

# HP 39gII Graphing Calculator Quick Start Guide



Edition 3

HP Part Number: NW249-90201

## **Keyboard Legend**

The table and photo on the following page illustrate a few of the many features available on the HP 39gII Graphing Calculator. These topics, as well as other features of the calculator, are discussed in the following quick start guide. For a complete list of features of the HP 39gII Graphing Calculator, refer to the *HP 39gII Graphing Calculator User's Guide* on the product CD. These manuals are also found on the HP website, [www.hp.com/calculators](http://www.hp.com/calculators).

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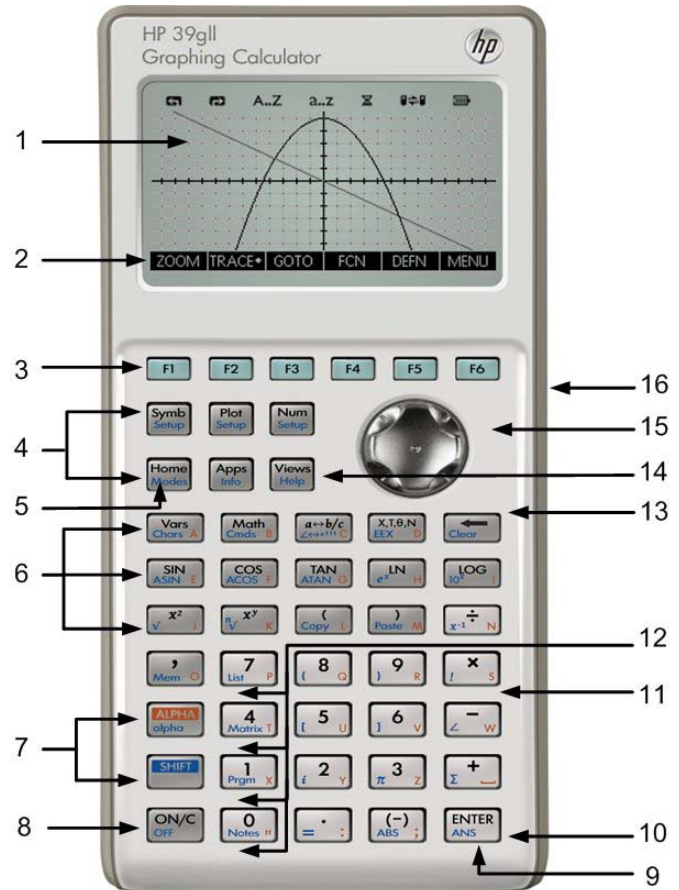
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## **Printing History**

Edition 3, March 2012

## HP 39gII Keyboard Legend

Number	Feature
1	Screen display 256 x 128 pixels
2	Context-sensitive menu
3	Context-sensitive menu keys
4	HP Apps keys
5	Modes
6	Common math and science functions
7	Shift keys
8	On (cancel)
9	Last Answer (ANS)
10	Enter key
11	Alphabetic entry
12	List, matrix, program, and note editors
13	Backspace (Clear)
14	Help key
15	Cursor keys
16	USB Connectivity





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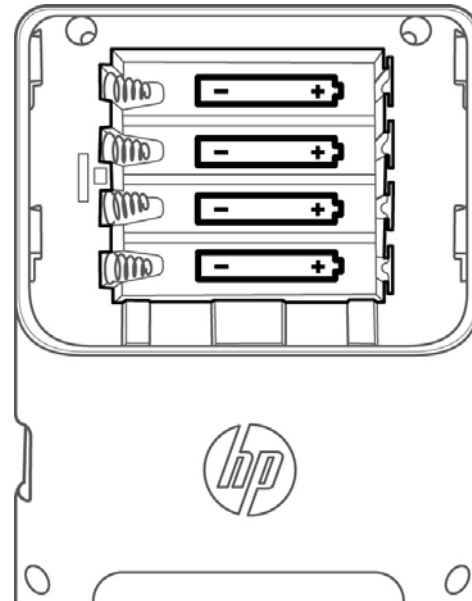
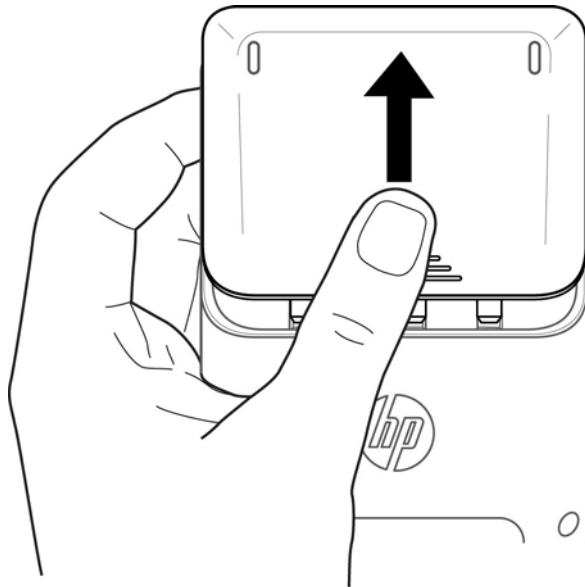
# 1 Getting Started

## Introduction

The HP 39gII Graphing Calculator is an easy to use, yet powerful graphing calculator designed for secondary mathematics education and beyond. This quick start guide covers basic tasks, such as entering and editing expressions, plotting graphs, and making tables of values. This guide also serves as an introduction to HP Apps. Finally, advanced topics, like working with lists or matrices, are also introduced. It is highly recommended you refer to the *HP 39gII Graphing Calculator User's Guide* on the product CD for more information about any topic presented in this guide. This manual makes use of certain conventions with text to differentiate between key presses and on-screen display options:

- Keyboard keys are represented by letters or words with the first letter capitalized representing the keys' functions, for example, *Symb* (Symbolic).
- SHIFT, when followed by the *Letters* or *Words* representing the keyboard keys and (*Letters* or *Words*), indicates the shifted functions of the keyboard keys printed at the bottom of the keys, for example, SHIFT Math (Cmds).
- Menu items for menu keys are spelled out in CAPITAL letters, followed by the term, *menu key*.
- Field names, choose box options, and other on screen text appear in **BOLD**.
- Numbered keys are represented simply by printed numbers: 1, 5, 123.35, etc.

## Installing the Batteries



Please install the batteries according to the following procedure:

1. Turn off the calculator.
2. Slide up the battery compartment cover.
3. Insert 4 new AAA (LR03) batteries into the compartment.
4. Make sure each battery is inserted in the indicated direction.

The calculator takes 4 AAA (LR03) batteries as a main power source. When the low battery symbol is displayed, you need to replace the



batteries as soon as possible. **Warning!** There is danger of explosion if the battery is incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Dispose of used batteries according to the manufacturer's instructions. Do not mutilate, puncture, or dispose of batteries in fire. The batteries can burst or explode, releasing hazardous chemicals.

## The Home View

Press the On key or Home to access the Home view. The HP 39gII Home view is divided into four parts, from top to bottom. There is a *Header* at the top, with the name of the HP App you're currently using and whether you are in degree (**DEG**) or radian (**RAD**) mode. Next comes the *History* of calculations. Below that is the *Entry Line*. Finally, at the bottom is the *Menu* for the menu keys. The top row of keys on the HP 39gII keyboard is labeled F1-F6. These are the context-sensitive menu keys. These keys take their functionality from the list of functions printed at the bottom of the display, which changes as you use the various views of the calculator. There are six menu keys in all. See Figure 1 for an illustration of these parts of the Home view.

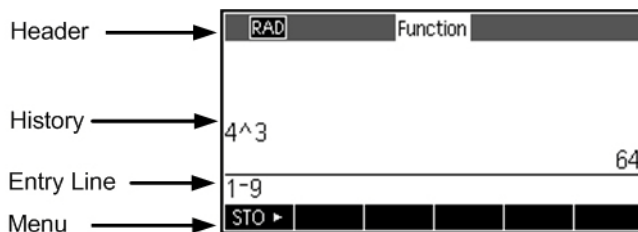


Figure 1

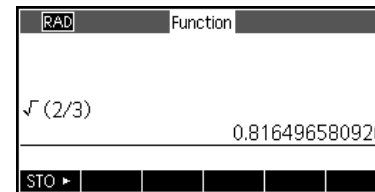
Take a moment to verify the screen is at a contrast that is comfortable to your eye. To adjust the contrast, press On and hold it, then press either the + (Plus) or the - (Minus) key repeatedly. Each press of the + or - key increases or decreases the contrast, respectively. To turn the calculator off, press SHIFT followed by On.

## Modes

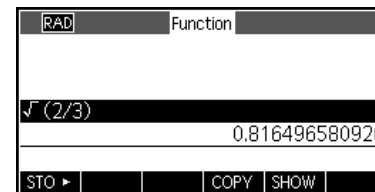
To change the angle measure, the number format, etc., press SHIFT followed by Home (Modes). Use the cursor keys to scroll through the fields. Use the CHOOSE or CHK menu keys to adjust your preferences, using the CANCL menu key to ignore a change or the OK menu key to accept one. Once you have set your preferences on the **Home Modes** page, press the Home key to return to the Home view.

## Entering and Editing Expressions

To calculate  $\sqrt{\frac{2}{3}}$ , enter the expression then press Enter. The HP 39gII displays the results with 12 digits of accuracy.

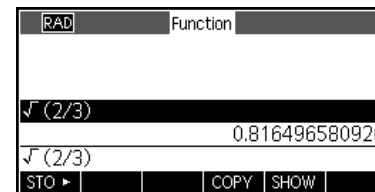



Now press the Up cursor key twice to highlight the expression you entered. Note that two additional menu labels are now displayed: COPY and SHOW. The SHOW command typesets the expression using standard mathematical notation. This command is useful if you want to check that the expression you entered - with one or more sets of parentheses - is exactly what you want. In Modes, toggle the Textbook Display field on to automatically display all expressions entered in Textbook Format.



## Deleting and Clearing

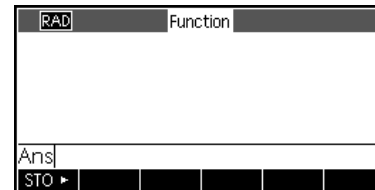
Press the COPY menu key to see the expression pasted into the entry line as shown in the figure to the right. If you had meant to enter  $\sqrt{\frac{2}{5}}$ , You can change the current expression by moving the cursor to the right of the 3, then pressing the Backspace key, then typing 5. Press On (Cancel) to cancel any entry, or Enter to execute the new calculation. Your last few entries are automatically copied to the clipboard as well. You can copy a number or expression into the clipboard and then paste it into another field or to the cursor location.



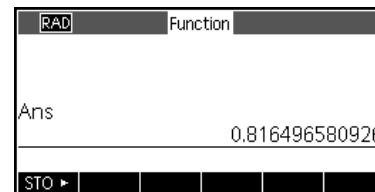
While entering data in the entry line, you can use the Backspace key  to delete any character. Note that the shift of the Backspace key is Clear. Use Clear to clear the entire entry line, or press the On key to cancel any entry. Use the History to show all your work as you solve problems. If you make a mistake, delete the lines from the History by selecting them and using the Backspace key. You can use the Clear command to delete the entire history. But be careful - there is no undo for this action!

## Last Answer

If you'd like to retrieve your last answer, you can use a feature called, *Answer (Ans)*. Press SHIFT followed by Enter (Ans).

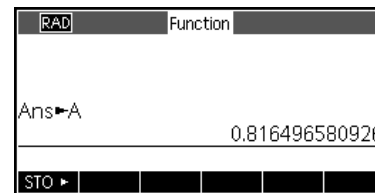


Press Enter once again to return your last answer to the calculation history.



## Storing Values in Variables

Now let's store our numeric approximation of  $\sqrt{\frac{2}{3}}$  in the variable A. With our last ANS displayed, press the STO menu key. Press the ALPHA key, followed by Vars (the key for the letter A) and then press Enter. Your stored value appears as shown to the right. Note how letters of the alphabet are printed on the lower right of many of the keys.



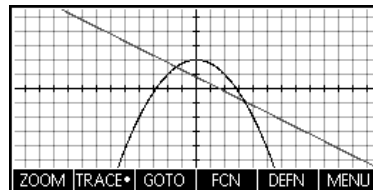
## HELP

At any time, you can press SHIFT Views (Help) to get help on the functionality in your current view. Once in the Help system, you can browse the entire list of topics and return to the current HP 39gII view at any time.

## Understanding the Software

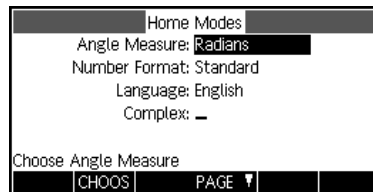
### Menu Keys

The bottom of the display contains a menu of up to six items. Use the F1-F6 menu keys to access the menu items.



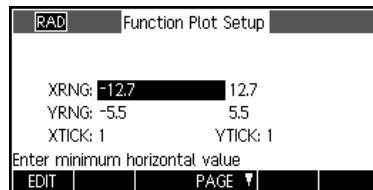
### Choose Boxes

To change the value in a Choose Box, press the CHOOS menu key, and a list of options appears. Scroll to a new selection and press the OK menu key. You can press the CANCL menu key to return to the previous value.



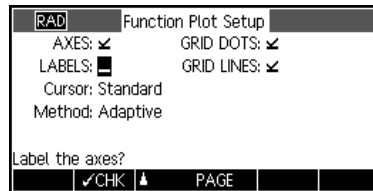
### Input Fields

To enter data in an input field, scroll to the field and either press the EDIT menu key to begin editing the current value or begin typing a new value or expression. The value or expression you are entering will appear at the bottom of the display above the menu until you press ENTER.



### Check Boxes

Toggle the option in a Check Box off or on by using the CHK menu key.



## 2 HP Apps and App Views

### HP Apps

Much of the functionality of the HP 39gII is partitioned into packages called *HP Apps*. The HP 39gII comes with 15 HP Apps; nine dedicated to mathematical topics or tasks, three specialized Solvers, and three function Explorers. These apps are listed in the tables below.

Table 1 HP Apps

HP App Name	Purpose
Function	Define functions and explore graphs and table of values
Solve	Enter equations and values of known variables, then solve for the unknown variable
Statistics 1-Var	Enter columns of data, define 1-variable statistical analyses, compute summary statistics, and explore statistical plots
Statistics 2-Var	Enter columns of data, define 2-variable statistical analyses, compute summary statistics, and explore statistical plots
Inference	Compute and explore hypothesis tests and confidence intervals
Sequence	Define sequences and explore graphs and tables of values
Parametric	Define parametric equations and explore their graphs and tables of values
Polar	Define polar equations and explore their graphs and tables of values
Data Streamer	Collect real-world data using sensors and the HP StreamSmart 410.

As you work in these HP Apps, you enter data such as definitions of functions, window settings, and preferences of one sort or another. The App records all of this data and automatically saves it for you. If you leave the App and come back later, all that data is still there. In fact, you can save the App with a new name and use the original version of the App for another purpose. The new version, under the new name, still has all of your data. You can share these apps with other HP 39gII users.

In addition to the apps described above, there are three specialized Solvers, each designed to solve problems of a specific type.

Table 2 HP Solver Apps

<b>Solver App Name</b>	<b>Purpose</b>
Finance	Solve TVM and Amortization problems
Linear Solver	Solve 2x2 and 3x3 systems of linear equations
Triangle Solver	Solve problems involving the lengths of sides and measures of angles in triangles

Finally, there are three apps designed to explore the relationships between the values of the parameters in a function and the shape of the graph of the function.

Table 3 HP Explorer Apps

<b>Explorer App Name</b>	<b>Purpose</b>
Linear Explorer	Explore the relationship between the shape of the graph and values of the parameters in linear functions
Quadratic Explorer	Explore the relationship between the shape of the graph and values of the parameters in quadratic functions
Trig Explorer	Explore the relationship between the shape of the graph and values of the parameters in sinusoidal functions

## App Views

The key to working with all HP Apps is to understand that they were designed to have the same structure, based on the symbolic, graphic, and numeric representations of mathematical objects. These three views are supported by a set of three keys, located near the top left of the HP 39gII keyboard. These keys are Symb, Plot, and Num. Each of these three views has an additional setup view, accessed by pressing the SHIFT of the view's key. For example, SHIFT Plot takes you to the Plot Setup view, where you can control the plot window, the cursor appearance, etc. All the data in these six views are automatically saved with the App. Below these three keys are three more keys that are central to HP Apps: Home, Apps, and Views. Apps are launched from the Apps Library. Press Apps and use the up- and down-cursor keys to select an App from the library. To launch the App, press the START menu key. Press Views to see any additional spe-

cial views that a particular app may have. Pressing Home always takes you to the calculator history, which is not part of any App, and thus not saved with any App. The table below summarizes the purpose of each of the six main views of HP Apps. The Function App is used to illustrate the views in the table.

### View Name and Purpose

#### Symbolic View

The purpose of the Symbolic view is to define mathematical objects for representation in the Plot (graphic) and Numeric views. The way the view is used varies a bit from app to app. This view is not used by the Solvers and Explorers, as their symbolic definitions are pre-defined by their scope

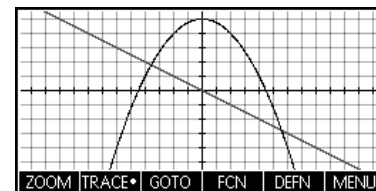
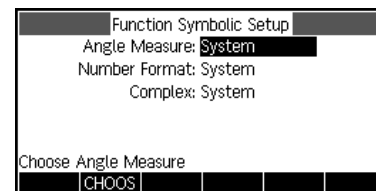
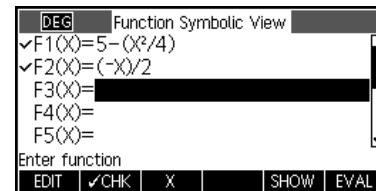
#### Symbolic Setup

The purpose of this view is to allow you to overwrite one or more of the Modes settings for an app. This view is not used by the Solvers and Explorers, as the few mode settings needed for each app can already be changed by using menu keys within the app.

#### Plot View

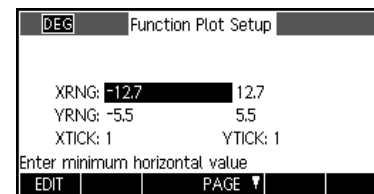
The purpose of the Plot view of an app is to display a graphic representation of the objects defined in the Symbolic view. The graphical representations include graphs of functions, statistical plots, and confidence intervals. The Plot view has all the tools needed for exploring these graphs, including Zoom, Trace, etc. For the Explorer Apps, this is the only view for the app.

### Example Display



## Plot Setup

The 2-page Plot Setup allows you to determine the appearance of the graphs displayed in the Plot view. This includes all graph window settings and options.



Function Plot Setup

XRNG: -12.7 12.7  
YRNG: -5.5 5.5  
XTICK: 1 YTICK: 1

Enter minimum horizontal value

EDIT PAGE ▾

## Numeric View

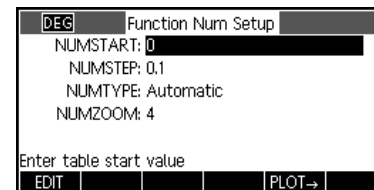
This view is used to display tables of numerical values. Like the Symbolic View, this view also varies a bit from app to app, though the purpose is always the same. For example, in the Function, Solve, Sequence, Polar, and Parametric Apps, this view is used to display a table of values, based on the definitions in the Symbolic view. In the Statistics 1-Var and Statistics 2-Var Apps, this view is used to enter and store numerical data

X	F1	F2	
0	5	0	
0.1	4.9975	-0.05	
0.2	4.99	-0.1	
0.3	4.9775	-0.15	
0.4	4.96	-0.2	
0			

ZOOM BIG• DEFN WIDTH3

## Numeric Setup

The purpose of the Numeric Setup is to determine the appearance of the Numeric view and the type of table provided. This view is not used by the Solve app, nor is it used by the Solvers and Explorers. These latter apps have their Numeric views pre-defined by their scope.



Function Num Setup

NUMSTART: 0  
NUMSTEP: 0.1  
NUMTYPE: Automatic  
NUMZOOM: 4

Enter table start value

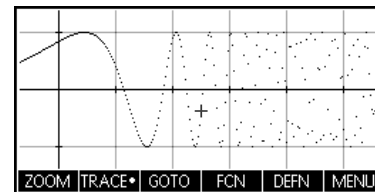
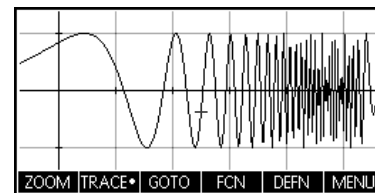
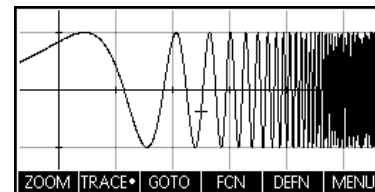
EDIT PLOT→



One note is in order concerning the Plot view. The HP 39gII gives you three options for graphing. By default, the HP 39gII uses the Adaptive method, an advanced method that gives very accurate results.

You can choose the more traditional method, called *Fixed-Step Segments*, which samples  $x$ -values, computes their corresponding  $y$ -values, and then plots and connects the points. Or you can choose *Fixed-Step Dots*, which works like Fixed-Step Segments but does not connect the points. This setting is found on Page 2 of the Plot Setup.

The figures to the right illustrate the differences among these methods for the function  $f(x)=\sin(e^x)$ . The top figure uses the Adaptive method; the middle one uses Fixed-Step Segments, and the bottom one uses Fixed-Step Dots.



The next chapter summarizes the functionality of each of the 15 HP Apps and their views.

### 3 HP App Summaries

The following sections describe each HP App briefly, summarizing the App's major views and the functionality available in each view.

#### The Function App

The Function App lets you define up to ten functions in  $x$ , view their graphs, create tables of values, and find intersections, roots, and extrema. The Function App is the default HP App when the HP 39gII is shipped from the factory. Table 4 summarizes the capabilities of this App. Press Apps, scroll down to select the Function App, and press the START menu key to get started.

Table 4 Function App Summary

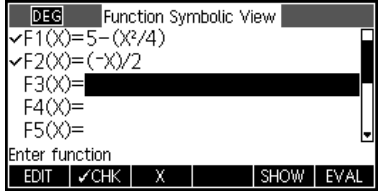
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. This view allows you to enter and manage up to ten function definitions in <math>x</math>. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen definition</li> <li>• <b>CHK</b>: toggles a function off or on for graphing and table-building</li> <li>• <b>X</b>: a typing aid</li> <li>• <b>SHOW</b>: displays the selected function in textbook format</li> <li>• <b>EVAL</b>: resolves references when one function is defined in terms of another</li> </ul>	<p><b>Function Symbolic View</b></p> 

Table 4 Function App Summary

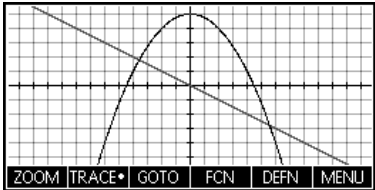
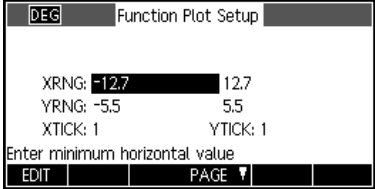
Summary of Functionality	View Name and Display
<p>Press Plot to enter the Plot view and work with graphs of functions. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>ZOOM</b>: enters the Zoom menu, with options to zoom in or out</li> <li>• <b>TRACE</b>: toggles tracing cursor off and on</li> <li>• <b>GOTO</b>: takes the tracing cursor to the point on the function with a given x-value</li> <li>• <b>FCN</b>: opens the Function menu, with options to find: <ul style="list-style-type: none"> <li>• Root</li> <li>• Intersection</li> <li>• Extremum</li> <li>• Slope</li> <li>• Signed area</li> </ul> </li> <li>• <b>DEFN</b>: displays the symbolic definition of the current function</li> <li>• <b>MENU</b>: toggles the menu off and on</li> </ul>	<p style="text-align: center;"><b>Function Plot View</b></p>  <p>The screenshot shows a coordinate plane with a grid. A downward-opening parabola is plotted, intersecting a straight line. A tracing cursor is positioned on the parabola. Below the grid is a menu bar with the following options: ZOOM, TRACE (with a small circle next to it), GOTO, FCN, DEFN, and MENU.</p>
<p>Press SHIFT followed by Plot to enter the Plot Setup. This view helps you manually set up the graphing window and the appearance of the graphs. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>XRNG</b>: the horizontal graphing range</li> <li>• <b>YRNG</b>: the vertical graphing range</li> <li>• <b>XTICK</b>: horizontal tick mark spacing</li> <li>• <b>YTICK</b>: vertical tick mark spacing</li> </ul> <p>The menu keys in this view are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>CHK</b>: toggles the current setting on or off</li> <li>• <b>PAGE</b> (with a small downward arrow): enters the second page of the view</li> </ul>	<p style="text-align: center;"><b>Function Plot Setup Page 1</b></p>  <p>The screenshot shows the 'Function Plot Setup' screen. At the top, it says 'DEG' and 'Function Plot Setup'. Below that, there are several fields: XRNG: -12.7 (with a cursor) 12.7; YRNG: -5.5 5.5; XTICK: 1 YTICK: 1. Below these fields is the text 'Enter minimum horizontal value'. At the bottom, there is a menu bar with 'EDIT', 'PAGE' (with a small downward arrow), and other options.</p>

Table 4 Function App Summary

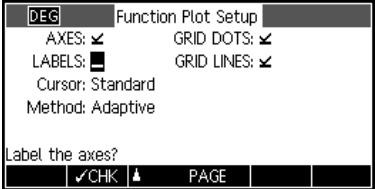
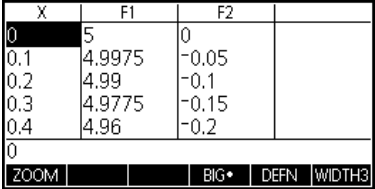
Summary of Functionality	View Name and Display
<p>Press <b>PAGE</b> to enter the second page of the Plot Setup. The fields in the view are:</p> <ul style="list-style-type: none"> <li>• <b>AXES</b>: toggles axes on and off</li> <li>• <b>LABELS</b>: toggles axis labels on and off</li> <li>• <b>GRID DOTS</b>: toggles grid dots on and off</li> <li>• <b>GRID LINES</b>: toggles grid lines on and off</li> <li>• <b>Cursor</b>: choose between Standard, Inverting, and Blinking cursor</li> <li>• <b>Method</b>: choose between Adaptive, Fixed-Step Segments, and Fixed-Step Dots</li> </ul> <p>The menu keys in this view are:</p> <ul style="list-style-type: none"> <li>• <b>CHK</b>: make a selection in a choose box</li> <li>• <b>CHK</b>: toggles the current setting on or off</li> <li>• <b>PAGE</b>: returns to the first page of the Function Plot View</li> </ul>	<p style="text-align: center;"><b>Function Plot Setup Page 2</b></p> 
<p>Press Num to enter the Numeric view of the Function App. This view is designed to create and explore a table of function values. Place the highlight bar in any row of the x-column and enter any real value - the table will reconfigure. The menu labels are:</p> <ul style="list-style-type: none"> <li>• <b>ZOOM</b>: zooms in or out on a row in the table</li> <li>• <b>BIG</b>: toggles between small and large fonts</li> <li>• <b>DEFN</b>: displays the definition of each column in the table</li> <li>• <b>WIDTHn</b>: toggles between displaying one, two, three, or four function columns</li> </ul>	<p style="text-align: center;"><b>Function Numeric View</b></p> 

Table 4 Function App Summary

Summary of Functionality	View Name and Display
<p>Press SHIFT followed by Num to enter the Numeric Setup. This view helps you manually control the appearance of the table. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>NUMSTART</b>: the first value of <math>x</math> shown in the table</li> <li>• <b>NUMSTEP</b>: the common difference between consecutive <math>x</math>-values</li> <li>• <b>NUMTYPE</b>: choose between table types: <ul style="list-style-type: none"> <li>• <b>Automatic</b>: provides <math>x</math>- and function-values</li> <li>• <b>Build Your Own</b>: you supply <math>x</math>-values; the App provides the corresponding function-values</li> </ul> </li> <li>• <b>NUMZOOM</b>: the zoom factor for zooming</li> </ul> <p>The menu keys in this view are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>PLOT→</b>: sets <b>NUMSTART</b> and <b>NUMSTEP</b> so that the table shows the same values as the tracing cursor in the Plot view</li> </ul>	<p style="text-align: center;"><b>Function Numeric Setup</b></p> <div style="border: 1px solid black; padding: 5px;"> <p><b>DEG</b> Function Num Setup</p> <p>NUMSTART: 0</p> <p>NUMSTEP: 0.1</p> <p>NUMTYPE: Automatic</p> <p>NUMZOOM: 4</p> <p>Enter table start value</p> <p>EDIT      PLOT→</p> </div>

## The Solve App

The Solve App lets you define up to ten equations, each using as many variables as you like. Although you can only solve one equation at a time, you can solve for any of its variables. If an equation has more than one possible solution for one of its variables, you can enter a seed value to retrieve the solution you want. If two or more of your equations share one or more variables, then the current or solved values of those variables are carried over as you move from one equation to the other. Table 5 summarizes the functionality of the Solve App. Press the App key, scroll down to select the Solve App, and press the START menu key to get started. Like the Function App, the Solve App starts in the Symbolic view.

Table 5 Solve App Summary

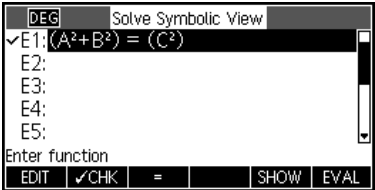
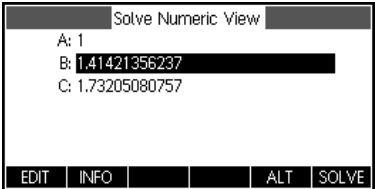
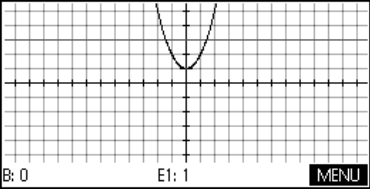
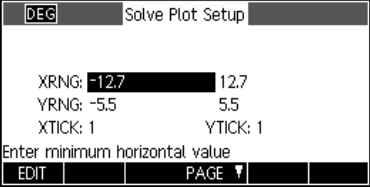
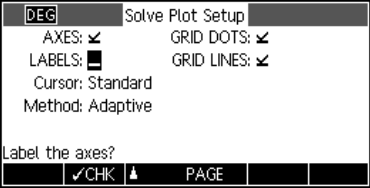
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. Use this view to enter and edit up to ten equations, each with as many variables as you like. The menu labels are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen definition</li> <li>• <b>CHK</b>: checks an equation to make it the current equation</li> <li>• <b>=</b>: a typing aid for entering equations</li> <li>• <b>SHOW</b>: typesets the highlighted equation in Textbook Format</li> <li>• <b>EVAL</b>: resolves references when one equation is defined in terms of another</li> </ul>	<p style="text-align: center;"><b>Solve Symbolic View</b></p> 
<p>Press Num to enter the Numeric view and enter values for variables whose values are known. Select and solve for a single unknown variable. You can enter a seed value for the unknown variable in case there are multiple solutions. The menu labels are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>INFO</b>: supplies information about the nature of the solution found</li> <li>• <b>DEFN</b>: displays the current equation</li> <li>• <b>ALT</b>: displays additional solutions</li> <li>• <b>SOLVE</b>: uses the current value of the highlighted variable to solve for that variable</li> </ul>	<p style="text-align: center;"><b>Solve Numeric View</b></p> 

Table 5 Solve App Summary

Summary of Functionality	View Name and Display
<p>Press Plot to enter the Plot view. In this view, the left side of the current equation and the right side of the current equation are plotted as two separate graphs. The variable that is highlighted in the Solve Numeric View is taken as the independent variable for graphing purposes. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>MENU</b>: this toggle reveals and hides the Plot menu, with options for zooming and tracing</li> <li>• <b>ZOOM</b>: enters the Zoom menu, with options to zoom in or out</li> <li>• <b>TRACE</b>: toggles tracing cursor off and on</li> <li>• <b>GOTO</b>: takes the tracing cursor to the point on the function with a given x-value</li> <li>• <b>DEFN</b>: displays the symbolic definition of each side of the equation. Press the up or down cursor keys to switch from one side to the other.</li> </ul>	<p style="text-align: center;"><b>Solve Plot View</b></p> 
<p>Press SHIFT followed by Plot to enter the Plot Setup. Page 1 of the Solve Plot Setup is the same as page 1 of the Function Plot Setup. The purpose of the page is to allow you to manually set up the graphing window and the appearance of the graphs.</p>	<p style="text-align: center;"><b>Solve Plot Setup Page 1</b></p> 
<p>Press <b>PAGE</b> to enter the second page of the Plot Setup. Page 2 of the Solve Plot Setup is the same as page 2 of the Function Plot Setup.</p>	<p style="text-align: center;"><b>Solve Plot Setup Page 2</b></p> 



## The Statistics 1-Var App

The Statistics 1-Var App is designed for the study of univariate statistics. This App provides tools for entering numeric data, calculating 1-variable summary statistics, and plotting 1-variable statistical graphs. This App can also provide summary statistics directly to the Inference App to calculate confidence intervals and test hypotheses. Table 6 summarizes the functionality of the Statistics 1-Var App. Press the Apps key, scroll down to select the Statistics 1-Var App, and press the START menu key to get started. The Statistics 1-Var App starts in the Numeric view.

Table 6 Statistics 1-Var App Summary

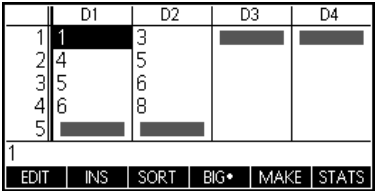
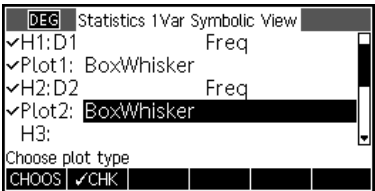
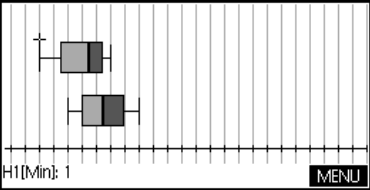
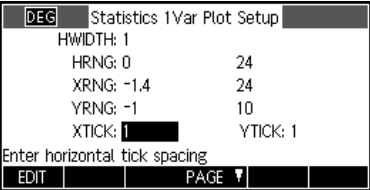
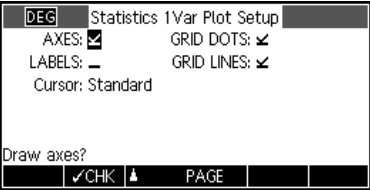
Summary of Functionality	View Name and Display
<p>Press Num to return to this view at any time. This view contains a table with up to ten columns of data, named D1 through D9 and D0. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>INS</b>: inserts a new row in the current column</li> <li>• <b>SORT</b>: sorts the current column in either ascending or descending order</li> <li>• <b>BIG</b>: toggles between large and small fonts</li> <li>• <b>MAKE</b>: generates a column of data based on an algebraic formula</li> <li>• <b>STATS</b>: provides summary statistics on the currently defined analyses (see Symbolic view)</li> </ul>	<p style="text-align: center;"><b>Statistics 1-Var Numeric View</b></p> 
<p>Press Symb to enter the Symbolic view. You can define up to 5 1-variable analyses (H1-H5), choosing for each analysis a data column and an optional frequency column. For the data column, you can enter either the name of a column (D0-D9) or a mathematical expression involving the name of a column (e.g. D1-9.8). There is also a Plot field for each analysis where you choose the graphical representation most fitting for your purposes. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>CHK</b>: toggles between making an analysis active or inactive for graphing and listing summary statistics</li> <li>• <b>D</b>: a typing aid for entering column names</li> <li>• <b>SHOW</b>: displays the fit equation using Textbook Format</li> </ul>	<p style="text-align: center;"><b>Statistics 1-Var Symbolic View</b></p> 

Table 6 Statistics 1-Var App Summary

Summary of Functionality	View Name and Display
<p>Press Plot to enter the Plot view. This view displays the selected 1-variable statistical plots for the active analyses (H1-H5). The menu is similar to the Function Plot view, with options for zooming and tracing.</p>	<p style="text-align: center;"><b>Statistics 1-Var Plot View</b></p> 
<p>Press SHIFT followed by Plot to enter the Statistics 1-Var Plot Setup. Page 1 of the Plot Setup contains settings that control the appearance of 1-variable statistical plots. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>HWIDTH</b>: the bin width for histograms</li> <li>• <b>HRNG</b>: the range for the data to plot</li> <li>• <b>XRNG</b>: the horizontal range of the graph window</li> <li>• <b>YRNG</b>: the vertical range of the graph window</li> <li>• <b>XTICK</b>: horizontal tick mark spacing</li> <li>• <b>YTICK</b>: vertical tick mark spacing</li> </ul>	<p style="text-align: center;"><b>Statistics 1-Var Plot Setup Page 1</b></p> 
<p>Press <b>PAGE</b> to enter the second page of the Statistics 1-Var Plot Setup. This view contains further settings to control the appearance of the graphing window and the plots. This view is nearly identical to page 2 of the Function and Sequence Plot Setup, except that there is no <b>Method</b> field.</p>	<p style="text-align: center;"><b>Statistics 1-Var Plot Setup Page 2</b></p> 

## The Statistics 2-Var App

The Statistics 2-Var App is designed for the study of bivariate statistics. This App provides tools for entering numerical data, calculating 2-variable summary statistics, and creating 2-variable statistical plots. This App can also provide summary statistics directly to the Inference App to calculate confidence intervals and test hypotheses. Table 7 summarizes the functionality of the applet. Press the Apps key, scroll down to select the Statistics 2-Var App, and press the START menu key to get started. The Statistics 2-Var App starts in the Numeric view.

Table 7 Statistics 2-Var App Summary

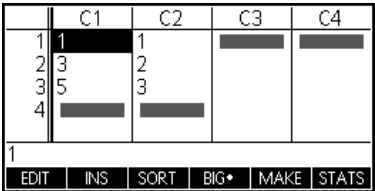
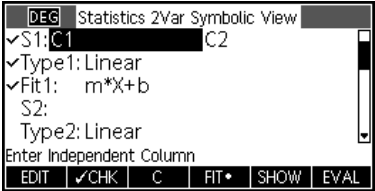

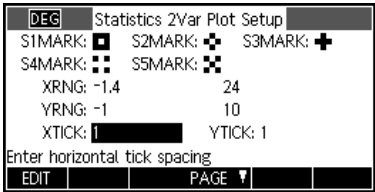
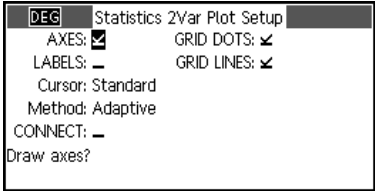
Summary of Functionality	View Name and Display
<p>Press Num to return to this view at any time. This view contains a table with up to ten columns of data, named C1 through C9 and C0. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>INS</b>: inserts a new row in the current column</li> <li>• <b>SORT</b>: sorts the current column in either ascending or descending order</li> <li>• <b>BIG</b>: toggles between large and small fonts</li> <li>• <b>MAKE</b>: generates a column of data based on an algebraic formula</li> <li>• <b>STATS</b>: provides summary statistics on the currently defined analyses (see Symbolic view)</li> </ul>	<p style="text-align: center;"><b>Statistics 2-Var Numeric View</b></p> 
<p>Press Symb to enter the Statistics 2-Var Symbolic view. You can define up to 5 2-variable analyses, named S1-S5. Each analysis has the following fields:</p> <ul style="list-style-type: none"> <li>• <b>S</b>: defines the independent and dependent columns (and optionally a frequency column)</li> <li>• <b>TYPE</b>: chooses a function type to fit to your data</li> <li>• <b>FIT</b>: the equation of your fit</li> </ul> <p>For the independent and dependent columns, you can enter mathematical expressions in terms of a column name (e.g. 2-C1).</p>	<p style="text-align: center;"><b>Statistics 2-Var Symbolic View</b></p> 

Table 7 Statistics 2-Var App Summary

Summary of Functionality	View Name and Display
<p>Press Plot to enter the Stats 2-Var Plot view. This view displays the selected 2-variable statistical plots for the active analyses. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>ZOOM</b>: zooms in or out on the graph(s)</li> <li>• <b>TRACE</b>: toggles tracing on and off</li> <li>• <b>GOTO</b>: jumps to a desired data point</li> <li>• <b>FIT</b>: toggles displaying a fit for each scatter plot</li> <li>• <b>DEFN</b>: shows the definition of the current graph being traced</li> <li>• <b>MENU</b>: reveals and hides the menu</li> </ul>	<p style="text-align: center;"><b>Statistics 2-Var Plot View</b></p> 
<p>Press SHIFT followed by Plot to enter page 1 of the Stats 2-Var Plot Setup. This view is similar to page 1 of the Stats 1-Var Plot Setup, except that you can choose different marks for each scatter plot.</p>	<p style="text-align: center;"><b>Statistics 2-Var Plot Setup Page 1</b></p> 
<p>Press <b>PAGE</b> (with a dropdown arrow) to enter page 2 of the Statistics 2-Var Plot Setup. This view is the same as Page 2 of the Function Plot setup.</p>	<p style="text-align: center;"><b>Statistics 2-Var Plot Setup Page 2</b></p> 

## The Inference App

The Inference App contains tools for Inferential Statistics, including creating confidence intervals and hypothesis testing. This App can import summary statistics from any column of the Statistics 1-Var or 2-Var Apps. Table 8 summarizes the Inference App functionality. One unique feature of this HP App is that the various confidence intervals and hypothesis tests contain default values that correspond to the online help sections in the App. Press the App key, scroll down to select the Inference App, and press the START menu key to get started. The Inference App starts in the Symbolic view.

Table 8 Inference App Summary

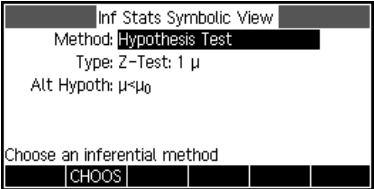
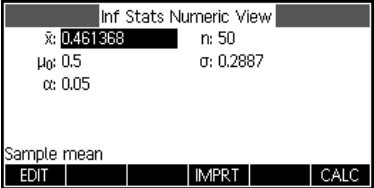
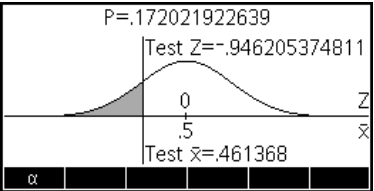
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. The Inference Symbolic view contains settings to define a confidence interval or hypothesis test. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>METHOD:</b> chooses between hypothesis test or confidence interval</li> <li>• <b>TYPE:</b> chooses from a variety of Z- and T-distributions</li> <li>• <b>ALT HYPOTH:</b> chooses one of three alternative hypotheses (hypothesis test only)</li> </ul>	<p style="text-align: center;"><b>Inference Symbolic View</b></p> 
<p>Press Num to enter the Inference Numeric view. This view contains fields for the sample statistics (e.g. sample mean <math>\bar{x}</math> and sample size <math>n</math>), the population parameters (e.g. null hypothesis mean, <math>\mu_0</math> and standard deviation, <math>\sigma</math>), and the significance level, <math>\alpha</math>. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT:</b> opens an input box to edit the chosen value</li> <li>• <b>IMPRT:</b> imports statistics (such as <math>\bar{x}</math>, <math>n</math>, etc.) from any column in the Statistics 1-Var or Statistics 2-Var apps (or any app based on these two)</li> <li>• <b>CALC:</b> computes the test results and displays them numerically in a table</li> </ul>	<p style="text-align: center;"><b>Inference Numeric View</b></p> 

Table 8 Inference App Summary

Summary of Functionality	View Name and Display																
<p>Press the CALC menu key to see the confidence interval or hypothesis test results. Press the OK menu key to return to the Numeric view.</p>	<p style="text-align: center;"><b>Inference Numeric View</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr><td>Result</td><td>1</td></tr> <tr><td>Test Z</td><td>-0.946205374811</td></tr> <tr><td>Test <math>\bar{x}</math></td><td>0.461368</td></tr> <tr><td>P</td><td>0.172021922639</td></tr> <tr><td>Crit. Z</td><td>-1.64485362695</td></tr> <tr><td>Crit. <math>\bar{x}</math></td><td>0.432843347747</td></tr> <tr><td colspan="2" style="text-align: center;">Fail to Reject <math>H_0</math> at <math>\alpha=0.05</math></td></tr> <tr><td colspan="2" style="text-align: right;">BIG OK</td></tr> </table>	Result	1	Test Z	-0.946205374811	Test $\bar{x}$	0.461368	P	0.172021922639	Crit. Z	-1.64485362695	Crit. $\bar{x}$	0.432843347747	Fail to Reject $H_0$ at $\alpha=0.05$		BIG OK	
Result	1																
Test Z	-0.946205374811																
Test $\bar{x}$	0.461368																
P	0.172021922639																
Crit. Z	-1.64485362695																
Crit. $\bar{x}$	0.432843347747																
Fail to Reject $H_0$ at $\alpha=0.05$																	
BIG OK																	
<p>Press Plot to enter the Inference Plot view. This view displays the test results or confidence interval graphically.</p> <p>Press the <math>\alpha</math> menu key to see the critical score against the test score. Use the left- and right-cursor keys to decrease and increase the alpha-level while the <math>\alpha</math> menu key is active.</p>	<p style="text-align: center;"><b>Inference Plot View</b></p>  <p style="text-align: center;">P=.172021922639 Test Z=-.946205374811 Test <math>\bar{x}</math>=.461368</p> <p style="text-align: center;"><math>\alpha</math></p>																

## The Parametric App

The Parametric App is quite similar in structure and functionality to the Function App. Table 9 lists the similarities and major differences between these two Apps. Press Apps, scroll down to select the Parametric App, and press the START menu key to get started. The Parametric App opens in the Symbolic view.

Table 9 Parametric App Summary

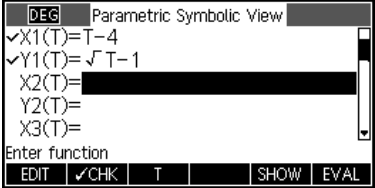
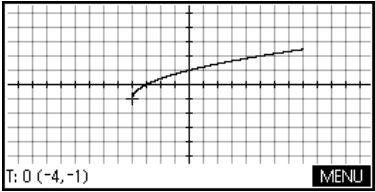
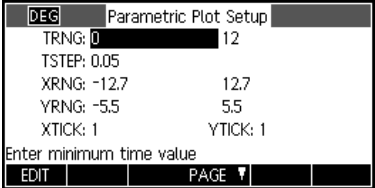
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. The Parametric Symbolic view contains definitions for up to ten parametric equations, each one defining <math>x(t)</math> and <math>y(t)</math> in terms of <math>t</math>. The menu items are the same as the Function Symbolic view, except here <math>T</math> replaces <math>X</math> as a typing aid.</p>	<p><b>Parametric Symbolic View</b></p> 
<p>Press Plot to enter the Parametric Plot view. This view displays the graphs of parametric equations defined in the Symbolic view. The functionality here is the same as in the Function Plot view, except that the FCN functions do not apply here.</p>	<p><b>Parametric Plot View</b></p> 
<p>Press SHIFT followed by Plot to enter the Parametric Plot Setup. This view is similar to the Function Plot Setup, except that it contains <b>TRNG</b> and <b>TSTEP</b> to control the <math>t</math>-values used to generate the <math>(x,y)</math> ordered pairs for graphing.</p>	<p><b>Parametric Plot Setup Page 1</b></p> 

Table 9 Parametric App Summary

Summary of Functionality	View Name and Display																																
<p>Press <b>PAGE</b> to enter page 2 of the Parametric Plot Setup, which is similar to page 2 of the Function and Sequence Plot setups.</p>	<p><b>Parametric Plot Setup Page 2</b></p> <div style="border: 1px solid black; padding: 5px;"> <p><b>DEG</b> Parametric Plot Setup</p> <p>AXES: <input checked="" type="checkbox"/>      GRID DOTS: <input checked="" type="checkbox"/></p> <p>LABELS: <input type="checkbox"/>      GRID LINES: <input checked="" type="checkbox"/></p> <p>Cursor: Standard</p> <p>Method: Fixed-Step Segments</p> <p>Draw axes?</p> <p><input checked="" type="checkbox"/>CHK <input type="checkbox"/>PAGE</p> </div>																																
<p>Press Num to enter the Parametric Numeric view. This view is the same as the Function Numeric view, with an additional t-column; here x and y are both columns dependent on t.</p>	<p><b>Parametric Numeric View</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>T</th> <th>X1</th> <th>Y1</th> <th></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>-4</td> <td>-1</td> <td></td> </tr> <tr> <td>0.1</td> <td>-3.9</td> <td>-6.838E-1</td> <td></td> </tr> <tr> <td>0.2</td> <td>-3.8</td> <td>-5.528E-1</td> <td></td> </tr> <tr> <td>0.3</td> <td>-3.7</td> <td>-4.523E-1</td> <td></td> </tr> <tr> <td>0.4</td> <td>-3.6</td> <td>-3.675E-1</td> <td></td> </tr> <tr> <td>0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZOOM</td> <td></td> <td>BIG•</td> <td>DEFN WIDTH3</td> </tr> </tbody> </table>	T	X1	Y1		0	-4	-1		0.1	-3.9	-6.838E-1		0.2	-3.8	-5.528E-1		0.3	-3.7	-4.523E-1		0.4	-3.6	-3.675E-1		0				ZOOM		BIG•	DEFN WIDTH3
T	X1	Y1																															
0	-4	-1																															
0.1	-3.9	-6.838E-1																															
0.2	-3.8	-5.528E-1																															
0.3	-3.7	-4.523E-1																															
0.4	-3.6	-3.675E-1																															
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ZOOM		BIG•	DEFN WIDTH3																														
<p>Press SHIFT followed by Num to enter the Parametric Numeric Setup, which is the same as the Function Numeric Setup.</p>	<p><b>Parametric Numeric Setup</b></p> <div style="border: 1px solid black; padding: 5px;"> <p><b>DEG</b> Parametric Num Setup</p> <p>NUMSTART: 0</p> <p>NUMSTEP: 0.1</p> <p>NUMTYPE: Automatic</p> <p>NUMZOOM: 4</p> <p>Enter table start value</p> <p>EDIT PLOT→</p> </div>																																



## The Polar App

The Polar App is similar in structure and functionality to the Function and Parametric Apps. Table 10 lists the similarities and major differences among these three Apps. Press Apps, scroll down to select the Polar App, and press the START menu key to get started. The Polar App starts in the Symbolic view.

Table 10 Polar App Summary

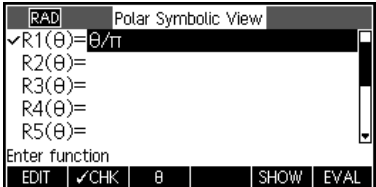
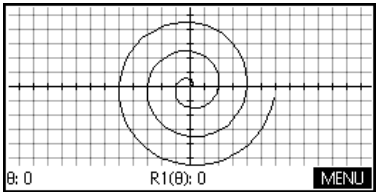
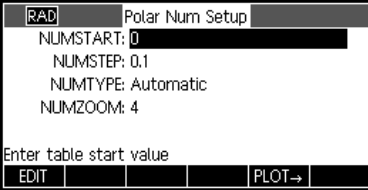
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. The Polar Symbolic view contains fields to define up to ten polar equations, each one defining R in terms of <math>\theta</math>.</p>	<p style="text-align: center;"><b>Polar Symbolic View</b></p> 
<p>Press Plot to enter the Polar Plot view. This view has the same functionality as the Parametric Plot view.</p>	<p style="text-align: center;"><b>Polar Plot View</b></p> 

Table 10 Polar App Summary

Summary of Functionality	View Name and Display																																
<p>Press SHIFT followed by Plot to enter the Polar Plot Setup. This view is the same as page 1 of the Parametric Plot Setup, except that Polar has <math>\theta</math> <b>RNG</b> and <math>\theta</math> <b>STEP</b> instead of <b>TRNG</b> and <b>TSTEP</b>.</p>	<p style="text-align: center;"><b>Polar Plot Setup Page 1</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>RAD</b></td> <td colspan="2">Polar Plot Setup</td> </tr> <tr> <td>BRNG: 0</td> <td style="text-align: right;">18.8496</td> <td></td> </tr> <tr> <td>BSTEP: 0.1308996939</td> <td></td> <td></td> </tr> <tr> <td>XRNG: -12.7</td> <td style="text-align: right;">12.7</td> <td></td> </tr> <tr> <td>YRNG: -5.5</td> <td style="text-align: right;">5.5</td> <td></td> </tr> <tr> <td>XTICK: 1</td> <td style="text-align: right;">YTICK: 1</td> <td></td> </tr> <tr> <td colspan="3">Enter step size</td> </tr> <tr> <td>EDIT</td> <td style="text-align: right;">PAGE</td> <td></td> </tr> </table>	<b>RAD</b>	Polar Plot Setup		BRNG: 0	18.8496		BSTEP: 0.1308996939			XRNG: -12.7	12.7		YRNG: -5.5	5.5		XTICK: 1	YTICK: 1		Enter step size			EDIT	PAGE									
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<p>Press <b>PAGE</b> to enter page 2 of the Plot Setup, which is identical to page 2 of the Parametric Plot Setup.</p>	<p style="text-align: center;"><b>Polar Plot Setup Page 2</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 15%;"><b>RAD</b></td> <td colspan="2">Polar Plot Setup</td> </tr> <tr> <td>AXES: <input checked="" type="checkbox"/></td> <td style="text-align: right;">GRID DOTS: <input checked="" type="checkbox"/></td> <td></td> </tr> <tr> <td>LABELS: <input type="checkbox"/></td> <td style="text-align: right;">GRID LINES: <input checked="" type="checkbox"/></td> <td></td> </tr> <tr> <td colspan="3">Cursor: Standard</td> </tr> <tr> <td colspan="3">Method: Adaptive</td> </tr> <tr> <td colspan="3">Draw axes?</td> </tr> <tr> <td><input checked="" type="checkbox"/>CHK</td> <td style="text-align: right;">PAGE</td> <td></td> </tr> </table>	<b>RAD</b>	Polar Plot Setup		AXES: <input checked="" type="checkbox"/>	GRID DOTS: <input checked="" type="checkbox"/>		LABELS: <input type="checkbox"/>	GRID LINES: <input checked="" type="checkbox"/>		Cursor: Standard			Method: Adaptive			Draw axes?			<input checked="" type="checkbox"/> CHK	PAGE												
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<p>Press Num to enter the Polar Numeric view. This view is similar to the Function Numeric view, with a <math>\theta</math>-column that is independent, followed by additional R-columns for each polar definition.</p>	<p style="text-align: center;"><b>Polar Numeric View</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 15%;">B</th> <th style="width: 15%;">R1</th> <th style="width: 15%;"></th> <th style="width: 15%;"></th> </tr> </thead> <tbody> <tr> <td>0</td> <td>0</td> <td></td> <td></td> </tr> <tr> <td>0.1</td> <td>3.1831E-2</td> <td></td> <td></td> </tr> <tr> <td>0.2</td> <td>6.3662E-2</td> <td></td> <td></td> </tr> <tr> <td>0.3</td> <td>9.5493E-2</td> <td></td> <td></td> </tr> <tr> <td>0.4</td> <td>1.2732E-1</td> <td></td> <td></td> </tr> <tr> <td>0</td> <td></td> <td></td> <td></td> </tr> <tr> <td>ZOOM</td> <td></td> <td>BIG•</td> <td>DEFN WIDTH3</td> </tr> </tbody> </table>	B	R1			0	0			0.1	3.1831E-2			0.2	6.3662E-2			0.3	9.5493E-2			0.4	1.2732E-1			0				ZOOM		BIG•	DEFN WIDTH3
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Table 10 Polar App Summary

Summary of Functionality	View Name and Display
<p>Press SHIFT followed by Num to enter the Polar Numeric Setup. This view has the same functionality as the Function and Parametric Numeric setups.</p>	<p style="text-align: center;"><b>Polar Numeric Setup</b></p>  <pre> RAD Polar Num Setup NUMSTART: 0 NUMSTEP: 0.1 NUMTYPE: Automatic NUMZOOM: 4 Enter table start value EDIT PLOT-&gt;                     </pre>

## The Sequence App

The Sequence App lets you define up to ten sequences, either recursively or in terms of  $n$ . You can view a staircase or cobweb plot of your sequences, and explore a table of sequence values. Table 11 summarizes the functionality in this App. Press Apps, scroll down to select the Sequence App, and press the START menu key to get started. Like the Function and Solve Apps, the Sequence App starts in the Symbolic view.

Table 11 Sequence App Summary

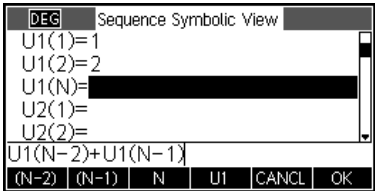
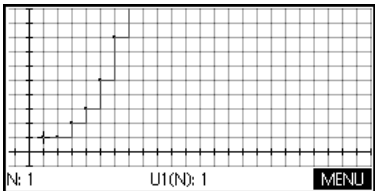
Summary of Functionality	View Name and Display
<p>Press Symb to return to this view at any time. Use this view to enter and manage up to ten sequence definitions in <math>n</math>. The first two terms of each sequence are entered numerically, and the <math>n^{\text{th}}</math> term is defined either recursively or in terms of <math>n</math>. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen definition</li> <li>• <b>CHK</b>: toggles the current item on or off</li> <li>• <b>(N-2), (N-1), N, U1</b>: typing aids</li> <li>• <b>CANCL</b>: cancels the current edit</li> <li>• <b>OK</b>: accepts the current edit</li> </ul>	<p style="text-align: center;"><b>Sequence Symbolic View</b></p> 
<p>Press Plot to enter the Plot view and work with sequence graphs. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>ZOOM</b>: enters the Zoom menu, with options to zoom in or out</li> <li>• <b>TRACE</b>: toggles the tracing cursor off and on</li> <li>• <b>GOTO</b>: takes the tracing cursor to the point on the sequence with a given value of <math>n</math>.</li> <li>• <b>DEFN</b>: displays the symbolic definition of the current sequence</li> <li>• <b>MENU</b>: toggles the menu off and on</li> </ul>	<p style="text-align: center;"><b>Sequence Plot View</b></p> 

Table 11 Sequence App Summary

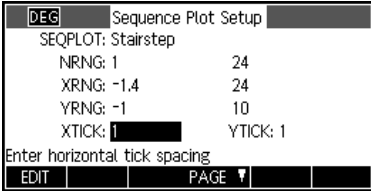
Summary of Functionality	View Name and Display
<p>Press SHIFT followed by Plot to enter the Plot Setup. Here you can manually set up the graphing window and the appearance of the sequence graphs. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>SEQPLOT</b>: chooses between Stairstep and Cobweb plots of each sequence</li> <li>• <b>NRNG</b>: the range of terms to plot for each sequence</li> <li>• <b>XRNG</b>: the horizontal graphing range</li> <li>• <b>YRNG</b>: the vertical graphing range</li> <li>• <b>XTICK</b>: horizontal tick mark spacing</li> <li>• <b>YTICK</b>: vertical tick mark spacing</li> </ul> <p>In addition, the menu items are:</p> <ul style="list-style-type: none"> <li>• <b>CHOOS</b>: opens the <b>SEQPLOT</b> choose box</li> <li>• <b>PAGE</b> ↓ : enters the second page of the view</li> </ul>	<p style="text-align: center;"><b>Sequence Plot Setup Page 1</b></p>  <pre> DEG Sequence Plot Setup SEQPLOT: Stairstep NRNG: 1          24 XRNG: -1.4      24 YRNG: -1        10 XTICK: 1        YTICK: 1 Enter horizontal tick spacing EDIT PAGE ↓     </pre>

Table 11 Sequence App Summary

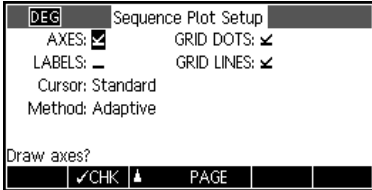
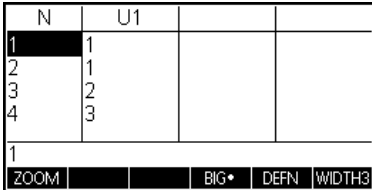
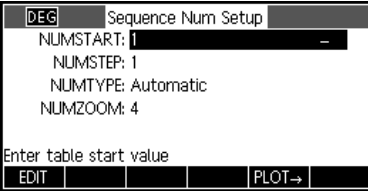
Summary of Functionality	View Name and Display
<p>Press <b>PAGE</b> to enter the 2<sup>nd</sup> page of the Plot Setup. This view has more options to define the appearance of graphs and the axes. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>AXES:</b> draws or omits axes</li> <li>• <b>LABELS:</b> shows or hides labels for the axes</li> <li>• <b>GRID DOTS:</b> toggles grid dots on or off</li> <li>• <b>GRID LINES:</b> toggles grid lines on or off</li> <li>• <b>Cursor:</b> chooses between Standard, Inverting, and Blinking cursor types</li> <li>• <b>Method:</b> chooses between Adaptive, Fixed-Step Segments, and Fixed-Step Dots plotting methods</li> </ul> <p>In addition, the menu labels are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT:</b> opens an input box to edit the chosen value</li> <li>• <b>CHK:</b> selects or deselects a toggle option</li> <li>• <b>PAGE</b>: returns to the first page</li> </ul>	<p><b>Sequence Plot Setup Page 2</b></p> 
<p>Press Num to enter the Numeric view. This view is the same as the Function Numeric View, except that it has an <math>n</math>-column first rather than an <math>x</math>-column. Furthermore, all <math>n</math>-values must be positive integers.</p>	<p><b>Sequence Numeric View</b></p> 

Table 11 Sequence App Summary

Summary of Functionality	View Name and Display
<p>Press SHIFT followed by Num to enter the Numeric Setup. This view is the same as the Function Numeric Setup, except <b>NUMSTEP</b> is fixed at 1 (any other value will be ignored).</p>	<p style="text-align: center;"><b>Sequence Numeric Setup</b></p> 





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## 4 HP Apps: Solvers and Explorers

### Solvers

The Solver Apps each have only a single view. These HP Apps include the Finance App, the Linear Solver, and the Triangle Solver. Each is designed to solve problems of a particular type. The Finance App solves TVM and amortization problems, the Linear Solver finds solutions to systems of linear equations, and the Triangle Solver finds angles and side lengths in problems involving triangles.

#### The Finance App

The Finance App solves time-value-of-money (TVM) and amortization problems. See Table 12. Press the Apps key, scroll to the Finance App, and press the START menu key to get started. The Finance App has two pages, one for TVM problems and the other for amortization. As you will see, the amortization page uses values from the TVM page.

Table 12 Finance App Summary

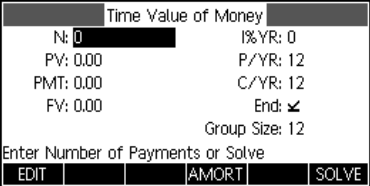
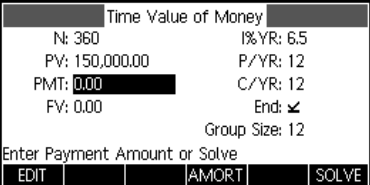
Summary of Functionality	View Name and Display
<p>The top page of the Finance App lets you enter and solve TVM problems. The fields are:</p> <ul style="list-style-type: none"> <li>• <b>N</b>: total number of periods or payments</li> <li>• <b>I%/YR</b>: the nominal annual interest rate</li> <li>• <b>PV</b>: present value at the start of the cash flow</li> <li>• <b>P/YR</b>: the number of payments made in a year</li> <li>• <b>PMT</b>: the payment due per period</li> <li>• <b>C/YR</b>: the number of compounding periods per year</li> <li>• <b>FV</b>: the value at the end of the cash flow</li> <li>• <b>END</b>: whether payment is made at the beginning or end of each period</li> <li>• <b>Group Size</b>: number of payments per group (for amortization schedule)</li> </ul> <p>The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>AMORT</b>: enters the app's amortization page</li> <li>• <b>SOLVE</b>: solves for the selected variable</li> </ul>	<p style="text-align: center;"><b>TVM View</b></p>  <p>The screenshot shows a 'Time Value of Money' interface with the following values: N: 0, I%YR: 0, PV: 0.00, P/YR: 12, PMT: 0.00, C/YR: 12, FV: 0.00, End: <input checked="" type="checkbox"/>, and Group Size: 12. At the bottom, it says 'Enter Number of Payments or Solve' and has buttons for EDIT, AMORT, and SOLVE.</p>
<p><b>Example 1</b></p> <p>You finance the purchase of a house with a 30-year loan at 6.5% annual interest. The cost of the house is \$180,000 and you make a down payment of \$30,000. How much are the required monthly payments? Assume payments start at the end of the first period. The figure to the right shows the setup.</p>	<p style="text-align: center;"><b>Example 1 Setup</b></p>  <p>The screenshot shows a 'Time Value of Money' interface with the following values: N: 360, I%YR: 6.5, PV: 150,000.00, P/YR: 12, PMT: 0.00, C/YR: 12, FV: 0.00, End: <input checked="" type="checkbox"/>, and Group Size: 12. At the bottom, it says 'Enter Payment Amount or Solve' and has buttons for EDIT, AMORT, and SOLVE.</p>

Table 12 Finance App Summary

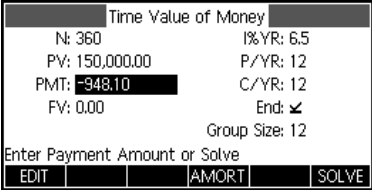
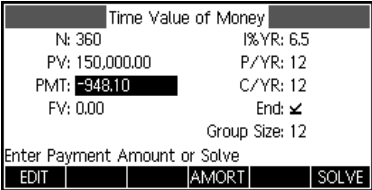
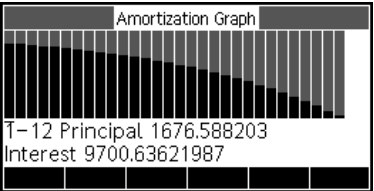
Summary of Functionality	View Name and Display																												
<p>Solution</p> <p>Highlight the <b>PMT</b> field and press the SOLVE menu key to view the results shown in the figure to the right. As shown, you will need to make monthly payments of \$948.10. Negative values indicate payments you make, while positive values indicate payments made to you.</p>	<p style="text-align: center;"><b>Example 1 Solution</b></p> 																												
<p>Example 2</p> <p>To continue the example, suppose you expect to sell the house after 10 years, repaying the balance of the loan with a balloon payment. What will be the amount of the balloon payment?</p>	<p style="text-align: center;"><b>Example 2 Setup</b></p> 																												
<p>Press the AMORT menu key to see the amortization schedule for the loan. The schedule is a table with columns for payment group, the principal paid during the group, the interest paid during the group, and the balance remaining at the end of the group. Use the cursor keys to scroll through the table. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>BIG</b>: toggles the font size</li> <li>• <b>TVM</b>: returns to the TVM view</li> </ul>	<p style="text-align: center;"><b>Amortization View</b></p> <table border="1"> <thead> <tr> <th>P</th> <th>Princ</th> <th>Inter</th> <th>Balan</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>-1.6766E3</td> <td>-9.7006E3</td> <td>1.48323E5</td> </tr> <tr> <td>2</td> <td>-3.4655E3</td> <td>-1.9289E4</td> <td>1.46535E5</td> </tr> <tr> <td>3</td> <td>-5.3741E3</td> <td>-2.8758E4</td> <td>1.44626E5</td> </tr> <tr> <td>4</td> <td>-7.4106E3</td> <td>-3.8098E4</td> <td>1.42589E5</td> </tr> <tr> <td colspan="4">1</td> </tr> <tr> <td colspan="3"></td> <td>BIG • TVM</td> </tr> </tbody> </table>	P	Princ	Inter	Balan	1	-1.6766E3	-9.7006E3	1.48323E5	2	-3.4655E3	-1.9289E4	1.46535E5	3	-5.3741E3	-2.8758E4	1.44626E5	4	-7.4106E3	-3.8098E4	1.42589E5	1							BIG • TVM
P	Princ	Inter	Balan																										
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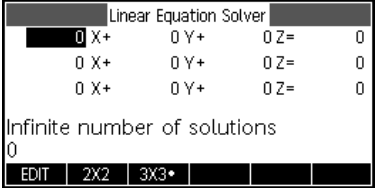
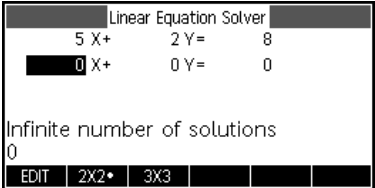
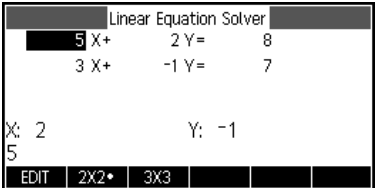
Table 12 Finance App Summary

Summary of Functionality	View Name and Display																												
<p><b>Solution</b></p> <p>To find the balloon payment due after 10 years of payments, scroll down the P column of the table to P=10. There you will see that you will have repaid \$22,835.53 in principal, as well as paying \$90,936.47 in interest. The fourth column in that row shows a balloon payment of \$127,164.19 due after 10 years.</p>	<p style="text-align: center;"><b>Example 3 Solution</b></p> <table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th>P</th> <th>Princ</th> <th>Inter</th> <th>Balan</th> </tr> </thead> <tbody> <tr> <td>7</td> <td>-1.4376E4</td> <td>-6.5265E4</td> <td>1.35624E5</td> </tr> <tr> <td>8</td> <td>-1.7015E4</td> <td>-7.4003E4</td> <td>1.32985E5</td> </tr> <tr> <td>9</td> <td>-1.9831E4</td> <td>-8.2564E4</td> <td>1.30169E5</td> </tr> <tr> <td>10</td> <td>-2.2836E4</td> <td>-9.0936E4</td> <td>1.27164E5</td> </tr> <tr> <td colspan="3">127164.189545</td> <td></td> </tr> <tr> <td colspan="3"></td> <td style="text-align: right;">BIG • TVM</td> </tr> </tbody> </table>	P	Princ	Inter	Balan	7	-1.4376E4	-6.5265E4	1.35624E5	8	-1.7015E4	-7.4003E4	1.32985E5	9	-1.9831E4	-8.2564E4	1.30169E5	10	-2.2836E4	-9.0936E4	1.27164E5	127164.189545							BIG • TVM
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8	-1.7015E4	-7.4003E4	1.32985E5																										
9	-1.9831E4	-8.2564E4	1.30169E5																										
10	-2.2836E4	-9.0936E4	1.27164E5																										
127164.189545																													
			BIG • TVM																										
<p>Press Plot to see a graphical representation of the amortization table. Use the left- and right-cursor keys to move between payment groups. For each group, the payment numbers are listed, as well as the principal paid (or invested) and the interest paid (or earned) during the payment group.</p>	<p style="text-align: center;"><b>Plot View</b></p>  <p style="text-align: center;">Amortization Graph</p> <p>T-12 Principal 1676.588203 Interest 9700.63621987</p>																												

### The Linear Solver App

The Linear Solver App solves 2x2 and 3x3 systems of linear equations within a single view. By default, the App opens ready to solve 3x3 systems. Note the square on the 3x3 menu key to indicate it is active. Press the 2x2 menu key to switch to solving 2x2 systems of linear equations. The solution statement at the bottom of the App changes in real time to reflect the current values of the parameters in each linear equation. Table 13 summarizes the functionality of this App. Press Apps, scroll to the Linear Solver App, and press the START menu key to get started.

Table 13 Linear Solver App Summary

Summary of Functionality	View Name and Display
<p>Use this view to enter values for the parameters of each linear equation and view the solution results below the equations. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>2x2</b>: solves a 2x2 system of 2 linear equations in 2 variables</li> <li>• <b>3x3</b>: solves a 3x3 system of 3 linear equations in 3 variables</li> </ul>	<p style="text-align: center;"><b>3X3 Linear Solver</b></p> 
<p><b>Example</b></p> <p>Find the solution of the linear system:</p> $5x + 2y = 8$ $3x - y = 7$	<p style="text-align: center;"><b>2X2 Linear Solver</b></p> 
<p><b>Solution</b></p> <p>Press the 2x2 menu key to activate the 2x2 input form and enter the parameters of both equations, as shown in the figure to the right. As you enter the values, the solution statement updates in real time. When you are done, the solution is shown as <math>x=2</math> and <math>y=-1</math>.</p>	<p style="text-align: center;"><b>Example Solution</b></p> 

## The Triangle Solver App

This App solves many kinds of geometric and trigonometric problems involving triangles. Press Apps, scroll to the Triangle Solver app, and press the START menu key to get started. The Triangle Solver opens in the Numeric view. Table 14 summarizes the functionality of this app.

Table 14- Triangle Solver HP App

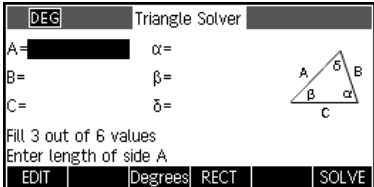
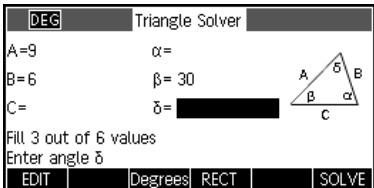
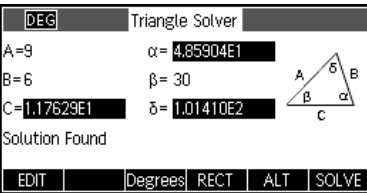
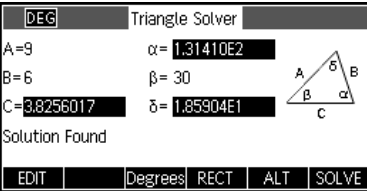
Summary of Functionality	View Name and Display
<p>Each triangle has 3 side lengths (A, B, and C) and three angles, each opposite one of the sides (<math>\alpha</math>, <math>\beta</math>, and <math>\delta</math> respectively). Enter any 3 values (one must be a length) and the Solver will find the other values. Note the Degrees/Radians menu key shows you how angles are currently measured. Press the Degrees/Radians menu key to change this setting. The menu items are:</p> <ul style="list-style-type: none"> <li>• <b>EDIT</b>: opens an input box to edit the chosen value</li> <li>• <b>Degrees/Radians</b>: toggles the angle measure mode between degrees and radians</li> <li>• <b>RECT</b>: toggles between general- and right-triangle forms for problem solving</li> <li>• <b>SOLVE</b>: solves for the remaining values</li> </ul>	<p style="text-align: center;"><b>Triangle Solver</b></p> 
<p><b>Example</b></p> <p>A triangle has consecutive sides of lengths 9 and 6. The angle opposite the second side measures <math>30^\circ</math>. Find the length of the third side.</p>	<p style="text-align: center;"><b>Example 1</b></p> 

Table 14- Triangle Solver HP App

Summary of Functionality	View Name and Display
<p>Solution</p> <p>Press the Degrees/Radians menu key, if needed, to change to Degrees angle measure. Enter <math>A=9</math>, <math>B=6</math>, and <math>\beta=30</math>, as shown in the figure to the right. Press the SOLVE menu key to see the results. The length of the third side is shown as <math>C=11.76\dots</math></p>	<p style="text-align: center;"><b>Solution 1</b></p> 
<p>Note, in this case, there is a second solution. Press the ALT menu key to see the second solution, <math>C=3.825\dots</math>. Press the ALT menu key to toggle back and forth between the two solutions.</p>	<p style="text-align: center;"><b>Solution 2</b></p> 

### Explorer Apps

Explorer Apps are designed to facilitate explorations of function families. These apps include the Linear, Quadratic, and Trigonometric Explorers. All three of these apps are very similar in structure, with a main Numeric view.

#### The Linear Explorer App

The Linear Explorer app is a micro-world designed to explore slopes and intercepts of linear functions of the form  $y=ax$  and  $y=ax+b$ . Press Apps, scroll to Linear Explorer, and press the START menu key to get started.

Table 15 Linear Explorer

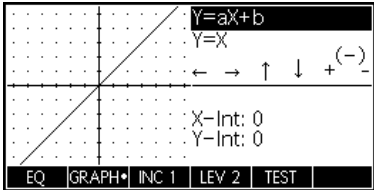
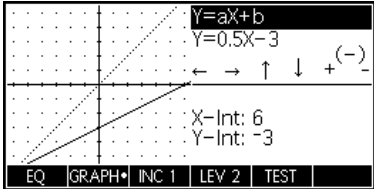
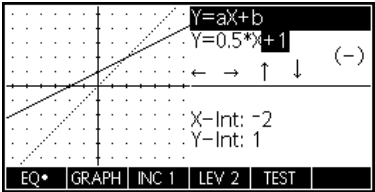
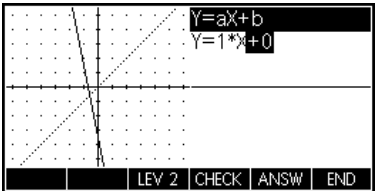
Summary of Functionality	View Name and Display
<p>The Linear Explorer opens in the Plot view with GRAPH mode active. The left half of the display shows the graph of a linear function. The right half shows the general form of the equation being explored at the top. Under that is the current equation of that form. The keys used to control the app appear below the equation, and the x- and y-intercepts appear at the bottom. Press SHIFT Backspace (Clear) and then the OK menu key to reset the app at any time. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>EQ</b>: when active, uses the cursor keys to switch between parameters in the equation and change their values</li> <li>• <b>GRAPH</b>: when active, uses the cursor keys to manipulate the graph</li> <li>• <b>INCn</b>: toggles the increment by which parameter values change</li> <li>• <b>LEVn</b>: toggles between <math>y=ax</math> and <math>y=ax+b</math> linear equations</li> <li>• <b>TEST</b>: enters the Test View of the app</li> </ul>	<p style="text-align: center;"><b>Plot View</b></p> 
<p>In GRAPH mode, you change the shape of the graph directly and observe the effect on the parameters of the equation. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the up- and down-cursor keys to translate the graph (changes the intercept)</li> <li>• Use the + and - keys to dilate the graph (changes the slope)</li> <li>• Use the (-) key to reflect the graph over the y-axis (changes the sign of the slope)</li> </ul> <p>If the LEV n menu key is set to LEV 1 (for <math>y=ax</math>), then the up- and down-cursor keys do not work and this is reflected in the set of active keys. Press the GRAPH menu key to return to this mode at any time.</p>	<p style="text-align: center;"><b>GRAPH Mode</b></p> 



Table 15 Linear Explorer

Summary of Functionality	View Name and Display
<p>Press the EQ menu key to enter EQ mode. In this mode, you change the parameters of the equation directly and observe the effect on the shape of the graph. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the left- and right-cursor keys to select a parameter</li> <li>• Use the up- and down-cursor keys to increase and decrease the parameter's value.</li> <li>• Use the (-) key to change the sign of the parameter <math>a</math></li> </ul> <p>Press the INCn menu key to toggle through different increment values. Press the EQ menu key to return to this mode at any time.</p>	<p style="text-align: center;"><b>EQ Mode</b></p> 
<p>Press the TEST menu key to enter the Test view of the app. In the Test view, you can test your skill at matching an equation to the graph shown. Test view is like EQ mode in that you use the cursor keys to select and change the value of each parameter in the equation to match the graph shown. When you are done, press the CHECK menu key to check if your answer is correct. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>LEVn</b>: chooses <math>y=ax</math> (LEV1) or <math>y=ax+b</math> (LEV2) for your test</li> <li>• <b>CHECK</b>: checks your current answer against the correct answer</li> <li>• <b>ANSW</b>: displays the correct answer</li> <li>• <b>END</b>: returns to the Plot view to explore</li> </ul>	<p style="text-align: center;"><b>Test View</b></p> 

## The Quadratic Explorer App

The Quadratic Explorer App is a micro-world designed to explore the relationships among the various representations of quadratic functions. Press Apps, scroll to Quadratic Explorer, and press the START menu key to get started.

Table 16 Quadratic Explorer App Summary

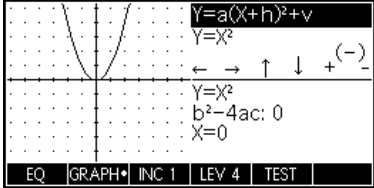
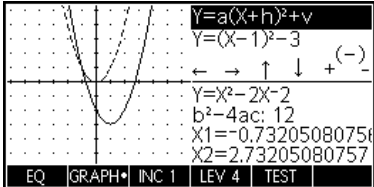
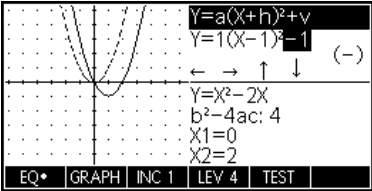
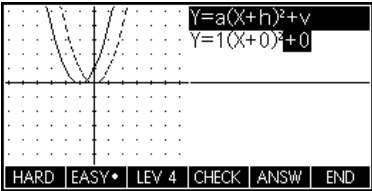
Summary of Functionality	View Name and Display
<p>Like the Linear Explorer, the Quadratic Explorer opens in the Plot view with GRAPH mode active. The left half of the display shows the graph of a quadratic function. The right half shows the general form of the equation being explored at the top. Under that is the current equation of that form. The keys used to control the app appear below the equation. Displayed at the bottom right are the equation in the form <math>y=ax^2+bx+c</math>, the value of the discriminant, and the root(s) of the quadratic. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>EQ</b>: when active, uses the cursor keys to switch between parameters in the equation and change their values</li> <li>• <b>GRAPH</b>: when active, uses the cursor keys to manipulate the graph</li> <li>• <b>INCn</b>: toggles the increment by which parameter values change</li> <li>• <b>LEVn</b>: toggles between various forms of quadratic functions</li> <li>• <b>TEST</b>: enters the Test View of the app</li> </ul> <p>Press SHIFT Backspace (Clear) and then the OK menu key to reset the app at any time.</p>	<p style="text-align: center;"><b>Plot View</b></p> 
<p>In GRAPH mode, you can translate and dilate the graph directly and see the resulting effects on the values of the equation parameters as you manipulate the graph. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the cursor keys to translate the graph</li> <li>• Use the + and - keys to dilate the graph</li> <li>• Use the (-) key to reflect the graph over the x-axis</li> </ul> <p>Press the GRAPH menu key to return to this mode at any time.</p>	<p style="text-align: center;"><b>GRAPH Mode</b></p> 

Table 16 Quadratic Explorer App Summary

Summary of Functionality	View Name and Display
<p>Press the EQ menu key to enter EQ mode. In this mode, you can change the parameters of the equation directly and observe the effect on the shape of the graph. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the left- and right-cursor keys to select a parameter</li> <li>• Use the up- and down-cursor keys to increase and decrease the selected parameter's value.</li> <li>• Use the (-) key to change the sign of the parameter a</li> </ul> <p>Press the INCn menu key to toggle through different increment values. Press the EQ menu key to return to this mode at any time.</p>	<p style="text-align: center;"><b>EQ Mode</b></p> 
<p>Press the TEST menu key to enter the Test view of the app. In the Test view, you can test your skill at matching an equation to the graph shown. Test view is like EQ mode in that you use the cursor keys to select and change the value of each parameter in the equation to match the graph shown. When you are done, press the CHECK menu key to check if your answer is correct. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>LEVn</b>: chooses one of four levels of difficulty</li> <li>• <b>CHECK</b>: checks your current answer against the correct answer</li> <li>• <b>ANSW</b>: displays the correct answer</li> <li>• <b>END</b>: returns to the Plot view to explore</li> </ul>	<p style="text-align: center;"><b>Test View</b></p> 

## The Trig Explorer App

Similar in concept to the Linear and Quadratic Explorers, the Trig Explorer App is a micro-world for exploring the relationship between the values of parameters in sine or cosine equations and the shapes of their graphs. The forms of the sinusoidal equations used are:

$$y = a \cdot \sin(bx + c) + d$$

$$y = a \cdot \cos(bx + c) + d$$

Press Apps, scroll to Trig Explorer, and press the START menu key to get started.

Table 17 Trig Explorer App Summary

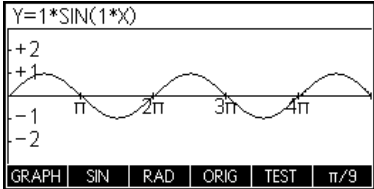
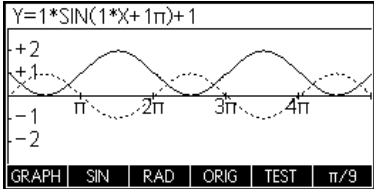
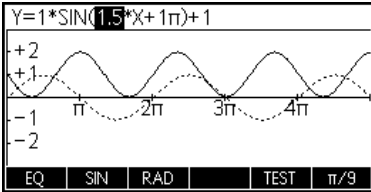
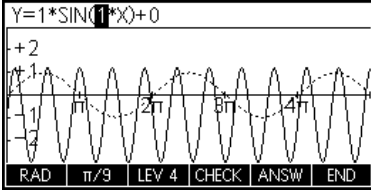
Summary of Functionality	View Name and Display
<p>Like the Linear and Quadratic Explorers, the Trig Explorer opens in the Plot view with GRAPH mode active. The equation of the current graph is shown at the top of the display, with the graph below it. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>GRAPH/EQ</b>: toggles between GRAPH and EQ modes</li> <li>• <b>SIN/COS</b>: toggles between exploring sine and cosine graphs</li> <li>• <b>RAD/DEG</b>: toggles between Radians and Degrees angle measure for <math>x</math></li> <li>• <b>ORIG/EXTR</b>: toggles between translating the graph (ORIG) and dilating it (EXTR) using the cursor keys</li> <li>• <math>\pi/n</math> (or <math>n^\circ</math>) toggles the increment by which parameter values change</li> <li>• <b>TEST</b>: enters the Test View of the app</li> </ul>	<p style="text-align: center;"><b>Plot View</b></p> 
<p>In GRAPH mode, you can translate and dilate the graph directly and see the resulting effects on the values of the equation parameters as you manipulate the graph. The behavior of the cursor keys depends on the setting of the ORIG/EXTR menu key. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the cursor keys to translate (ORIG) and dilate (EXTR) the graph, vertically or horizontally</li> <li>• Use the (-) key to reflect the graph over the <math>x</math>-axis</li> </ul> <p>The increment by which the parameters <math>a</math>, <math>b</math>, and <math>d</math> change is always 0.1; the increment for the parameter <math>c</math> depends on the setting of both the RAD/DEG menu key and the F6 menu key (either <math>\pi/n</math> or <math>n^\circ</math>). Press the GRAPH/EQ menu key toggle to return to this mode at any time.</p>	<p style="text-align: center;"><b>GRAPH Mode</b></p> 

Table 17 Trig Explorer App Summary

Summary of Functionality	View Name and Display
<p>Press the GRAPH/EQ menu key to toggle it to EQ mode. In this mode, you can change the parameters of the equation directly and observe the effect on the shape of the graph. The active keys are:</p> <ul style="list-style-type: none"> <li>• Use the left- and right-cursor keys to select a parameter</li> <li>• Use the up- and down-cursor keys to increase and decrease the selected parameter's value.</li> <li>• Use the (-) key to change the sign of the parameter <math>a</math></li> </ul> <p>The increments in EQ mode behave the same way as in GRAPH mode. Press the GRAPH/EQ menu key to toggle back to this mode at any time.</p>	<p style="text-align: center;"><b>EQ Mode</b></p> 
<p>Press the TEST menu key to enter the Test view of the app. In the Test view, you can test your skill at matching an equation to the graph shown. Test view is like EQ mode in that you use the cursor keys to select and change the value of each parameter in the equation to match the graph shown. When you are done, press the CHECK menu key to check if your answer is correct. The menu keys are:</p> <ul style="list-style-type: none"> <li>• <b>RAD/DEG</b>: chooses the angle measure for your test</li> <li>• <math>\pi/n</math> (or <math>n^\circ</math>): chooses the increment for your test</li> <li>• <b>LEVn</b>: chooses the level for your test</li> <li>• <b>CHECK</b>: checks your current answer against the correct answer</li> <li>• <b>ANSW</b>: displays the correct answer</li> <li>• <b>END</b>: returns to the Plot view to explore</li> </ul>	<p style="text-align: center;"><b>Test View</b></p> 

## Managing the Apps Library

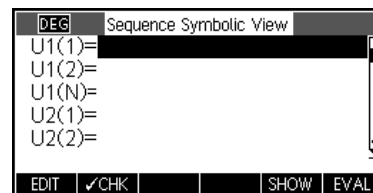
As shown in the previous App summaries, the HP 39gII comes with a set of 15 built-in HP Apps. These Apps are in Read-Only Memory (ROM) and cannot be deleted, so pressing the Apps key will always give you access to at least 15 Apps. However, you can add and

delete other Apps from your Library. The following sections show you how to manage your App Library.

## Saving and Sharing Apps

This section contains step-by-step instructions for creating, saving, and sharing an App called *Fibonacci* that is based on the Sequence App.

Press Apps, highlight the Sequence App, and press the RESET menu key to clear this App of data. Press the OK menu key to complete the reset and then press the START menu key.

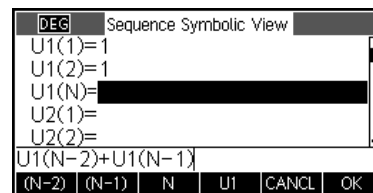


1. The Sequence App starts in the Symbolic view, with ten sequence definitions. The Fibonacci Sequence definition is:

- $U1(1)=1$
- $U1(2)=1$
- $U1(N)=U1(N-2)+U1(N-1)$

Enter this definition of U1 as shown in the figure to the right.

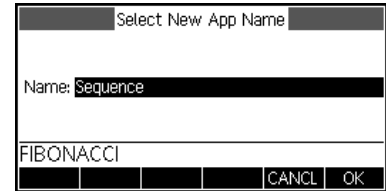
Tip: use the menu keys to enter (N-2), (N-1), etc.



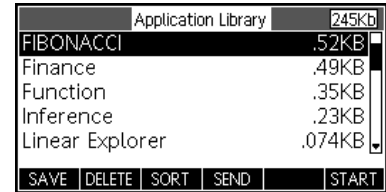
2. Press the Num key to see a table of values for the sequence. You can explore the sequences using the direction keys. With the highlight bar in the N column, you can also manually enter any counting number and the table will jump to that value.

N	U1		
1	1		
2	1		
3	2		
4	3		
1			
ZOOM		BIG•	DEFN WIDTH3

3. Now that the sequence has been defined and you have checked the results, it is time to save the App under a new name. Press the Apps key and then press the SAVE menu key. Enter a new name for the App. In the figure to the right, the name FIBONACCI is being entered. Press the OK menu key to accept your new name and the App will show up as a new App in the Library.



4. When you press the START menu key on the new FIBONACCI App, the definitions for the sequences appear. Press the Num key to start exploring the sequences numerically.



The advantage you get from saving an App is that now you can use the underlying App for some other problem and still come back to the saved App at any time. For example, you can save the Solve App with multiple Physics formulas as *Physics*, then use the Solve App to solve other equations. Your Physics App is still available - just as you left it. The Fibonacci App you have just created is a very simple example of a custom App based on one of the built-in HP Apps. In fact, these custom Apps can contain programs and notes as well. Please see the *HP 39gII Graphing Calculator User's Guide* for more details on customizing your Apps.

## Backing Up Your App Library

There are two ways to back up your App Library. The best way is to use the HP 39gII Connectivity Kit to copy your App Library to your PC periodically. In a pinch, you can also keep a second HP 39gII handy with a back-up of all your Apps.

## Deleting Custom Apps

At some point, if you have loaded too many Apps, the HP 39gII will run out of memory space. In this case, back up your App Library to your PC using the HP 39gII Connectivity Kit and delete one or more of the Apps on your HP 39gII. To delete an App, select it from the App Library and press the DELETE menu key. You will be prompted to confirm the deletion; press the OK menu key to confirm, or the CANCL menu key to cancel deletion.



## 5 The Math Menus

### The MATH Menu

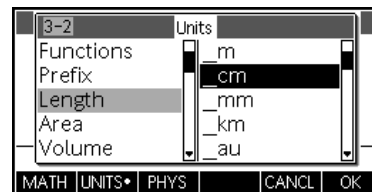
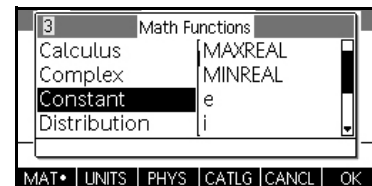
Press the Math key to see an extensive menu of advanced math commands in a two-column table. The first column contains a list of categories and the second column shows the commands in each category. Use the up- and down-cursor keys to scroll through the lists; use the left- and right-cursor keys to switch between the columns. Highlight the command you want and press the OK menu key to paste it into an edit line, or press the CANCL menu key to return to the edit line.

Press the CATLG menu key to see an alphabetical list of all functions, commands, and variables that the HP 39gII has to offer. Select an entry and press the OK menu key to paste it to the cursor location, or press the CANCEL menu key to close the catalog.

You can always type in any command letter-by-letter, and the HP 39gII will accept it.

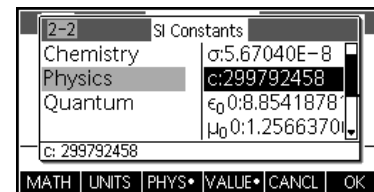
### Units

Units can be attached to numerical values, and calculations can be performed on numbers that have units, even differing units. For example, to enter 5 cm, type 5, then press Math to open the Math menu and press the UNITS menu key to open the Units menu. Scroll down the categories on the left to find Area, then scroll to the right and down to find **\_cm**. Press the OK menu key and the unit is attached to the number with an underscore: 5\_cm. You can now add 5\_cm + 2\_in to get 10.08\_cm.



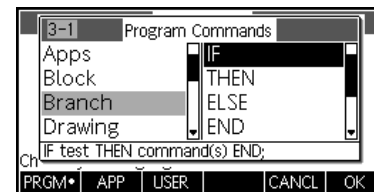
## The Physical Constants Menu

With the Math menu open, press the PHYS menu key to see a list of physical constants, arranged by subject. Choose a subject, then scroll to the constant you want. The name and value of each constant is shown as you scroll through them. Press the VALUE menu key to display just the value of each constant. Press the OK menu key to paste the constant into the edit line or CANCL to return to the edit line.



## The Program Commands Menu

Press the SHIFT of the Math key to see the two-column Program Commands Menu. The program commands are grouped by category; the categories appear in the left column and the commands under each category are found in the right column.



You can always type a command in letter-by-letter and the HP 39gII will accept it.

## 6 Catalogs and Editors

### Lists

Press SHIFT 7 (List) to see the List Catalog. There are ten lists available, named L1-L9 and L0. The menu keys here are:

- **EDIT**: opens an input box to edit the chosen list
- **DELETE**: deletes the contents of a list
- **SEND**: sends a list to another HP 39gII

Select one of the lists and press the EDIT menu key. You are now in the List Editor, where you can edit or create a list. The menu keys are:

- **EDIT**: opens an input box to edit the chosen cell
- **INS**: inserts a new row in a list with a value of zero
- **DELETE**: deletes the selected row
- **BIG**: toggles between a large and small font
- **WIDTHn**: toggles between display of one, two, three, or four lists at a time

Type in the first number in the list and press the Enter key. Continue until you have completed the list. When you have completed the list you can return to the List Catalog and send the list to another HP 39gII. You can also receive a list from another HP 39gII. In programs or the Home view, you can reference your list by name (L1, L2, etc.) to perform operations on your new list. Use the left- and right-cursor keys to scroll through all ten lists once you are in the List Editor. Use the WIDTHn menu key to see one, two, three, or four lists at a time.

Lists		
L1	0	OKB
L2	0	OKB
L3	0	OKB
L4	0	OKB
L5	0	OKB

L1	
1	

L1	
1	11
2	14
3	21
4	

## Matrices

Press SHIFT 4 (Matrix) to enter the Matrix Catalog. There are ten matrices available, named M1-M9 and M0. The menu keys in this catalog are:

- **EDIT**: opens the Matrix Editor to edit the selected matrix
- **DELETE**: deletes the contents of a matrix
- **VECT**: changes a matrix into a vector
- **SEND**: sends a matrix to another HP 39gII

Matrix	
M1 1*1	OKB
M2 1*1	OKB
M3 1*1	OKB
M4 1*1	OKB
M5 1*1	OKB
EDIT	DELETE
VECT	SEND

Press the EDIT menu key to start a new matrix or edit an existing one. You are now in the Matrix Editor. While editing a matrix, the menu keys are:

- **EDIT**: opens an input box to edit the chosen cell
- **INS**: inserts either a row above the current row or a column to the left of the current column
- **DELETE**: makes the current cell value zero
- **GO**: toggles between entering the matrix row by row or column by column
- **BIG**: toggles between the normal font and a larger one
- **WIDTHn**: toggles between displaying one, two, three, or four columns at a time

M1	1			
1	0			
0				
EDIT	INS	WIDTH4	BIG•	GO→

You do not have to define the dimensions of a matrix beforehand. Just start typing in values. You can enter values row by row, or column by column; the GO menu key toggles through the options.

M1	1	2		
1	3	0		
2	0	3		
INS	WIDTH4	BIG•	GO→	

As with lists, you can send them to another HP 39gII or receive them from another HP 39gII. In programs or the Home view, you can reference M1 to perform operations on your matrix.

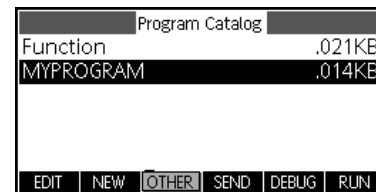
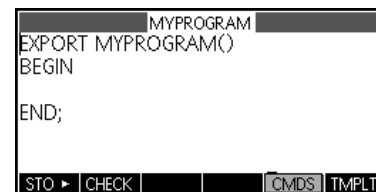
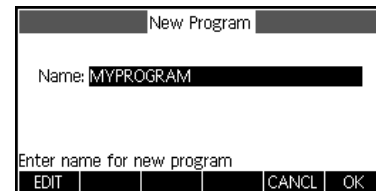
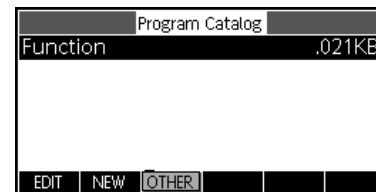
## Programs

Press SHIFT 1 (Prgm) to enter the Program Catalog and view the list of existing programs. For programs listed, you can edit, run, debug, or send programs to another HP 39gII. You can also rename or remove programs. If there are no programs listed in the catalog, press the NEW menu key to start. For existing programs, catalog menu keys include:

- **EDIT:** opens an input box to edit the chosen program
- **NEW:** starts a new program
- **OTHER:** (gray folder) opens a folder with the following options for existing programs:
  - **SAVE:** rename an existing program
  - **DELETE:** delete the selected program in the Program Catalog
  - **CLEAR:** delete all programs in the Program CatalogPress ON/C to exit and return to the Program Catalog
- **SEND:** sends a program to another HP 39gII
- **DEBUG:** debugs an existing program
- **RUN:** runs an existing program

You can type in your program letter-by-letter if you know the command names or use one of the menus. Press SHIFT Math (Cmds) to access the full set of programming commands. Press the CMDS menu key (gray folder) to access the common branch, loop, and test commands. Remember to press the On/C key to exit this CMDS folder and return to the Program Editor when you are done. Finally, press the TEMPLT menu key for quick access to commonly used commands like BEGIN...END, INPUT, and EXPORT.

Once you have finished your program, return to the Program Catalog by pressing SHIFT 1 (Program). Here you can see your new program listed in the catalog along with all the menu keys described above. Press the RUN menu key to run your program, or in the Home view enter your program name and press Enter to run your program.



## Notes

The HP 39gII has a notes catalog where you can build a library of notes. In addition, if you want to attach notes to an App, there is a similar editor for this purpose. Press Shift 0 (Notes) to enter the Notes Catalog. The menu items here are:

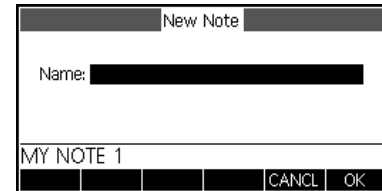
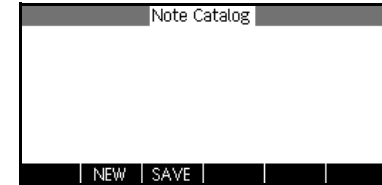
- **NEW**: creates a new note
- **SAVE**: saves the selected note

Additional keys appear for existing notes:

- **EDIT**: opens the Notes Editor to edit the selected note
- **SEND**: sends a note to another HP 39gII
- **DELETE**: deletes the selected note
- **SAVE**: renames the selected note

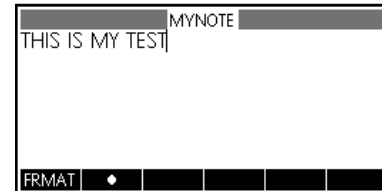
For creating a note attached to an APP, press SHIFT Apps (Info).

Press the NEW menu key and enter a name for your new note. Press the OK menu key to enter your name into the Name field and press it again to enter the Notes Editor.

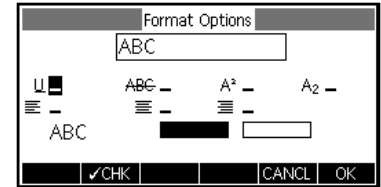


Once you are in the Notes Editor, the menu items are:

- **FRMAT**: formatting options for the selected text
- **BULLETS**: cycles through three levels of bullets

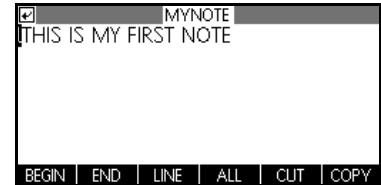


Press the FRMAT menu key to open the Formatting input form. Select the formatting options you want to use for your note. The text displayed in the box near the top of the menu reflects the current formatting options. Press the Check menu key to tick an option, or use the CHOOS menu key to select a font size, font color, or background color. Press the OK menu key to return to your note with the new formatting options in place, or press the CANCEL menu key to return to your note without changing the format.



If you wish to change the formatting of existing text, or if you want to copy existing text, press SHIFT Copy (right parenthesis) to view the Copy menu. The FRMAT menu key appears here as well so you can re-format existing text. Use the following menu keys to select text:

- **BEGIN**: starts text selection for formatting; press this toggle again to cancel text selection
- **END**: use with BEGIN; ends text selection for formatting
- **LINE**: selects text line-by-line (use the up and down arrow keys)
- **ALL**: selects the entire note
- **CUT**: cuts selected text
- **COPY**: copies selected text



Press ON/C to return to the Notes Editor. Press Shift Notes to return to the Notes Catalog.





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## 7 Product Regulatory & Environment Information

### **Federal Communications Commission Notice**

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio or television technician for help.

### **Modifications**

The FCC requires the user to be notified that any changes or modifications made to this device that are not expressly approved by Hewlett-Packard Company may void the user's authority to operate the equipment.

### **Cables**

Connections to this device must be made with shielded cables with metallic RFI/EMI connector hoods to maintain compliance with FCC rules and regulations. Applicable only for products with connectivity to PC/laptop.

### **Declaration of Conformity for products Marked with FCC Logo, United States Only**

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

If you have questions about the product that are not related to this declaration, write to:

Hewlett-Packard Company  
P.O. Box 692000, Mail Stop 530113  
Houston, TX 77269-2000

For questions regarding this FCC declaration, write to:

Hewlett-Packard Company  
P.O. Box 692000, Mail Stop 510101 Houston, TX 77269-2000 or call HP at 281-514-3333

To identify your product, refer to the part, series, or model number located on the product.

### **Canadian Notice**

This Class B digital apparatus meets all requirements of the Canadian Interference-Causing Equipment Regulations.

### **Avis Canadien**

Cet appareil numérique de la classe B respecte toutes les exigences du Règlement sur le matériel brouilleur du Canada.

### **European Union Regulatory Notice**

Products bearing the CE marking comply with the following EU Directives:

- Low Voltage Directive 2006/95/EC
- EMC Directive 2004/108/EC
- Ecodesign Directive 2009/125/EC, where applicable

CE compliance of this product is valid if powered with the correct CE-marked AC adapter provided by HP.

Compliance with these directives implies conformity to applicable harmonized European standards (European Norms) that are listed in the EU Declaration of Conformity issued by HP for this product or product family and available (in English only) either within the product documentation or at the following web site: **[www.hp.eu/certificates](http://www.hp.eu/certificates)** (type the product number in the search field).

The compliance is indicated by one of the following conformity markings placed on the product:



For non-telecommunications products and for EU harmonized telecommunications products, such as Bluetooth® within power class below 10mW.



For EU non-harmonized telecommunications products (if applicable, a 4-digit notified body number is inserted between CE and !).

Please refer to the regulatory label provided on the product.

The point of contact for regulatory matters is:

Hewlett-Packard GmbH, Dept./MS: HQ-TRE, Herrenberger Strasse 140, 71034 Boeblingen, GERMANY.

#### Japanese Notice

この装置は、クラスB情報技術装置です。この装置は、家庭環境で使用することを目的としていますが、この装置がラジオやテレビジョン受信機に近接して使用されると、受信障害を引き起こすことがあります。

取扱説明書に従って正しい取り扱いをして下さい。 VCCI-B

#### Korean Class Notice

B급 기기 (가정용 방송통신기기)	이 기기는 가정용(B급)으로 전자파적합등록을 한 기기로서 주로 가정에서 사용하는 것을 목적으로 하며, 모든 지역에서 사용할 수 있습니다.
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## Disposal of Waste Equipment by Users in Private Household in the European Union



This symbol on the product or on its packaging indicates that this product must not be disposed of with your other household waste. Instead, it is your responsibility to dispose of your waste equipment by handing it over to a designated collection point for the recycling of waste electrical and electronic equipment. The separate collection and recycling of your waste equipment at the time of disposal will help to conserve natural resources and ensure that it is recycled in a manner that protects human health and the environment. For more information about where you can drop off your waste equipment for recycling, please contact your local city office, your household waste disposal service or the shop where you purchased the product.

## Chemical Substances

HP is committed to providing our customers with information about the chemical substances in our products as needed to comply with legal requirements such as REACH (*Regulation EC No 1907/2006 of the European Parliament and the Council*). A chemical information report for this product can be found at:

<http://www.hp.com/go/reach>

Perchlorate Material - special handling may apply

This calculator's Memory Backup battery may contain perchlorate and may require special handling when recycled or disposed in California.

产品中有毒有害物质或元素的名称及含量

根据中国《电子信息产品污染控制管理办法》

部件名称	有毒有害物质或元素					
	铅 (Pb)	汞 (Hg)	镉 (Cd)	六价铬 (Cr(VI))	多溴联苯 (PBB)	多溴二苯醚 (PBDE)
PCA	X	0	0	0	0	0
外觀漆 /字體	0	0	0	0	0	0

0：表示该有毒有害物质在该部件所有均质材料中的含量均在SJ/T 11363-2006标准规定的限量要求以下。

X：表示该有毒有害物质至少在该部件的某一均质材料中的含量超出SJ/T 11363-2006标准规定的限量要求。

表中标有“X”的所有部件都符合欧盟RoHS法规

“欧洲议会和欧盟理事会2003年1月27日关于电子电器设备中限制使用某些有害物质的2002/95/EC号指令”

注：环保使用期限的参考标识取决于产品正常工作的温度和湿度等条件