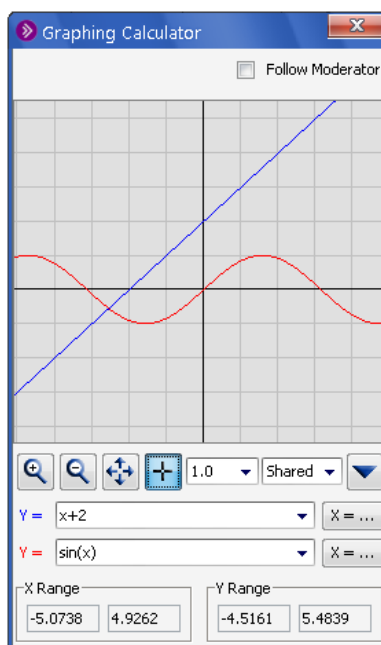
Use the following abbreviations for these functions and numbers.

Type	To represent this function or number…
sqrt	Square Root
abs	Absolute Value
log	Logarithm (base 10)
ln	Natural Logarithm
sin	Sine
cos	Cosine
tan	Tangent
csc	Cosecant
sec	Secant
cot	Cotangent
asin	Arcsine
acos	Arccosine
atan	Arctangent
pi	pi
e	e

Note: Trigonometric functions are graphed in radians.

Display the Function History

Both function entry fields maintain a history of the ten most recent functions that you graphed. When you exit the session, all the functions are erased.

Click the drop down arrow button next to the function field to display the history of graphed functions for that field.
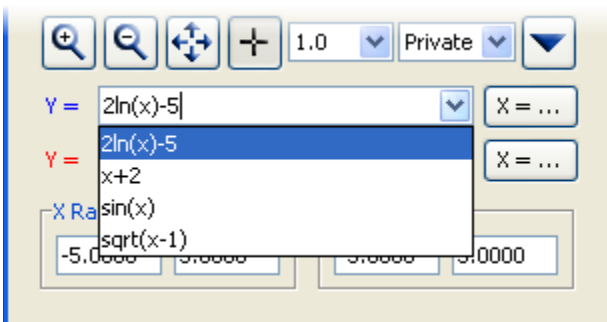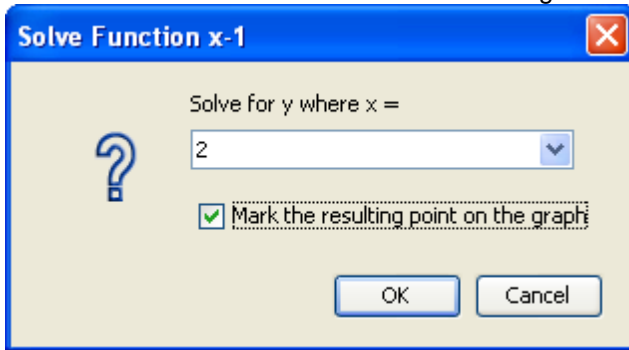

Evaluate Functions

1. Enter a value or expression for X in the Y= text box.
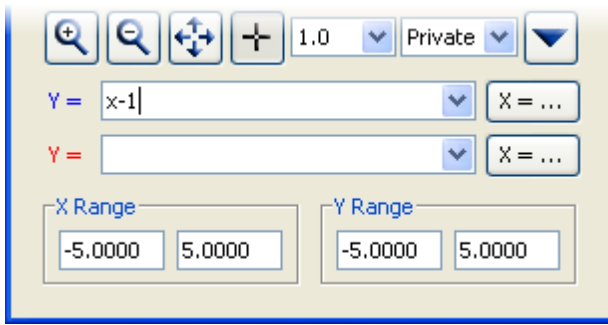
2. Click the [X = ...] button to evaluate Y for the given value of X. The Solve Function dialog box appears.


3. Select the option Mark the resulting point on the graph if you want the coordinates of the result plotted on your graph.
4. Click OK to accept your changes and dismiss the dialog box. Your result is displayed in the Solve Function information box.
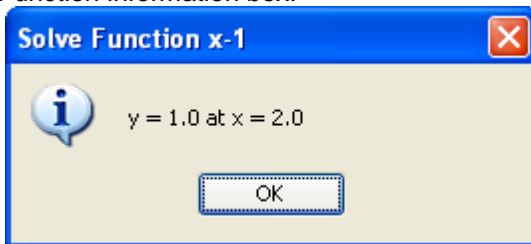
5. Click OK to dismiss the information box and view the coordinates on your graph. The coordinates are displayed and plotted on the graph. You can zoom out or move the display region to view the plotted coordinates on your graph.

Select and Display Points on the Graph

Select the + button on the calculator and then click a point on the grid. The point is identified with a green X and the x- and y-coordinates for the point are displayed to four decimal places.
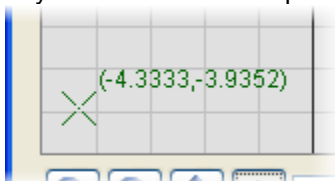
Display an x- or y-intercept or a point of intersection

1. Select the ✛ button on the calculator.
2. Drag a selection box over a region that contains an x- or y-intercept or a point of intersection of two functions to display the coordinates for a point.
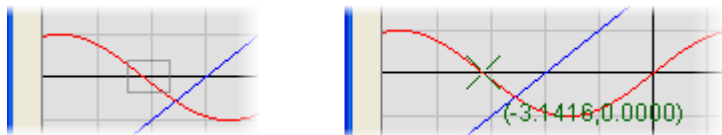
If you select a region that has more than one point of interest, the point will be identified in the following order of preference:

1. Point of intersection
2. x-intercept
3. y-intercept

If you select a region that has more than one point of equal priority, only the point with the lowest x-value will be plotted. Alternatively, you can re-select a region with only one point of interest.

Note: The calculator displays the coordinates of only one point at a time.

Change the Calculator Display Region

Set the Display Region and Grid Spacing

The display region of the graph is defined by the X range and Y range values. The Grid Spacing draws visible lines that correspond to tick points on the x- and y-axis. By default, the display region is set at –5 to 5 for the X range, –5 to 5 for the Y range and the Grid Spacing is set to 1.

To display a different region of the graph, enter values for the X range and Y range and set the Grid Spacing.
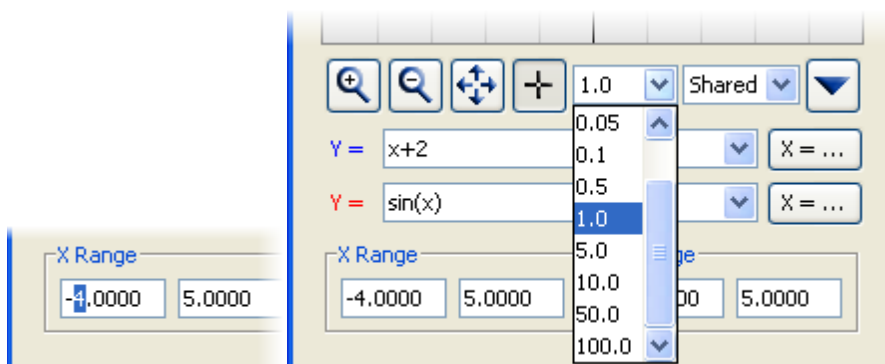

Zoom In and Out

To zoom in, click the 🔍 button and then click the region of the graph you want to zoom in on. You can zoom in as many times as you need until you see the level of detail that you require. To zoom out, click the 🔍 button and then click the display region. Click the display region again to zoom out to see more of the display.

Moving the Graph in the Display Region

Click the ⊕ button and then click and drag the display region to move the graph with your mouse.
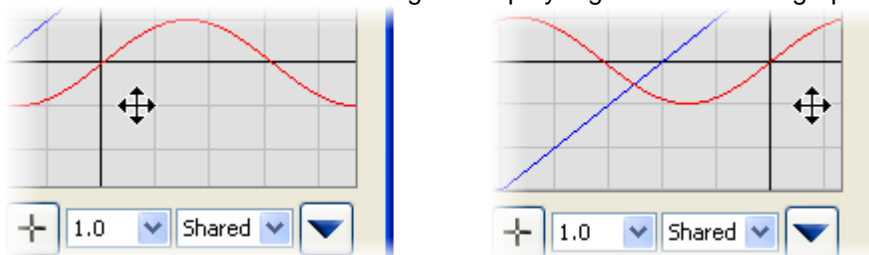
You can also re-position the display region by selecting the options on the Restore Defaults menu:
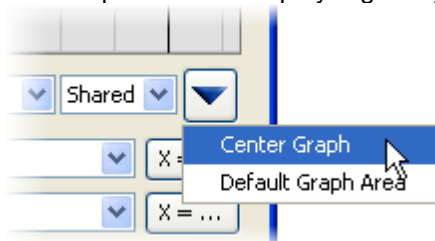
- *Center Graph:* This option is dependent on your current X and Y range and centers the graph in the display region based on those values. If you had changed the grid size, this option will **not** restore the grid defaults.
- *Default Graph Area:* Centers the graph and resets the maximum and minimum Display Region values back to the defaults (-5, 5 for both X and Y axes). If you had changed the grid size, this option will **not** restore the grid defaults.